Appendix C

ALTERNATIVE EVALUATION SUMMARY DOCUMENTATION

Alternative Screening Workshop for North Beach Basin

Feb. 11, 2010 and Feb. 17, 2010
King Street Center

Summary of Discussion

Attendance

King County		*Consultant*	*SPU*
Betsy Cooper	John Phillips	Ellen Blair	Sahba Mohandessi
Hien Dung	Kevin Schock	Karl Hadler	
Pam Erstad	Bob Swarner	Jeff Lykken	
Ron Kohler	Martha Tuttle	Kristine Maristela	
Kathy Mathena	Jim Weber	Brian Matson	
Sue Meyer	Mary Wohleb	Lloyd Skinner	
Lee Miller	Monica Van der	Bob Wheeler	
Shahrzad Namini	Vieren		
Chris Okuda	Karl Zimmer		
Ukwenga Oleru			
Sekhar Palepu			

Purpose of this Summary:
This document provides a summary of the workshop process and captures the discussion themes that supported recommendations for CSO control project alternatives to be forwarded for review by internal management and further development by the project team.

Workshop Process
Team members used a collaborative approach to screen alternative means for CSO control using a range of factors. The work was accomplished through a workshop on Feb. 11, 2010 and is part of the team evaluation process to identify three CSO control alternatives for further evaluation. Documenting the workshop process is a critical piece of the project.

Workshop Goals and Objectives:
1. Recommend three alternative means for CSO control for the North Beach Basin to present the public for input and to develop in more detail, with the remaining alternatives to be tabled at this time.
2. Where possible, recommend a set of alternative means that represents the range of complexity and constraints in the basin.
3. Discuss and document the reasons and rationale for recommendations.

<u>Materials Available for Workshop</u>
1. Final revised North Beach Basin Alternatives summary sheets (1 for each alternative)
2. Final revised table of selection factors ratings and descriptions of Low, Moderate, and High impact

3. Final revised Alternative Rating Sheets for North Beach Basin (summary & expanded to include description of ratings)
4. Summary of major changes to Barton, Murray, and South Magnolia Basin Alternatives and overall evaluation criteria
5. Inventory of Available Property and Property Profiles
6. Preliminary planning level cost information for comparison purposes for North Beach Basin

Workshop Approach/Agenda

1. Overview & Summary of North Beach Alternatives (Karl Hadler, Carollo Engineers)

- Presentation
- Clarifying questions

2. Initial "Straw Poll" by King County Staff

- A "Straw Poll" was conducted to generate discussion and help inform the team's recommendations. An enlarged chart of the screening factors and draft ratings for all alternatives for the North Beach basin was posted on the wall. King County staff used dot stickers to indicate the alternatives they thought should be recommended for further evaluation and those they thought should not be recommended. Most importantly, staff also wrote their thoughts on the wall charts as to why certain alternatives should or should not be recommended as well as any questions they might have.

3. Initial North Beach Alternatives Narrowing - Discussion (facilitated by Bob Wheeler, Triangle Associates)

- Identify alternatives that clearly do not merit further consideration at this time
- Identify alternatives that clearly merit further consideration at this time
- Discussion of remaining alternatives to reduce the recommended number to three
- Discussion of basis for recommendations on all alternatives

3. Presentation of Preliminary Planning Level Cost Information for Comparison Purposes ()

- Methodology for determining costs
- Review of methodology for creating comparative cost ratings
- Discussion of whether cost information changes any of the three alternatives currently identified for further evaluation

4. Team Agreement on 3 Alternative means for CSO control for Further Development (facilitated by Bob Wheeler, Triangle Associates)

- Survey of team for confidence in recommended alternatives
- Final thoughts on recommendations

Workshop Outcome

King County staff recommended the following alternative means for CSO control to be considered for further development:

- Rectangular Storage, Bottom of Basin (Alternative 1A)
- Pipe Storage in Right of Way, Bottom of Basin (Alternative 1B)
- Conveyance to 8th Ave Interceptor, Storage in Upper Basin (Alternative 1C)

Additionally, King County staff recommended investigation of the infiltration and inflow (I/I) reduction approaches included in Alternative 5A) as an adaptive management strategy for the future.

The engineering basin lead, Karl Hadler, for the North Beach Basin supported these choices.

February 17, 2010 - *Follow up Meeting*

Meeting Approach/Agenda
Several good comments on Alternative 1C (Centralized Storage Up in Basin with Conveyance to 8th Avenue Interceptor) that were made at the February 11 workshop led to the development of a variation of this alternative – Alternative 1D, Centralized Storage at the Bottom of the Basin with Conveyance to 8th Avenue Interceptor. This configuration requires a smaller pump station. It also simplifies control in the event of a peak flow event. It would cost less due to the smaller pump station and smaller force mains.

Alternative 1D was presented at the February 17 project team meeting.

Meeting Outcome
King County staff agreed that Alternative 1D should be recommended for further development in place of Alternative 1C.

Summary of Workshop Process Discussion for North Beach Basin

Considerations for all CSO Project Basins

- All new force mains must have twin force mains instead of single.

Considerations for North Beach Basin

- The project team will not consider whether an alternative would eliminate the need to upgrade existing facilities while screening the CSO control alternatives. The project team may note that certain alternatives would eliminate the need to upgrade existing facilities and that information will be provided to WTD management. Alternative 1C, 2A, and 2B would eliminate the need to upgrade existing facilities.
- Building Alternative 1A or Alternative 1B would not preclude the County from building a project to pump and convey flows directly to the 8th Ave Interceptor in the future.
- It will be important to determine how the storage facilities would be cleaned.
- Remnants of older wastewater facilities may be discovered underground at Blue Ridge Park during construction. These may need to be removed.

Considerations for North Beach Basin CSO Control Alternatives

Alternative 1A: Rectangular Storage, Bottom of Basin (Recommended for further development)

Design Engineering
No discussion. Comments related to design engineering were captured in the evaluation document for the North Beach basin CSO control alternatives.

Cost
No discussion. Comments related to cost were captured in the evaluation document.

Land Use/Permitting
No discussion. Comments related to land use/permitting were captured in the evaluation document.

Environmental
No discussion. Comments related to environmental issues were captured in the evaluation document.

Community Impact
- Construction would be required in or near Blue Ridge Park.
- Construction would be required on private property.

O&M
No discussion. Comments related to O&M were captured in the evaluation document.

Alternative 1B: Pipe Storage in Right of Way, Bottom of Basin (Recommended for further development)

Design Engineering
- This is large diameter pipe in a narrow Right of Way.

Cost
No discussion. Comments related to cost were captured in the evaluation document.

Land Use/Permitting
No discussion. Comments related to land use/permitting were captured in the evaluation document.

Environmental
No discussion. Comments related to environmental issues were captured in the evaluation document.

Community Impact
- Construction would impact traffic on NW Blue Ridge Dr. and access to about a dozen homes.

O&M
No discussion. Comments related to O&M were captured in the evaluation document.

Alternative 1C: Conveyance to 8th Ave Interceptor, Storage in Upper Basin (Recommended for further development as variation Alternative 1D)

Design Engineering

- There is a regulatory limit on the volume of flow pumped based on the average wet weather flow.
- There are two gravity lines that connect directly to the North Beach force main. The flow in those lines would have to be re-routed.

Cost

- The cost of operating a high head pump station like this would be very high compared to most pump stations.

Land Use/Permitting

No discussion. Comments related to land use/permitting were captured in the evaluation document.

Environmental

No discussion. Comments related to environmental issues were captured in the evaluation document.

Community Impact

- Construction would be required in or near Blue Ridge Park. Construction would be required on private property.
- Construction would impact traffic along the conveyance line alignment.
- Construction would occur and a permanent facility would be built in the upper basin.
- The new pump station would be a little higher above ground than the existing pump station in Blue Ridge Park.

O&M

- Two-stage pumping is challenging to operate and consumes a lot of energy.
- It would be an advantage to take flow away from Carkeek facilities.

Alternative 2A: Conveyance along Beach Alignment to Carkeek CSO Treatment Plan (Not recommended for further development)

Design Engineering

- There may not be sufficient space to site an additional treatment facility within the existing footprint at Carkeek. It may be necessary to replace the whole Carkeek treatment facility with a higher capacity treatment facility.

Cost
No discussion. Comments related to cost were captured in the evaluation document.

Land Use/Permitting
- If this alternative requires the replacement of the entire Carkeek treatment facility, the Carkeek treatment facility would be out of service for 24 – 30 months during construction. The project team would need to consult with the Department of Ecology about the feasibility of doing this.

Environmental
- Force main alignment requires construction on the beach and it crosses creek.

Community Impact
No discussion. Comments related to community impacts were captured in the evaluation document.

O&M
No discussion. Comments related to O&M were captured in the evaluation document.

Alternative 2B: Conveyance with Neighborhood Alignment to Carkeek CSO Treatment Plant
(Not recommended for further development)

Design Engineering
- There may not be sufficient space to site an additional treatment facility within the existing footprint at Carkeek. It may be necessary to replace the whole Carkeek treatment facility with a higher capacity treatment facility.
- Topography would make siting the conveyance pipeline challenging.

Cost
No discussion. Comments related to cost were captured in the evaluation document.

Land Use/Permitting
- If this alternative requires the replacement of the entire Carkeek treatment facility, the Carkeek treatment facility would be out of service for 24 – 30 months during construction. The project team would need to consult with the Department of Ecology about the feasibility of doing this.

Environmental
No discussion. Environmental comments were captured in evaluation document.

Community Impact
- Requires construction of over 1000 feet of force main through residential neighborhood.

O&M
No discussion. Comments related to O&M were captured in the evaluation document.

Alternative 3A: Bottom of Basin Treatment Facility (Not recommended for further development)

Design Engineering

- There is a cross-connection between the sewer system and a stormwater outfall in one of the subbasins. The design of this alternative needs to account for closing the stormwater outfall so it does not receive overflows from the sewer system.

Cost

No discussion. Comments related to cost were captured in the evaluation document.

Land Use/Permitting

- Treatment facility in shoreline is currently prohibited by code.

Environmental

No discussion. Comments related to environmental issues were captured in the evaluation document.

Community Impact

- Community members may object to treatment facility in residential neighborhood.
- The treatment facility is larger than the storage tank proposed in Alternative 1A for the same location. Since a storage tank is more attractive for other reasons, there does not appear to be a good reason to pursue the treatment facility.

O&M

- O&M more complicated and time-consuming for staff than storage.

Alternative 3B: Upper Basin Treatment Facility (Not recommended for further development)

Design Engineering

No discussion. Comments related to design engineering were captured in the evaluation document.

Cost

- High cost compared to other North Beach CSO control alternatives.

Land Use/Permitting

No discussion. Comments related to land use/permitting were captured in the evaluation document.

Environmental

No discussion. Comments related to environmental issues were captured in the evaluation document.

Community Impact

- Location near a school may result in community opposition, which could delay the project schedule.

O&M

- O&M more complicated and time-consuming for staff than storage.

Alternative 5A – Infiltration and Inflow (I/I) Control (Not recommended for further development)

Design Engineering

- Further investigation will be needed to determine if it would be required to build a stormwater collection system in subbasin NB03.
- Further investigation will be needed to determine where improper stormwater connections are located.
- Further investigation is needed to determine if the stormwater collection system in subbasin NB02 has sufficient capacity to take flow discussed for this alternative.
- The topography of subbasin NB03 would make it challenging to construct a stormwater collection system.
- I/I reduction removes flow and therefore reduces stress on the entire wastewater system.
- Participation by property owners would have to be sufficient to meet the CSO control requirement.

Cost

- Low cost compared to other North Beach CSO control alternatives if no stormwater collection system is required in subbasin NB03. Cost would be the high end of what was estimated for this alternative if a stormwater collection system is required in subbasin NB03.
- Cost estimates assume no cost-sharing with the City of Seattle.

Land Use/Permitting

No discussion. Comments related to land use/permitting were captured in the evaluation document.

Environmental

No discussion. Comments related to environmental issues were captured in the evaluation document.

Community Impact

- A landslide was recently repaired near subbasin NB03. Community members may prefer not to remove stormwater from the sewer system.
- Ratepayers may expect King County to minimize capital outlay. This alternative would focus instead on fixing existing infrastructure. Ratepayers might find that attractive.

- Infiltration reduction would require construction on many private properties.
- I/I reduction can lead to localized flooding and drainage problems.
- Project schedule could be considerably delayed because of need to coordinate with City of Seattle and work required on hundreds of private properties.

O&M

No discussion. Comments related to O&M were captured in the evaluation document.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 1A: RECTANGULAR BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1B: PIPELINE BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1C: CENTRALIZED STORAGE UP IN BASIN WITH CONVEYANCE TO 8TH AVENUE INTERCEPTOR	
	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. 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.	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. Because of the small size of the facilities, the alterantive may be consistent with the 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. 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.
2. Seattle Municipal Code (SMC/Zoning Code)	2	Located on or adjacent to existing pump station. Zoning is Single Family Residential. Utility Service Use is permitted as a City Council conditional use.	2	Located on or adjacent to existing pump station. Zoning is Single Family Residential. Utility Service Use is permitted as a City Council conditional use.	3	**Bottom of Basin Site:** Zoning is Single Family Residential. **Holman Road Site:** Zoning is Commercial. Utility Service Uses are permitted in C1-40 zones.
3. Shoreline Master Program Compatibility	2	Storage 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 (pump stations will likely be considered a water-related use) are preferred next in line to water-dependent uses within the Shoreline District. It may be possible to locate the storage facility outside the Shoreline District (i.e., more than 200 feet from the Puget Sound shoreline).	3	Storage is most likely outside of the shoreline zone.	2	The pump station may be within the shoreline district. Utilities would be buried underground which would only temporarily disrupt public access. Storage tank would not be within the shoreline.
4. Permitting Complexity	2	This alternative may require a Shoreline Permit. Affected roadways in residential area with regional transportation (railway) adjacent to site. Will require careful traffic planning to maintain access. Work hours likely to be restricted.	3	This alternative likely does not require a Shoreline Permit. Affected roadways in residential area with regional transportation (railway) adjacent to site. Will require careful traffic planning to maintain access. Work hours likely to be restricted.	2	This alternative may require a Shoreline Permit. Affected roadways in residential area with regional transportation (railway) adjacent to site. Will require careful traffic planning to maintain access. Work hours likely to be restricted.
5. Property Acquisition Complexity	2	Single family residential acquisition required. Concerns regarding acquisition from homeowners association. Approximately 1/2 Ac.	3	Assumes street use of 250 lineal feet for pipeline storage.	2	**Bottom of Basin Site:** Single family residential. Possible concerns regarding acquisition from homeowners association. Approximately 1/4 Ac. **Holman Road Site:** Assume purchase from City of Seattle Parks **not** required. If purchase from City of Seattle Parks Dept. required would change to 1. Approximately 1/2 Ac. **Pipeline:** Extensive street right of way required.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 1A: RECTANGULAR BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1B: PIPELINE BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1C: CENTRALIZED STORAGE UP IN BASIN WITH CONVEYANCE TO 8TH AVENUE INTERCEPTOR	
	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION
ENVIRONMENT						
1. Cultural Resources	3	No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources.	3	No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources.	3	No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources.
2. Fish and Wildlife	3	Construction and operation of this alternative would not adversely affect fish and wildlife, or their habitat.	3	Construction and operation of this alternative would not adversely affect fish and wildlife, or their habitat.	3	Construction and operation of this alternative would not affect fish and wildlife, or their habitat.
3. Wetlands, Streams and Shoreline	3	GIS maps show a piped stream crossing through the project area. This rating assumes that construction would not impact the stream or any wetlands or shoreline area.	3	GIS maps show a piped stream crossing through the project area. This rating assumes that construction would not impact the stream or any wetlands or shoreline area.	3	**Bottom of Basin Site:** GIS maps show a piped stream crossing through this project area. This rating assumes that construction would not impact the stream or any wetlands or shoreline area. **Holman Road Site:** No wetlands, streams or shoreline in this project area.
4. Soils and Sediments	3	No known contaminated sites. Project area is not within liquifaction zone. No steep slopes and/or known landslide areas. Potential landslide areas are located within project area, but it is assumed that construction of this alternative would not increase the likelihood of landslides.	3	No known contaminated sites. Project area is not within liquifaction zone. No steep slopes and/or known landslide areas. Potential landslide areas are located within project area, but it is assumed that construction of this alternative would not increase the likelihood of landslides.	2	No known contaminated sites in the vicinity of the Blue Ridge Park Site. There are known contaminated sites and potential to encounter contaminated soils in the vicinity of the storage basin site and pipeline alignment near Holman Road. Project area is not within liquifaction zone. No steep slopes and/or known landslide areas. Potential landslide areas are located within project area, but it is assumed that construction of this alternative would not increase the likelihood of landslides.
5. Water Quality	3	No new untreated discharges to surface waters.	3	No new untreated discharges to surface waters.	3	No 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	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.	2	Two sites. More complex approach including pump station sized for baseline and peaking. Gravity overflow at new control structure pumped to 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.
2. Compatibility with Existing WW system	3	Stand alone alternative. Diversion structure to tank built in collection system upstream of existing CSO control. Does not affect downstream capacity in county system.	3	Stand alone alternative. Diversion structure to tank built in collection system upstream of existing CSO control. Does not affect downstream capacity in county system.	3	Stand alone alternative. Diversion structure to pump station built in collection system upstream of existing CSO control. Re-directs flow now going to Carkeek Pump Station. Potential impact at 3rd Street NW CSO and other downstream facilities needs to be evaluated.
3. Flexibility/Adaptive Management	2	Storage tank not easily modified for enlargement.	2	Storage tank not easily modified for enlargement.	1	Storage tank and pump station not easily modified for enlargement.
4. Constructability/ Implementation Schedule	2	Risks associated with shoring, groundwater and limited space. Very limited staging and access area due to residential area. Alternative can likely meet the construction schedule.	2	Risks associated with shoring, groundwater and limited space. Very limited staging and access area due to residential area. Alternative can likely meet the construction schedule.	2	Risks associated with shoring, groundwater and limited space for pump station. Limited staging and access area due to residential area. Storage site provides more flexibility but still provides challenges. Alternative can likely meet the construction schedule.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 1A: RECTANGULAR BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1B: PIPELINE BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1C: CENTRALIZED STORAGE UP IN BASIN WITH CONVEYANCE TO 8TH AVENUE INTERCEPTOR	
	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 needed for cleaning. Facility should not impact downstream facilities.	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 needed for cleaning. Facility should not impact downstream facilities.	2	Facility can be automatically started and run autonomously under design conditions. However, facility will be started using monitoring and telemetry. This may require operator response to ensure proper startup and operation of the facility. Some staffing/supervision may needed for cleaning. Facility should not impact downstream facilities.
2. Training	3	Staff familiar with storage facilities. Similar control approaches to other facilities within the system can be specified for consistency.	3	Staff familiar with storage facilities. Similar control approaches to other facilities within the system can be specified for consistency.	3	Staff familiar with pump stations and storage facilities. 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 not critical for ability to store peak flows. Storage is a proven technology for controlling peak flow events.	3	System is not complex. Gravity diversion over a weir. Power not critical for ability to store peak flows. Storage is a proven technology for controlling peak flow events.	2	A pump station is required to actively divert flows to a storage tank during a peak event. Power is critical for operation of telemetry & monitoring equipment. Storage is a proven technology for controlling peak flow events.
4. Maintenance	3	Alternative requires little maintenances. Minimal telemetry/controls to maintain (typical level sensing and pump system controls). Assumes no entry to storage.	3	Alternative requires little maintenances. Minimal telemetry/controls to maintain (typical level sensing and pump system controls). Assumes no entry to storage.	2	Alternative requires more maintenance due to need for a two-stage pump station. More complex telemetry/controls than bottom of the basin alternatives. Assumes no entry to storage.
5. Safety	3	No street access required. No traffic control procedures required. No street use/closure permit required.	2	No street access required typical operations. Infrequent maintenance issues will require traffic control procedures and street use/closure permit.	3	No street access required. No traffic control procedures required. No street use/closure permit required.
COST EFFECTIVENESS						
1. Project Capital Costs	3	Relative Cost = 1.0	3	Relative Cost = 1.0	1	Relative Cost = 4.4 Potential benefit of avoided future costs since this eliminates the need for the existing North Beach Pump Station and Force Main.
2. Life Cycle Costs						
3. Cost Variability/Risk	3	Variability Ratio = 1.13	3	Variability Ratio = 1.01	3	Variability Ratio = 1.37
Note: Project Capital Costs for North Beach Alternatives range from a low $7.3M to a high of $63.3M						
COMMUNITY IMPACT						
1. Location	1	Alternative requires acquisition of private property. Facility can be designed to be consistent with community's vision of itself; however permanent above ground facilities will be visible to numerous homes. Some permanent loss of park use area may occur.	3	Pipeline in street is not visible. Ancillary facilites located within existing North Beach Pump Station site. Design will need to address concerns about light, noise, or odor control. Acquisition of private property is not required for this alternative. Does not address PS/FM upgrade project.	1	**Bottom of Basin Site:** Siting will require acquisition of private property. Facility will be visible from numerous properties uphill of the site. Design will need to address concerns about light, noise, or odor control. **Holman Road Site:** Site is currently privately owned. Site is visible but can be designed to be compatible with the surrounding commercial area.
2. Potential Community Impacts	2	Use will require frequent visits by O&M and potential heavy equipment access, primarily following a peak flow event. Assuming portion of Blue Ridge Park can be restored to park activities, some O&M activites may conflict with site uses and adjacent facilities requiring close coordination between O&M and the community.	2	Use will require frequent visits by O&M and potential heavy equipment access, primarily following a peak flow event. Pipeline storage in the right of way may require street closures.	3	Use will require frequent visits by O&M and potential heavy equipment access, primarily following a peak flow event. However, this will be at the Holman Road Site which is a commercial area. Operations at the bottom of the basin would be comparable to existing. Project eliminates need for a second project to upgrade existing infrastructure.
3. Construction Impacts	1	Siting will affect adjacent properties during construction Construction staging may require acquisition of additional single family residential property. Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Work hour and noise restrictions may impact the construction duration. It may be difficult to mitigate impacts through standard construction methods. Blue Ridge Park will be inaccessible during construction.	1	Siting will affect adjacent properties during construction. Construction staging may require acquisition of additional single family residential property. Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Work hour and noise restrictions may impact the construction duration. It may be difficult to mitigate impacts through standard construction methods. Blue Ridge Park will have limited access during construction.	1	Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Work hour and noise restrictions may impact the construction duration. It may be difficult to mitigate impacts through standard construction methods. Limited private property required at the bottom of the basin. Siting will affect adjacent properties during construction. Construction impacts various areas of the basin due to pipeline construction and facilities at two sites.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 1D: CENTRALIZED STORAGE AT BOTTOM OF BASIN WITH CONVEYANCE TO 8TH AVENUE INTERCEPTOR		ALTERNATIVE 2A: CONVEYANCE TO CARKEEK CSO TREATMENT PLANT WITH BEACH ALIGNMENT		ALTERNATIVE 2B: CONVEYANCE TO CARKEEK CSO TREATMENT PLANT WITH NEIGHBORHOOD ALIGNMENT	
	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. 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.	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. 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	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	**Bottom of Basin Site:** Located on or adjacent to existing pump station. Zoning is Single Family Residential. Utility Service Use is permitted as a City Council conditional use. **Holman Road Site:** Zoning is Commercial. Utility Service Uses are permitted in C1-40 zones.	1	**Bottom of Basin Site:** Zoning is Single Family Residential. **Carkeek Park Site:** Zoning is Single Family. Expansion of an existing sewage treatment plant is permitted under strict provisions in the Land Use Code, requiring a City Council finding of no feasible alternative locations. **Pipeline:** On a Puget Sound Beach. Rating of 1 (red) is for permitting a pipeline on the beach, plus expanding STP in Carkeek Park.	2	**Bottom of Basin Site:** Zoning is Single Family Residential. **Carkeek Park Site:** Zoning is Single Family Residential. Expansion of an existing sewage treatment plant is permitted under strict provisions in the Land Use Code, requiring a City Council finding of no feasible alternative locations. **Pipeline:** In the public right-of-way.
3. Shoreline Master Program Compatibility	2	The pump station and storage tank may be within the shoreline district. Storage 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 (pump stations will likely be considered a water-related use) are preferred next in line to water-dependent uses within the Shoreline District. It may be possible to locate the storage facility outside the Shoreline District (i.e., more than 200 feet from the Puget Sound shoreline).	1	The pump station may require a shoreline permit. Treatment Facility would be within existing Carkeek Facility footprint. The Pipeline would be within the public beach. Utilities would be primarily buried underground which would only temporarily disrupt public access. Rating of 1 (red) is for permitting a pipeline on the beach.	2	The pump station may require a shoreline permit. Treatment Facility would be within existing Carkeek Facility footprint. The Pipeline would be within public right-of-way. Utilities would be primarily buried underground which would only temporarily disrupt public access.
4. Permitting Complexity	2	This alternative may require a Shoreline Permit. Affected roadways in residential area with regional transportation (railway) adjacent to site. Will require careful traffic planning to maintain access. Work hours likely to be restricted.	1	**Bottom of Basin Site:** Pump station may require shoreline substantial development permit. If so, Utility Service Uses are permitted in shoreline district only if they require a shorteline location. Shoreline permit is appealable to State Shorelines Hearings Board. Seattle ECA review, land use review, possible Shorelines permit. Special inspections may be required due to shoring and water control. Stormwater control will be complex due to likelihood of groundwater. **Carkeek Park Site: Treatment plant expansion would be required.** Permits to construct/upgrade facilities on existing County site require City Council approval and finding of no feasible alternative location. **Pipeline:** Marine access will add federal and state permits in addition to local permits. This could add up to a year or more to the schedule.	1	**Bottom of Basin Site:** may require shoreline permit. If so, Utility Service Uses are permitted in shoreline district only if they require a shorteline location. Shoreline permit is appealable to State Shorelines Hearings Board. **Carkeek Park Site:** Treatment plant expansion would be required. Permits to construct/upgrade facilities on existing County site require City Council approval and finding of no feasible alternative location. Seattle ECA review (environmentally critical areas) will be required. **Pipeline:** Pipeline within road right-of-way. Rating of 1 (red) for STP expansion in Carkeek Park - less complex than Alternative 2A because no beach pipeline.
5. Property Acquisition Complexity	2	**Bottom of Basin Site:** Single family residential. Possible concerns regarding acquisition from homeowners association. Approximately 1/2 Ac. **Holman Road Site:** Assume purchase from City of Seattle Parks **not** required. If purchase from City of Seattle Parks Dept. required would change to 1. Approximately 1/4 Ac. **Pipeline:** Extensive street right of way required.	2	**Bottom of Basin Site:** Single family residential. Possible concerns regarding acquisition from homeowners association. Approximately 1/2 Ac. **Carkeek Park Site:** Site owned by King County. **Pipeline:** Assumed within existing County easement.	2	**Blue Ridge Park Site:** Single family residential. Possible concerns regarding acquisition from homeowners association. Approximately 1/2 Ac. **Carkeek Park Site:** Site owned by King County. **Pipeline:** Extensive street right of way required.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 1D: CENTRALIZED STORAGE AT BOTTOM OF BASIN WITH CONVEYANCE TO 8TH AVENUE INTERCEPTOR		ALTERNATIVE 2A: CONVEYANCE TO CARKEEK CSO TREATMENT PLANT WITH BEACH ALIGNMENT		ALTERNATIVE 2B: CONVEYANCE TO CARKEEK CSO TREATMENT PLANT WITH NEIGHBORHOOD ALIGNMENT	
	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION
ENVIRONMENT						
1. Cultural Resources	3	No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources.	2	**NBPS Site:** No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources. **FM Alignment & CSTP Sites:** Piper's Creek is identified as an ethnologic site. Based on site characteristics, the mouth of Piper's Creek and the CSTP area have a medium probability of containing archaeological resources. The Piper homestead orchard and garden are maintained in Carkeek Park, but it is assumed that they would not be affected by construction or operation of this alternative.	2	**NBPS Site:** No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources. **FM Alignment & CSTP Site:** Piper's Creek is identified as an ethnologic site. Based on site characteristics, the CSTP area has a medium probability of containing archaeological resources. The Piper homestead orchard and garden are maintained in Carkeek Park, but it is assumed that they would not be affected by construction or operation of this alternative.
2. Fish and Wildlife	3	Construction and operation of this alternative would not affect fish and wildlife, or their habitat.	1	Construction of the forcemain along the Puget Sound beach and Piper's Creek alignments would likely adversely affect fish and wildlife and/or their habitat. Piper's Creek is a salmon-bearing stream and the lower portion of the creek is identified as a Priority Habitat and Species (PHS) area. Operation of this alternative would not adversely affect fish and wildlife, or their habitat.	2	Construction of the new treatment facility next to Piper's Creek in Carkeek Park may adversely affect fish and wildlife and/or their habitat. Piper's Creek is a salmon-bearing stream. Operation of this alternative would not adversely affect fish and wildlife, or their habitat.
3. Wetlands, Streams and Shoreline	3	**Bottom of Basin Site:** GIS maps show a piped stream crossing through this project area. This rating assumes that construction would not impact the stream or any wetlands or shoreline area. **Holman Road Site:** No wetlands, streams or shoreline in this project area.	1	**Bottom of Basin Site:** GIS maps show a piped stream crossing through this project area. It is assumed that construction would not impact the stream or any wetlands or shoreline area. **FM Alignment:** It is likely that construction of the forcemain along the Puget Sound beach and Piper's Creek alignments would directly impact shoreline, wetlands and Piper's Creek. **CSTP Site:** Construction of the treatment facility at Carkeek Park could affect the Piper's Creek stream buffer.	2	**Bottom of Basin Site:** GIS maps show a piped stream crossing through this project area. It is assumed that construction would not impact the stream or any wetlands or shoreline area. **FM Alignment & CSTP Site:** It is likely that construction of the forcemain and/or new treatment facility would directly impact the Piper's Creek stream buffer.
4. Soils and Sediments	2	No known contaminated sites in the vicinity of the Blue Ridge Park Site. There are known contaminated sites and potential to encounter contaminated soils in the vicinity of the drop structure and odor control facility site and pipeline alignment near Holman Road. Project area is not within liquifaction zone. No steep slopes and/or known landslide areas. Potential landslide areas are located within project area, but it is assumed that construction of this alternative would not increase the likelihood of landslides.	2	No known contaminated sites and pipeline alignment is in beach and Piper's Creek corridor where contaminated soils are not expected. No steep slopes and/or known landslide areas at Blue Ridge Park Site or along beach alignment. The pipeline alignment between the beach and the CSTP Site contains steep slopes and potential landslide areas.	3	No known contaminated sites and pipeline alignment is in a mostly residential area where contaminated soils are not expected. Project area is not within liquifaction zone. No steep slopes and/or known landslide areas at Blue Ridge Park Site and pipeline construction in not expected to increase the likelihood of landslides.
5. Water Quality	3	No new untreated discharges to surface waters.	3	No new untreated discharges to surface waters.	3	No new untreated discharges to surface waters.
TECHNICAL						
1. Technical Complexity	3	Primary facilites on single site. Simplified control approach with pump station sized for baseline flows only with gravity overflow to storage. Automatic cleaning and emptying after event will require telemetry and local controls. Flows exceeding tank capacity overflow at diversion structure to existing outfall.	1	Two sites. Complex approach with treatment facility required at Carkeek. Gravity overflow at new control structure pumped to treatment facility. Treatment facility can run automatically but coagulation/flocculation/sedimentation/disinfection processes are critical to meeting effluent limits. Flows exceeding tank capacity overflow at diversion structure to existing outfall.	1	Two sites. Complex approach with treatment facility required at Carkeek. Gravity overflow at new control structure pumped to treatment facility. Treatment facility can run automatically but coagulation/flocculation/sedimentation/disinfection processes are critical to meeting effluent limits. Flows exceeding tank capacity overflow at diversion structure to existing outfall.
2. Compatibility with Existing WW system	3	Stand alone alternative. Diversion structure to pump station built in collection system upstream of existing CSO control. Re-directs flow now going to Carkeek Pump Station. Potential impact at 3rd Street NW CSO and other downstream facilities needs to be evaluated.	2	Diversion structure to pump station built in collection system upstream of existing CSO control. Carkeek wet weather facility capacity would need to be increased to handle flows.	2	Diversion structure to pump station built in collection system upstream of existing CSO control. Carkeek wet weather facility capacity would need to be increased to handle flows.
3. Flexibility/Adaptive Management	1	Storage tank and pump station not easily modified for enlargement.	2	Treatment facility provides flexibility in peak flow treatment with limited space required to add significant additional capacity. The pump station would also require modification.	2	Treatment facility provides flexibility in peak flow treatment and limited space required to add significant additional capacity. The pump station would also require modification.
4. Constructability/ Implementation Schedule	2	Risks associated with shoring, groundwater and limited space for pump station and storage facility. Limited staging and access area due to residential area. Alternative can likely meet the construction schedule.	1	Risks associated with shoring, groundwater and limited space for pump station. Limited staging and access area due to residential area. Treatment facility site at Carkeek provides challenges due to remote location and uses surrounding site. Beach alignment of pipeline will provide additional construction challenges. Alternative can likely meet the construction schedule.	1	Risks associated with shoring, groundwater and limited space for pump station. Limited staging and access area due to residential area. Treatment facility site at Carkeek provides challenges due to remote location and uses surrounding site. Neighborhood alignment of pipeline will provide additional construction challenges. Alternative can likely meet the construction schedule.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 1D: CENTRALIZED STORAGE AT BOTTOM OF BASIN WITH CONVEYANCE TO 8TH AVENUE INTERCEPTOR		ALTERNATIVE 2A: CONVEYANCE TO CARKEEK CSO TREATMENT PLANT WITH BEACH ALIGNMENT		ALTERNATIVE 2B: CONVEYANCE TO CARKEEK CSO TREATMENT PLANT WITH NEIGHBORHOOD ALIGNMENT	
	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 needed for cleaning. Facility should not impact downstream facilities.	1	Facility can be automatically started and run autonomously under design conditions. However, the treatment facility at Carkeek will likely require operator response to ensure proper startup and operation of the facility. Staffing/supervision will be needed for cleaning. Facility should not impact downstream facilities.	1	Facility can be automatically started and run autonomously under design conditions. However, the treatment facility at Carkeek will likely require operator response to ensure proper startup and operation of the facility. Staffing/supervision will be needed for cleaning. Facility should not impact downstream facilities.
2. Training	3	Staff familiar with pump stations and storage facilities. Similar control approaches to other facilities within the system can be specified for consistency.	1	Staff familiar with pump stations. Similar control approaches to other facilities within the system can be specified for consistency. However, County does not currently operate a high rate clarification facility. New control approaches and training procedures will need to be developed.	1	Staff familiar with pump stations. Similar control approaches to other facilities within the system can be specified for consistency. However, County does not currently operate a high rate clarification facility. New control approaches and training procedures will need to be developed.
3. Reliability	3	System is not complex. Gravity diversion over a weir. Power not critical for ability to store peak flows. Storage is a proven technology for controlling peak flow events.	2	A pump station is required to actively divert flows during a peak event. Power is critical for operation of telemetry & monitoring equipment. High rate clarification is a proven technology for treating peak flow events, however it is mechanically intensive which may impact the reliability.	2	A pump station is required to actively divert flows during a peak event. Power is critical for operation of telemetry & monitoring equipment. High rate clarification is a proven technology for treating peak flow events, however it is mechanically intensive which may impact the reliability.
4. Maintenance	2	Alternative requires more maintenance due to need for a two-stage pump station. Assumes no entry to storage.	1	Alternative requires significant maintenance for pump station and high rate clarification facility. More complex telemetry/controls including pump station monitors, flow meters, chemical metering systems, flocculation/sedimentation and disinfection facilities.	1	Alternative requires significant maintenance for pump station and high rate clarification facility. More complex telemetry/controls including pump station monitors, flow meters, chemical metering systems, flocculation/sedimentation and disinfection facilities.
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.	3	No street access required. No traffic control procedures required. No street use/closure permit required.
COST EFFECTIVENESS						
1. Project Capital Costs	2	Relative Cost = 3.4 Potential benefit of avoided future costs since this eliminates the need for the existing North Beach Pump Station and Force Main.	1	Relative Cost = 6.0 Potential benefit of avoided future costs since this eliminates the need for the existing North Beach Pump Station and Force Main.	1	Relative Cost = 6.8 Potential benefit of avoided future costs since this eliminates the need for the existing North Beach Pump Station and Force Main.
2. Life Cycle Costs						
3. Cost Variability/Risk	3	Variability Ratio = 1.47	3	Variability Ratio = 1.04	3	Variability Ratio = 1.41
Note: Project Capital Costs						
COMMUNITY IMPACT						
1. Location	1	**Bottom of Basin Site:** Siting will require acquisition of private property. Facility will be visible from numerous properties uphill of the site. Design will need to address concerns about light, noise, or odor control. **Holman Road Site:** Site is currently privately owned. Site is visible but can be designed to be compatible with the surrounding commercial area.	1	**Bottom of Basin Site:** Siting will require acquisition of private property. Facility will be visible from numerous properties uphill of the site. Design will need to address concerns about light, noise, or odor control. **Carkeek Park Site:** Siting at Carkeek is not compatible with community's understanding of what Carkeek TP is scoped to do, and who it is supposed to serve. Additional effluent, even treated, from the Carkeek site may cause environmental concerns. Facility will be visible from numerous properties uphill of the site. Design will need to address concerns about light, noise, or odor control.	1	Alternative may be inconsistent with community's vision of itself with limited opportunity to address issues during design. Siting requires use of private property. Pump station facility will be visible from numerous properties uphill of the site . There will be significant concern about light, noise, or odor control that may exceed county design standards. Community and Parks may be concerned about potential expansion of facilities at Carkeek, and additional outfalls or effluent.
2. Potential Community Impacts	2	Use will require frequent visits by O&M and potential heavy equipment access, primarily following a peak flow event. Assuming portion of Blue Ridge Park can be restored to park activities, some O&M activites may conflict with site uses and adjacent facilities requiring close coordination between O&M and the community. Project eliminates need for a second project to upgrade existing infrastructure.	3	O&M work efforts will generally be infrequent, similar to existing pump station O&M efforts at North Beach and Carkeek. Project planning may need to address limited impacts to park use.	3	O&M work efforts will generally be infrequent, similar to existing pump station O&M efforts at both North Beach and Carkeek.
3. Construction Impacts	1	Construction staging may require acquisition of additional single family residential property. Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Work hour and noise restrictions may impact the construction duration. It may be difficult to mitigate impacts through standard construction methods. Limited private property required at the bottom of the basin. Siting will affect adjacent properties during construction. Construction impacts various areas of the basin due to pipeline construction and facilities at two sites. Blue Ridge Park will be inaccessible during construction.	1	Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Impacts may be difficult to mitigate using standard methods. Work hour and noise restrictions may impact the construction duration. Access and use of Blue Ridge Park will be limited.Beach alignment of pipeline will impact recreational users during construction.	1	Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Impacts may be difficult to mitigate using standard methods. Work hour and noise restrictions may impact the construction duration. Access and use of Blue Ridge Park will be limited during construction. This alternative would also affect additional residents living outside of the basin.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 3A: BOTTOM OF BASIN TREATMENT FACILITY		ALTERNATIVE 3B: CENTRALIZED TREATMENT FACILITY UP IN BASIN		ALTERNATIVE 5A: I/I CONTROL	
	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION
LAND USE AND PERMITTING						
1. City of Seattle Comprehensive Plan	1	Seattle's Land Use Element of the Comprehensive Plan promotes public health and environmental quality (LU G3, for example). Many Land Use policies stress compatibility with neighboring uses, and discourage non-residential uses in residential zones except for those uses necessary to the functioning of residential areas (LU 12). This type of balancing will support some necessary wastewater facilities in residential zones. However, there is a strong emphasis on compatibility of function, character, and scale for non-residential uses. Establishing a new sewage treatment plant along the Puget Sound shoreline may run counter to many of these policies.	1	Seattle's Land Use Element of the Comprehensive Plan promotes public health and environmental quality (LU G3, for example). Many Land Use policies stress compatibility with neighboring uses, and discourage non-residential uses in residential zones except for those uses necessary to the functioning of residential areas (LU 12). This type of balancing will support some necessary wastewater facilities in residential zones. However, there is a strong emphasis on compatibility of function, character, and scale for non-residential uses. Establishing a new sewage treatment plant in a residential zone may run counter to many of these policies.	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 for which the County maintains responsibility. The Comp Plan places much emphasis on sustainable solutions and restoration of natural drainages.
2. Seattle Municipal Code (SMC/Zoning Code)	1	Zoning is Single Family Residential. The establishment of new sewage treatment plants is prohibited in SFR zones (SMC 23.44.036.E.4).	1	**Blue Ridge Park Site:** Zoning is Single Family Residential. **North Beach Elementary Site:** Zoning is Single Family Residential. Establishing a new sewage treatment plant in a SF zone is prohibited by the land use code.	2	May be consistent with the Seattle Municipal Code.
3. Shoreline Master Program Compatibility	1	New treatment plants are not allowed in Shoreline District	2	The pump station may require a shoreline permit. Treatment Facility would not be within Shoreline District. The Pipeline would be within road right-of-way.	3	N/A - Not within Shoreline District.
4. Permitting Complexity	1	This alternative will require a Shoreline Permit for a prohibited use. Affected roadways in residential area with regional transportation (railway) adjacent to site. Will require careful traffic planning to maintain access. Work hours likely to be restricted. The large size of facility and associated construction impacts (temporary) may be considered a "high impact' use by the City.	1	This alternative may require a Shoreline Permit. Affected roadways in residential area with regional transportation (railway) adjacent to site. Will require careful traffic planning to maintain access. Work hours likely to be restricted. Approval will require a permit for a currently prohibited use in a single family zone (in the upper basin, possibly at the site of an elementary school).	2	ROW permits required. Water quality treatment issues may increase permitting complexity. Affected roadways have moderate traffic volume in residential and neighborhood commercial land uses. Will require careful traffic planning to maintain access. Work hours may be restricted. Permit review likely to be complex.
5. Property Acquisition Complexity	2	**Bottom of Basin Site:** Single family residential. Possible concerns regarding acquisition from homeowners association. Approximately 1/2 Ac.	1	**Bottom of Basin Site:** Single family residential. Possible concerns regarding acquisition from homeowners association. Approximately 1/2 Ac. **North Beach Elementary Site: Zoned commercial.** Purchase from Seattle School District. Approximately 1/2 Ac.	2	Street use permits, may require rights of entry for property disconnection. May require property acquisition for stormwater treatment facilities.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 3A: BOTTOM OF BASIN TREATMENT FACILITY		ALTERNATIVE 3B: CENTRALIZED TREATMENT FACILITY UP IN BASIN		ALTERNATIVE 5A: I/I CONTROL	
	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION
ENVIRONMENT						
1. Cultural Resources	3	No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources.	3	No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources.	3	No known cultural resources.
2. Fish and Wildlife	3	Construction and operation of this alternative would not adversely affect fish and wildlife, or their habitat.	3	Construction and operation of this alternative would not affect fish and wildlife, or their habitat.	2	Construction of this alternative would not adversely affect fish and wildlife, or their habitat. Operation could have adverse effects on fish and wildlife if treatment was not required for stormwater discharges.
3. Wetlands, Streams and Shoreline	2	GIS maps show a piped stream crossing through the project area. This piped stream would likely have to be moved to construct this alternative. This alternative would not impact wetlands or shoreline areas.	3	**Bottom of Basin Site:** GIS maps show a piped stream crossing through this project area. It is assumed that construction would not impact the stream or any wetlands or shoreline area. **North Beach Elementary Site:** No wetlands, streams or shoreline in this project area.		need more information
4. Soils and Sediments	3	No known contaminated sites. Project area is not within liquifaction zone. No steep slopes and/or known landslide areas. Potential landslide areas are located within project area, but it is assumed that construction of this alternative would not increase the likelihood of landslides.	3	No known contaminated sites and pipeline alignment is in a mostly residential area where contaminated soils are not expected. Project area is not within liquifaction zone. No steep slopes and/or known landslide areas. Potential landslide areas are located within project area, but it is assumed that construction of this alternative would not increase the likelihood of landslides.		need more information
5. Water Quality	3	No new untreated discharges to surface waters.	3	No new untreated discharges to surface waters.	1	This assumes stormwater treatment is not required. If stormwater treatment is required, rating would change from 1 to 3.
TECHNICAL						
1. Technical Complexity	1	One site. Complex approach with treatment facility required. Gravity overflow at new control structure to treatment facility. Treatment facility can run automatically but coagulation/flocculation/sedimentation/disinfection processes are critical to meeting effluent limits. Flows exceeding tank capacity overflow at diversion structure to existing outfall.	1	Two sites. Complex approach with treatment facility required up in basin. Gravity overflow at new control structure pumped to treatment facility. Treatment facility can run automatically but coagulation/flocculation/sedimentation/disinfection processes are critical to meeting effluent limits. Flows exceeding tank capacity overflow at diversion structure to existing outfall.	2	Simple approach, however effectiveness to meet CSO control objectives is largely unknown until implemented.
2. Compatibility with Existing WW system	3	Stand alone alternative. Diversion structure to treatment facility built in collection system upstream of existing CSO control. Does not affect downstream capacity in county system.	3	Stand alone alternative. Diversion structure to treatment facility built in collection system upstream of existing CSO control. Does not affect downstream capacity in county system.	3	Upgrades existing infrastructure by removing excess infiltration in side sewers as the initial target.
3. Flexibility/Adaptive Management	3	Treatment facility provides flexibility in peak flow treatment with limited space required to add significant additional capacity.	2	Treatment facility provides flexibility in peak flow treatment and limited space required to add significant additional capacity. The pump station would also require modification.	3	Ability to adapt by increasing number of disconnections and side sewer repairs subject to capacity of stormwater system.
4. Constructability/ Implementation Schedule	1	Significant risks associated with shoring, groundwater and limited space for treatment facility. Limited staging and access area due to residential area. Alternative can likely meet the construction schedule.	2	Risks associated with shoring, groundwater and limited space for the pump station and treatment facility. Limited staging and access area due to residential area. Alternative can likely meet the construction schedule.	2	Unknown if approach can meet schedule. Low probability of groundwater effects if disconnected flow goes directly to stormwater system. Side sewer repair requires cooperation of homeowners. Number of disconnects can only be estimated. Both factors increases risk for compliance, but work could be implemented relatively soon.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 3A: BOTTOM OF BASIN TREATMENT FACILITY		ALTERNATIVE 3B: CENTRALIZED TREATMENT FACILITY UP IN BASIN		ALTERNATIVE 5A: I/I CONTROL	
	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION
O&M						
1. Staffing	1	Facility can be automatically started and run autonomously under design conditions. However, the treatment facility will likely require operator response to ensure proper startup and operation of the facility. Staffing/supervision will be needed for cleaning. Facility should not impact downstream facilities.	1	Facility can be automatically started and run autonomously under design conditions. However, the treatment facility will likely require operator response to ensure proper startup and operation of the facility. Staffing/supervision will be needed for cleaning. Facility should not impact downstream facilities.	3	No operator attention required
2. Training	1	County does not currently operate a high rate clarification facility. New control approaches and training procedures will need to be developed.	1	Staff familiar with pump stations. Similar control approaches to other facilities within the system can be specified for consistency. However, County does not currently operate a high rate clarification facility. New control approaches and training procedures will need to be developed.	3	There are numerous stormwater conveyance and treatment facilities throughout the area.
3. Reliability	2	High rate clarification is a proven technology for treating peak flow events, however it is mechanically intensive which may impact the reliability. Power is critical for operation of telemetry & monitoring equipment.	2	A pump station is required to actively divert flows during a peak event. Power is critical for operation of telemetry & monitoring equipment. High rate clarification is a proven technology for treating peak flow events, however it is mechanically intensive which may impact the reliability.	3	System is not complex assuming no stormwater treatment. Gravity stormwater and treatment system. Peak flow reduction, when effectively implemented, is a proven technology for controlling peak flow events.
4. Maintenance	1	Alternative requires significant maintenance for high rate clarification facility. More complex telemetry/controls including flow meters, chemical metering systems, flocculation/sedimentation and disinfection facilities.	1	Alternative requires significant maintenance for pump station and high rate clarification facility. More complex telemetry/controls including pump station monitors, flow meters, chemical metering systems, flocculation/sedimentation and disinfection facilities.	3	Minimal maintenance compared to other alternatives assuming no stormwater treatment. Typical stormwater piping and treatment system maintenace.
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.	3	Maintenance of storm sewers will require manhole access in streets.
COST EFFECTIVENESS						
1. Project Capital Costs	2	Relative Cost = 3.5	1	Relative Cost = 5.3	2/3	Relative Cost = 1.1 to 2.6
2. Life Cycle Costs						
3. Cost Variability/Risk	3	Variability Ratio = 1.04	3	Variability Ratio = 1.11	2	Variability Ratio = 2.98
Note: Project Capital Costs						
COMMUNITY IMPACT						
1. Location	1	Facility type is inconsistent with community's vision of itself. Siting will affect adjacent properties during construction and require acquisition of private property. Construction staging may require acquisition of additional single family residential property. Facility will be visible from numerous properties uphill of the site . Design will have to address noise, light, and odor concerns.	1	**Bottom of the basin:** Siting will require acquisition of private property. Facility will be visible from numerous properties uphill of the site . Design will need to address concerns about light, noise, or odor control that may exceed county design standards. **North Beach Elementary Site:** Proposed location is adjacent to a school playground and proximal to residences and may be viewed as inconsistent with community's vision of itself.	3	Will affect numerous homes throughout the basin to have a significant reduction in CSO flows but impact will be minimal and not visible, noisy or have lighting issues after construction. If stormwater treatment facilities are required, the rating of this alternative may change to a "1" to account for siting new above ground facilities that are inconsistent with the community's vision of itself.
2. Potential Community Impacts	1	O&M work efforts will be more involved than storage or pumping otions, including staff during a peak flow event and additional routine maintenance. Treatment option will also require chemical delivery and storage. Treatment facilities will require security fencing and significant screening efforts. Some O&M activites may require close coordination between O&M and the community.	1	O&M work efforts will be more involved than storage or pumping otions, including staff during a peak flow event and additional routine maintenance. Treatment option will also require chemical delivery and storage in a location adjacent to residences and a school. Treatment facilities will require security fencing and significant screening efforts. Some O&M activites may require close coordination between O&M and the community.	2	Design will need to address concerns about increased surface water in the area. If stormwater conveyance systems and treatment are required, the additional infrastructure required would change this rating to a "1".
3. Construction Impacts	1	Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Work hour and noise restrictions may impact the construction duration. During construction, there will be no park access. Additional property will be required for staging.	1	Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Work hour and noise restrictions may impact the construction duration. Access and use of Blue Ridge Park may be limited during construction. Special safety procedures may be required due to construction adjacent to school.	2	Construction may be carried out on private property and in streets; however, duration in any area is expected to be limited. If stormwater conveyance systems and treatment are required, construction impacts may change in rating to a "1".

North Beach Scoring Alternatives Workshop 505-3

August 4, 2010
King Street Center

Summary of Discussion

Attendance

King County		*Consultant*	*SPU*
Betsy Cooper	John Phillips	Ellen Blair	None
Hien Dung	Kevin Schock	Jennifer Corrigan	
Pam Erstad	Linda Sullivan	Karl Hadler	
Ron Kohler	Bob Swarner	Brian Matson	
Kathy Mathena	Martha Tuttle	Lloyd Skinner	
Tiffany McClaskey	Jim Weber	Alan Foster	
Sue Meyer	Monica Van der		
Shahrzad Namini	Vieren		
Chris Okuda	Karl Zimmer		

Purpose of Summary

This document provides a summary of the workshop process and captures the discussion themes that support the project team's recommendation of a CSO control alternative to be forwarded for review by internal King County Wastewater Treatment Division (WTD) management. Internal management will propose a CSO control alternative to be carried forward to environmental review.

Workshop Process

Team members used a collaborative approach to review three alternative means for CSO control using a range of factors. Documenting the workshop process is a critical piece of the project.

Workshop Goals and Objectives:

1. Recommend one alternative for CSO control for the North Beach Basin to develop it in more detail and carry forward to environmental review, with remaining alternatives tabled at this time.
2. Discuss and document the reasons and rationale for the recommendation.

Materials Available at the Workshop

1. Project alternatives aerial photos and facility diagrams handout
2. Final revised alternatives rating sheets for North Beach (including description of ratings reflecting updates by category leads)
3. Project memo describing the history of alternative development, evaluation and screening
4. Cost information
5. Summary of Contents of Alternatives Development Documentation Binder

An enlarged chart of the selection factors and ratings for all alternatives for the North Beach Basin was posted on the wall along with a graph of the ratings for each alternative.

Workshop Agenda

Introduction

- Project updates for other Basins

North Beach Update

- Development of Alternatives

Presentations

- Efforts since narrowing Workshop
- Community Input from North Beach
- Changes to the evaluation criteria
- Evaluation Matrix results
- Cost estimates
- Interpretation of information
- Basin recommendation

Team Discussion

- Team efforts
- Community input
- Evaluation Criteria
- Evaluation Matrix Results
- Cost Estimate
- Interpretation of Results

Note: This section of the agenda was for the project team to discuss and provide input on the alternatives and hear responses to questions and comments. If team members wished to change the interpretation outcome and the Basin Lead's recommendation, the scoring on the evaluation matrix had to be changed.

- Truth Test – Do we have the right scoring for the alternatives?
- Confirm and add reasons and rationale for scoring

Workshop Outcome

King County staff agreed to recommend that Alternative 1B (Pipeline Bottom of Basin Storage) be forwarded for review by internal management.

Summary of Workshop Process and Discussion for North Beach Basin

General Considerations for North Beach Basin

- The project team changed the score of the "Permitting Complexity" criterion in the "Land Use and Permitting" criteria category from 2 to 1 for Alternatives 1A and 1D. This was based on the need for a code amendment or rezone to build the project in the shoreline conservancy zone.

- The evaluation matrix showed Alternative 1B with the most green scores (least impact) and the fewest red scores (most impact) compared to Alternative 1A and Alternative 1D.
- For any facilities in a park, WTD will endeavor to place all facilities underground, including odor control and electrical facilities. However, it must be feasible to access and maintain the facilities.
- O&M recommends CSO Beach projects set two different drain pump sizes to allow pump assets to be utilized across numerous facilities. This would include one small size for up to 4 pumps per facility and one large size for up to 4 pumps per facility. Designers choose proper size. O&M also requests unified WTD specifications for equipment commonality across all CSO projects.

Considerations for North Beach Basin CSO Control Alternatives

Alternative 1A: Rectangular Bottom of Basin Storage (Not recommended for further review)

Design Engineering
No discussion. Comments related to design engineering were captured in the evaluation document.

Cost
No discussion. Comments related to cost were captured in the evaluation document.

Land Use/Permitting
- Requires code amendment or rezone to build project in a shoreline conservancy zone.

Environmental
No discussion. Comments related to environmental issues were captured in the evaluation document.

Community Impact
No discussion. Comments related to community impact were captured in the evaluation document.

O&M
No discussion. Comments related to O&M were captured in the evaluation document.

Alternative 1B: Pipeline Bottom of Basin Storage (Recommended for further review)

Design Engineering
No discussion. Comments related to design engineering were captured in the evaluation document.

Cost
No discussion. Comments related to cost were captured in the evaluation document.

Land Use/Permitting

- Requires access agreement with SDOT for operations and maintenance.

Environmental

No discussion. Comments related to environmental issues were captured in the evaluation document.

Community Impact

- A substantial majority of comments received from residents in the basin expressed a strong preference for Alternative 1B. Residents have indicated an awareness that this alternative will have community impacts during construction and operations.
- It appears feasible to site the odor control facility adjacent to the existing North Beach Pump Station. Siting it below-grade, adjacent to existing facilities would minimize the visual impact.

O&M

- O&M concerns and requirements must be prioritized during the design phase to ensure that staff can access the facilities safely for operation and maintenance necessary to achieve the ultimate goal of CSO control in the basin. If the O&M design needs are not met, the alternative chosen may not meet O&M ability to operate effectively.
- O&M prefer at-grade access for these required facilities for lower life cycle for maintaining the facilities.
- Safe, off-road access for O&M staff is necessary or it will be necessary to close the street and use a traffic control team to access the facilities.
- Street closures will be required for long term maintenance of the storage tank. This will be needed due to the boom truck, vactor truck, flatbed, compressors etc. necessary to enter a below grade confined space.
- Intermediate hatches will be required. Hatch access further than 150' is problematic in securing a fire department entry agreement.
- If safe O&M access requires the removal of private property encroachment in the public right of way, this work must be addressed at the start of the project so as not to impede O&M access when it is needed. If this right of way impingement is not removed by this project, O&M will not have ability to enter the facility safely.

Alternative 1D: Centralized Bottom of Basin Storage with Conveyance to 8th Avenue Interceptor
(Not recommended for further review)

Design Engineering

No discussion. Comments related to design engineering were captured in the evaluation document.

Cost

No discussion. Comments related to cost were captured in the evaluation document.

Land Use/Permitting

- Requires code amendment or rezone to build project in a shoreline conservancy zone.

Environmental

No discussion. Comments related to environmental issues were captured in the evaluation document.

Community Impact

- It is likely cost prohibitive to locate the pump station underground.
- Above ground facilities, especially in Blue Ridge Park, would be strongly opposed.

O&M

No discussion. Comments related to O&M were captured in the evaluation document.

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TECHNICAL MEMORANDUM

Project Name:	BMMNB Beaches CSO Projects	**Date:**	October 8, 2010
Client:	King County DNRP, Wastewater Treatment Division	**Project Number:**	7562A.10
Prepared By:	Karl Hadler		
Reviewed By:	Brian Matson		
Subject:	North Beach Alternatives Update Information – Basis of Alternatives		
Distribution:	King County, Project Team		

1.0 INTRODUCTION AND BACKGROUND

This project memorandum (PM) presents updated alternatives information for the three North Beach Basin alternatives being considered to meet the CSO control objective.

The alternatives being considered are:

- Alternative 1A – A buried, rectangular concrete storage tank located adjacent to the existing county North Beach Pump Station within Blue Ridge Park. The storage tank volume is approximately 0.23 million gallons (MG) and would require a below grade odor control and electrical support facility because it assumed to be within Blue Ridge Park.
- Alternative 1B – A buried, storage pipeline located adjacent to the existing county North Beach Pump Station within the public right-of-way (Triton Drive NW and NW Blue Ridge Drive). The storage tank volume is approximately 0.23 MG and would require an odor control and electrical support facility on county property adjacent to the North Beach Pump Station.
- Alternative 1D – A buried, rectangular concrete storage tank located adjacent to the existing county North Beach Pump Station within Blue Ridge Park. The storage tank volume is approximately 0.15 MG.In addition, this alternative includes a 3.5 million gallon per day (mgd) high head pump station and above grade odor control and electrical support facility adjacent to the storage tank. This pump station would replace the existing North Beach Pump Station and convey base flows through two small-diameter (~8-inch) force mains, drop structure and gravity sewer (~12-inch) to the 8th Avenue Interceptor.

A data summary table follows on the next page.

Table 1 – North Beach Basin Alternatives Data Summary

	Alternative 1A	**Alternative 1B**	**Alternative 1D**
Type of Vessel, Dims., ft.	Buried, Rectangular Tank, 85 x 40 x 15	Buried, Pipeline Storage, 12 (diameter) x 325	Buried, Rectangular Tank 55 x 40 x 15 High Head PS 85 x 35 x 35 (15 above grade)
# Internal Channels	2	1	2
Sewer, Dia, in./length, ft/ construction	N/A	N/A	2@8/ 5,000 LF/Cut and Cover 12/ 3,000 LF/Cut and Cover
Excavation Limits to Shoring, L x W x H (depth), ft	90 x 50 x 35	335 x 25 x 25	65 x 50 x 40 High Head PS 60 x 40 x 30
Diversion Control Structure Dims L x W x H (depth), ft	N/A	10 x 10 x 10	N/A
Odor Control/ Electrical Footprint, L x W x H (height),ft	40 x 20 x 15	40 x 20 x 15	35 x 35 x 15 Attached to High Head Pump Station
Drop Structure Dims L x W x H (depth), ft	N/A	N/A	20 x 15 x 5
Land acquisition, SF	10,000	N/A	18,000
Construction Limits, Staging, SF	20,000	20,000 (in addition to 60-ft TCE along storage pipeline)	20,000
Street Use	N/A	See Property Acquisition Plan	See Property Acquisition Plan
Capital Cost(1), $	$8,800,000	$8,400,000	$27,400,000
Land(1), $	$600,000	$400,000	$785,000
Street Use(1), $	N/A	$350,000	$480,000
Notes: 1. In 2010 dollars.			

2.0 BASIS OF OPERATION

All alternatives operate in a similar manner by diverting combined sewage flow exceeding the capacity of either the North Beach Pump Station (3.0 mgd for Alternative 1A and 1B) or new high-head pump station (3.5 mgd for Alternative 1D) into a storage vessel.

2.1 Existing CSO Control

The existing North Beach Pump Station wet well includes an overflow weir (Elevation 122.83) to divert flows in excess of the pump station capacity. The combined overflows then enter a 15-inch overflow pipeline and are conveyed approximately 1,000 feet into Puget Sound.

A secondary overflow point exists at a manhole upstream of the North Beach Pump Station. The overflow weir is at approximately Elevation 124.89 and connects to a 30-inch storm drain pipe that discharges north of the railroad right-of-way.

2.2 Modified CSO Control

The CSO control philosophy for each of the three alternatives varies slightly. Modified CSO control for each alternative is discussed in further detail below.

2.2.1 Alternative 1A

The 15-inch overflow line will be routed from the North Beach Pump Station to the upstream end of the storage tank. Any flows during a peak wet weather event that exceed the capacity of the pump station (approximately 3.0 mgd) will overtop the weir at the North Beach Pump Station and flow to the storage tank via the outfall line. Once the capacity of the storage tank has been reached, flow will overtop the outfall weir (approximate elevation 123.00) in the storage tank and flow back to the existing 15-inch outfall line. See Figure 1 for a schematic of the flow control for Alternative 1A.

2.2.2 Alternative 1B

Flow to the North Beach Pump Station will be routed through a new diversion structure. During wet weather events, the water level in the wet well of the pump station will back-up and overflow the weir (approximate elevation 123.00) at the diversion structure. A new 15-inch overflow pipeline will run from the diversion structure to the head of the 12-foot diameter storage pipeline. When the maximum water surface elevation (approximately 121.00) is reached in the storage pipe, the rising water level will overtop the existing outfall weirs to Puget Sound. See Figure 2 for a schematic of the flow control for Alternative 1B.

2.2.3 Alternative 1D

Alternative 1D includes construction of a new 3.5 mgd high-head pump station. Flow will be routed directly from the collection system via the existing 18-inch line to the wet well of the new pump station. Flows exceeding 3.5 mgd will overtop the first weir (approximate elevation 120.00) in the wet well. Flows will be conveyed via a short pipeline to the underground storage tank. When the level in the tank reaches its maximum water surface elevation, flow in the wet well will overtop the overflow weir (approximate elevation 118.00). The overflow will flow by gravity to the existing outfall and Puget Sound. See Figure 3 for a schematic of the flow control for Alternative 1D.

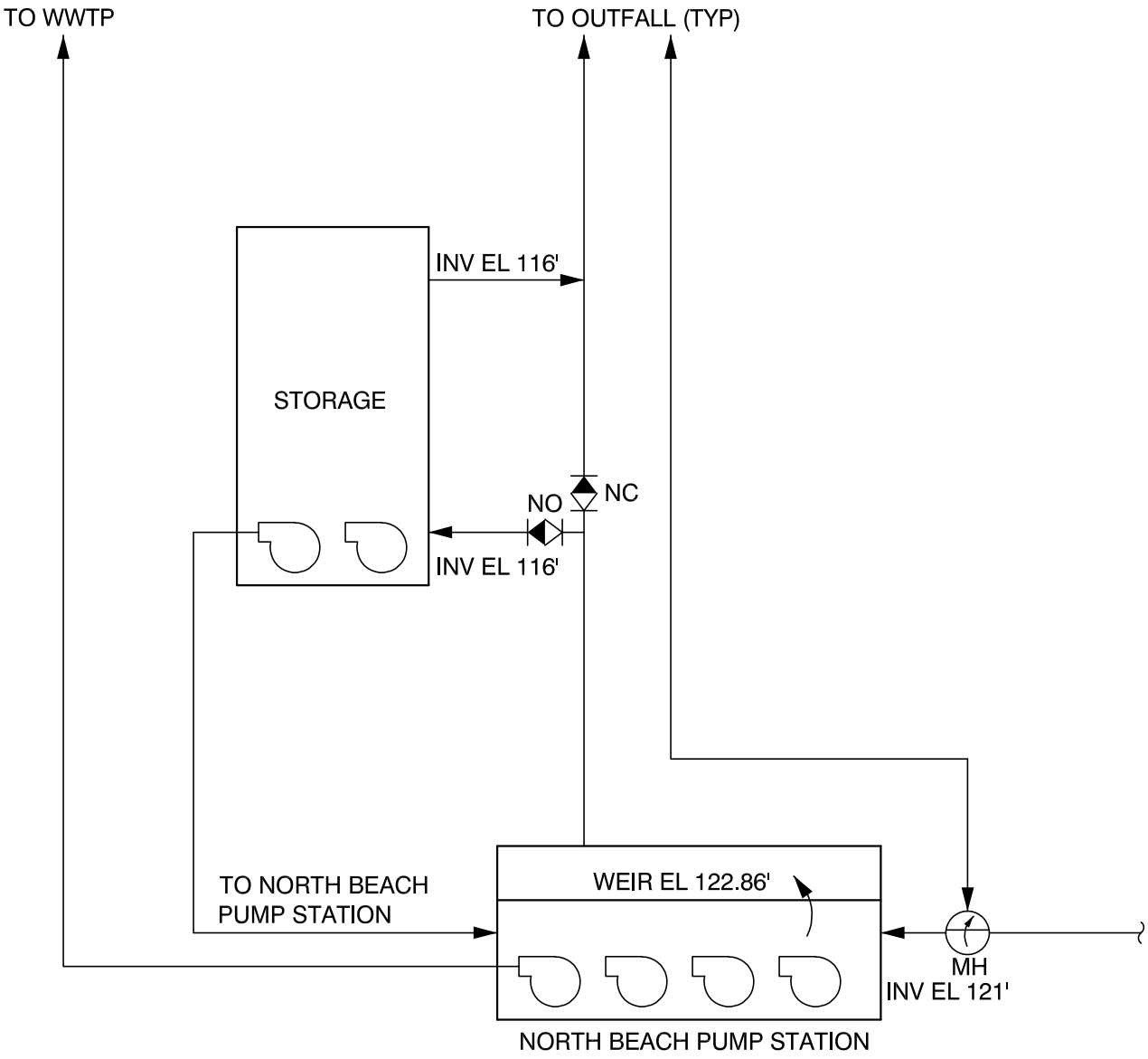


FIGURE 1
ALTERNATIVE 1A
OPERATING SCHEMATIC
KING COUNTY DEPARTMENT OF
NATURAL RESOURCES & PARKS

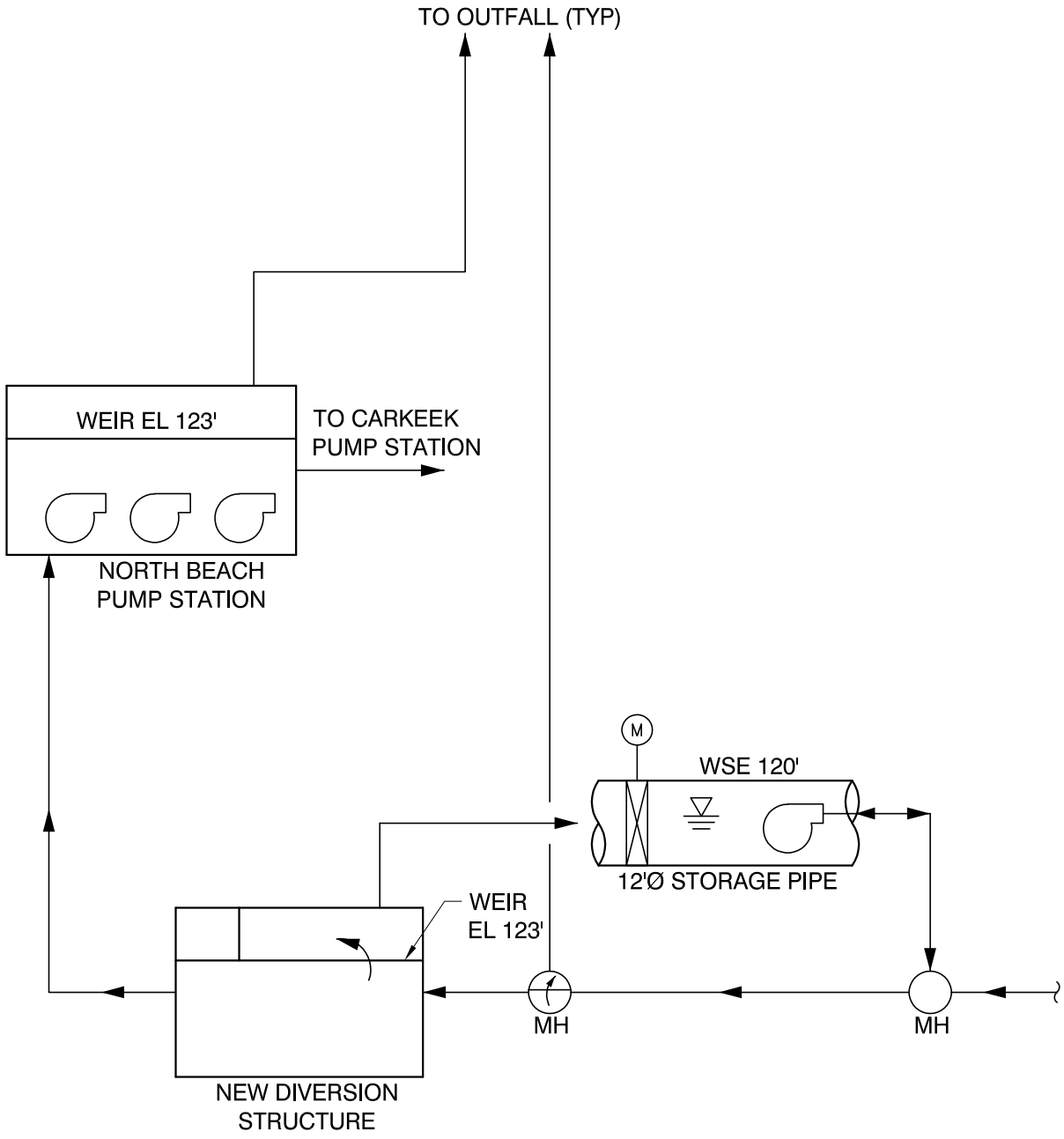


FIGURE 2
ALTERNATIVE 1B
OPERATING SCHEMATIC
KING COUNTY DEPARTMENT OF
NATURAL RESOURCES & PARKS

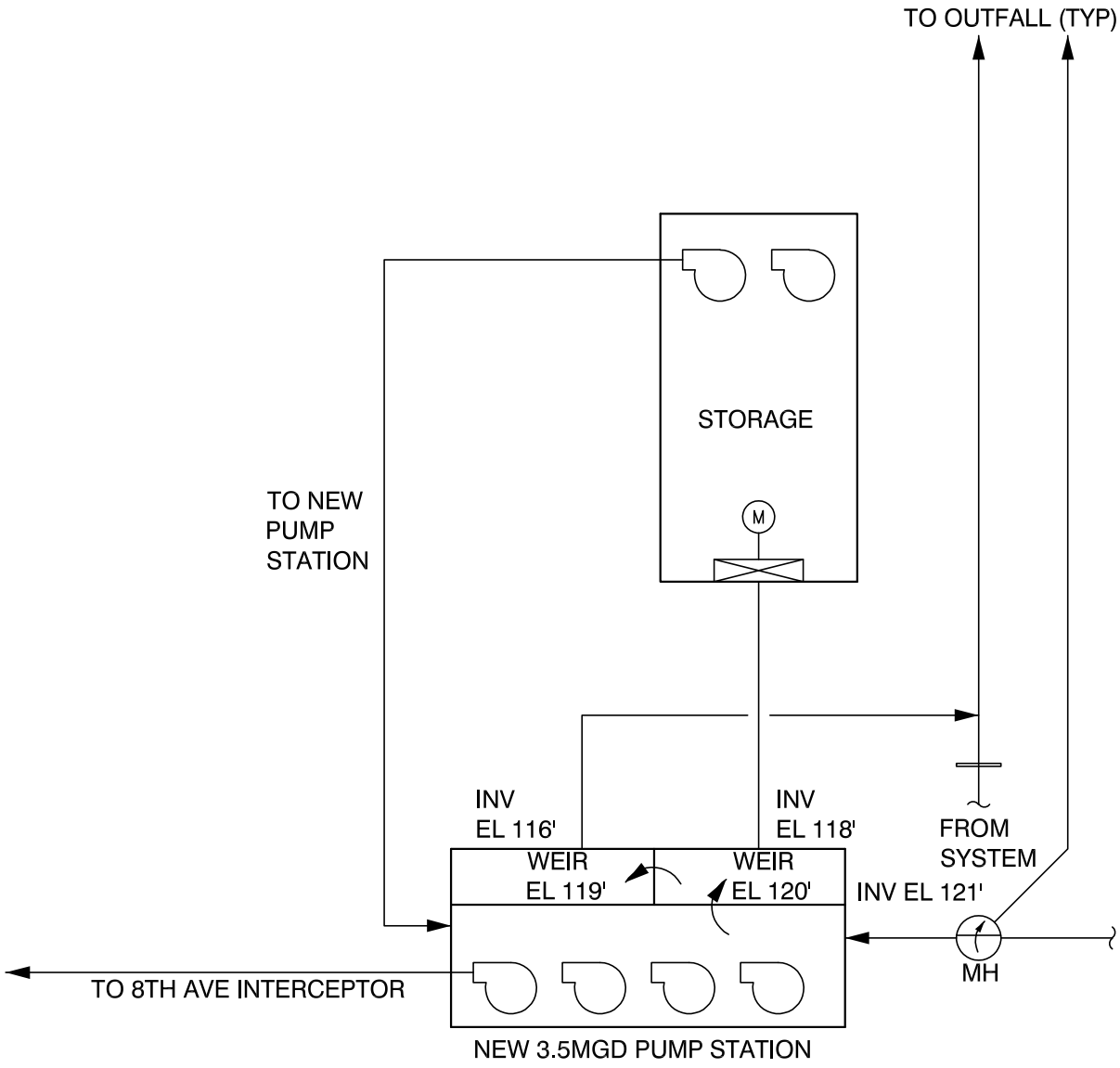


FIGURE 3
ALTERNATIVE 1D
OPERATING SCHEMATIC
KING COUNTY DEPARTMENT OF
NATURAL RESOURCES & PARKS

2.3 Storage Vessel Inlet Control

As described in Section 2.2, overtopping of the storage vessel will be prevented with an overflow weir connecting back into the existing 15-inch overflow line. For Alternative 1A, the overflow weir is located inside of the new storage tank. For Alternative 1B, the overflow occurs at a new diversion structure. For Alternative 1D, the overflow weir is located in the wet well of the new pump station.

2.4 Control Narrative

Flows directed to the storage vessels will be conveyed by gravity flow in all alternatives. A telemetry system is required to report ready status of all valves/gates and vessel emptying pumps, odor control, and electrical systems. All valves/gates are assumed to be motorized.

2.4.1 Filling

- Storage vessels in ready status. Diversion control valves are set in the proper position (Alternative 1A) or gates are open (Alternative 1B and Alternative 1D) and tank drainage pumps are verified ready by the telemetry and control system.
- Flows reach the capacity of the North Beach Pump Station (3.0 mgd for Alternative 1A and 1B) or the new high-head pump station (3.5 mgd for Alternative 1D) at approximately elevation 123.00 (Metro datum).
- Rising flow enters the 15-inch overflow pipeline (Alternative 1A), new pipeline from the diversion structure (Alternative 1B), or pipeline from the new pump station (Alternative 1D) and are diverted to the storage vessel.
- When the storage vessel reaches the maximum water level, continued flows overtop the storage vessel overflow weir (Alternative 1A), overflow weir at the diversion structure (Alternative 1B), or overflow weir at the wet well of the new headworks (Alternative 1D) and are directed to the 15-inch overflow. The objective is to prevent pressurization of the storage vessel.
- The odor control system will operate throughout the CSO event.
- Tank level will be continuously monitored.

2.4.2 Draining

- It is anticipated that flow from the either the North Beach Pump Station (Alternative 1A and Alternative 1B) or the new 3.5 mgd high-head pump station (Alternative 1D) and level in the respective wet wells will be monitored to control draining of the storage vessel.
- When flows drop below the capacity of the North Beach Pump Station or new high-head pump station and the level in the wet wells has dropped below the overflow weir (flow and level to be determined), the storage tank drain pumps will be activated to convey combined sewage flows back to the pump station wet wells.

- The maximum pumping rate will be approximately 0.5 mgd (320 gpm) to drain the storage vessel in a maximum of 12 hours.

2.4.3 Storage Vessel Cleaning Cycle

- The odor control system will shut down and air inlets will allow air to enter the storage vessel at the start of the cleaning cycle.
- The storage vessel flushing cycle will begin once the vessel is drained. Flushing and discharging vessel contents will be pumped, at a rate not exceeding 0.5 mgd, to the North Beach Pump Station wet well (Alternative 1A and Alternative 1B) or the new high-head pump station wet well (Alternative 1D).
- When the tanks are drained, the flushing pumps will cease operation and the system will be returned to a ready status.

3.0 DESCRIPTION OF ALTERNATIVES

Alternatives are described below. See Appendix 1 for plans, sections, and haul routes for these alternatives.

3.1 Alternative 1A – Rectangular Bottom of the Basin Storage

A buried, rectangular concrete storage tank, located adjacent to the existing county North Beach Pump Station on Triton Drive NW, provides approximately 0.23 MG of combined sewage storage volume. Below grade odor control and electrical facilities are included. To isolate the tank for maintenance, manual valves will be placed on the 15-inch line to the storage tank and on the 15-inch outfall line ahead of the tank overflow connection.

Construction comprises the following major elements:

- Construction Limits. An area of approximately 120 by 80 feet is identified as the construction limit.
- Access and Staging. Access will be primarily from Triton Drive NW and NW Blue Ridge Drive via NW Neptune Place and 24th Avenue NW. During construction, staging area in addition to the North Beach Pump Station property will be required. Construction access will be via NW Neptune Place.
- Residential Access. It is anticipated that this alternative will not significantly impact residential access and parking except for current access to Blue Ridge Park.
- Excavation and Shoring. This alternative includes excavation of approximately 6,000 cubic yards (CY) of material to facilitate construction. Temporary slope stabilization and protection will be required to maintain the integrity of the construction site. Shoring will be required for the storage tank, extending from the surface to approximately elevation 132 (Metro datum), about 35 feet in depth. The extent of shoring will be approximately 90 by 50 feet. Shoring will likely be removed after construction.

- Tank construction. Tank construction will be cast in place concrete, approximately 1,700 CY, supported most likely on a gravel pad. Approximate top and bottom elevations will be determined by hydraulic conditions. For purposes of this alternative, a storage vessel invert at approximately Elevation 107 (Metro datum) has been assumed. Ancillary tank equipment includes flushing gates and channel gates, mechanically or electrically operated, and submersible drainage pumps.
- Truck Hauling. Hauling of excavated soil away from the site, and hauling of materials to the site will be required for construction. Approximately 1,100 one way truck trips will be required for excavation hauling and delivery of concrete only. Most of these truck trips will occur in the first 6 months of construction and taper off over the following months during a total construction duration of approximately 12 months. The number of trips will be dependent on contractor planning and sequencing.
- Ancillary Facilities. Ancillary facilities include odor control and electrical equipment, as well as site paving and fencing. The odor control and electrical facility are planned to be a below grade structure, approximately 40 by 20 feet in plan. The structure would be approximately 15 feet deep. Odor control will include ventilation fans and activated carbon for use during wet weather events in which the storage tank is used. Odor control will not be activated unless the tank is in filling or draining mode. Site paving and fencing will enclose an operations and access area of about 7,200 square feet (SF) around the tank. Some additional area on top of the tank may also be paved as required by final design decisions.

3.2 Alternative 1B – Bottom of Basin Pipeline Storage

A buried, pipeline storage tank, located in Triton Drive NW and NW Blue Ridge Drive public right-of-way provides approximately 0.23 MG of combined sewage storage volume. Odor control and electrical facilities are included on the existing North Beach Pump Station property. These ancillary components are assumed to be below grade if feasible. A gate in the influent structure of the storage pipeline will be provided for isolation of the tank for maintenance.

Construction comprises the following major elements:

- Construction Limits. An area of approximately 40 by 20 feet on existing county property will be required for an odor control and electrical support facility. An area of approximately 325 by 25 feet has been identified as the construction limit for the underground storage tank. Construction of the storage vessel in public right-of-way would require a temporary 40 to 60-foot wide easement for the entire length of the tank during construction. Exact limits will be established during final design.
- Access and Staging. Access will be primarily from Triton Drive NW and NW Blue Ridge Drive via NW Neptune Place and 24th Avenue NW. During construction, staging area in addition to the North Beach Pump Station property will be required. Construction access will be via NW Neptune Place.

- Residential Access. It is anticipated that this alternative will impact residential access and parking. The final location of the storage vessel and construction sequencing will need to be refined to provide access to homeowners and emergency vehicles. The conceptual plan shown in Appendix 1 shows the approximate location of the storage vessel. Based on preliminary layout, the access for 3 residences on the north side and 3 residences on the south side of NW Blue Ridge Drive will need to be addressed.
- Excavation and Shoring. This alternative includes a large linear excavation in flat ground near Puget Sound for construction of 325 linear feet (LF) of 12-foot diameter reinforced concrete pipe. Approximately 7,000 CY of material will be removed to facilitate construction. Temporary slope stabilization and protection will be required to maintain the integrity of the construction site. Shoring will be required for the storage vessel, extending from the surface of the site to approximately elevation 108 (Metro datum) or about 25 feet in depth. Additional, shallower shoring will be needed for the smaller diameter sewers at either end of the storage vessel. The extent of shoring is approximately 335 by 25 feet in NW Blue Ridge Drive.
- Storage Vessel Construction. The storage vessel comprises approximately 325 LF of 12-foot diameter reinforced concrete pipe. Approximate top and bottom elevations will be determined by hydraulic requirements. For purposes of this alternative, a storage vessel invert at approximately Elevation 110 (Metro datum) has been assumed. Ancillary tank equipment includes flushing gates, mechanically or electrically operated, and submersible drainage pumps. The tank drain pipe will be approximately 6-inches in diameter and installed using cut and cover methods to the local collection system.
- Truck Hauling. Hauling of excavated soil away from the site, and hauling of materials to the site will be required for construction. Approximately 600 one way truck trips will be required for excavation hauling and delivery of concrete only. Most of these truck trips will occur in the first 6 months of construction and taper off over the following months during a total construction duration of 12 months. The number of trips will be dependent on contractor planning and sequencing.
- Ancillary Facilities. Ancillary facilities include odor control and electrical equipment, diversion structure, as well as site paving. The odor control and electrical facility is approximately 40 by 20 feet in plan. The structure would be approximately 15 feet high. Odor control will include ventilation fans and carbon for use during wet weather events in which the storage tank is used. The diversion structure will incorporate two weirs to divert flow to either the storage vessel or the outfall. During normal operation (flows less than 3.0 mgd), flows would pass through the structure to the North Beach Pump Station. Site paving will facilitate access to the odor control and electrical equipment on the existing North Beach Pump Station property.

3.3 Alternative 1D – Pump Station with Conveyance to 8th Avenue Interceptor and Rectangular Bottom of Basin Storage

A buried, rectangular concrete storage tank, located adjacent to a new county pump station on Triton Drive NW, provides approximately 0.15 MG of combined sewage storage volume. The new 3.5 mgd pump station would replace the existing North Beach Pump Station and convey base wastewater flows through two 8-inch diameter force mains to a drop structure at the top of the basin. The drop structure would provide a transition from the force mains to a 12-inch gravity sewer that conveys the flows to the 8th Avenue Interceptor. The drop structure includes odor control equipment. Odor control and electrical facilities are also included within the new pump station for the facilities at the bottom of the basin. In order to allow for isolation of the storage vessel for maintenance, a gate will be included on the influent pipeline to the tank.

Construction comprises the following major elements:

- Construction Limits. An area of approximately 90 by 90 feet is identified as the construction limit at the bottom of the basin. The construction limit of the drop structure and odor control facility is approximately 30 by 25 feet.
- Access and Staging. Access will be primarily from Triton Drive NW and NW Blue Ridge Drive via NW Neptune Place and 24th Avenue NW. During construction, staging area in addition to the North Beach Pump Station property will be required. Construction access will be via NW Neptune Place.
- Residential Access. It is anticipated that this alternative will not significantly impact residential access and parking except for current access to Blue Ridge Park.
- Excavation and Shoring. This alternative includes excavation of approximately 7,000 CY of material to facilitate construction. Temporary slope stabilization and protection will be required to maintain the integrity of the construction site. Shoring will be required for the storage tank and pump station. Shoring for the storage tank will extend from the surface to approximately Elevation 98 (Metro datum), about 40 feet in depth. Shoring for the pump station will extend from the surface to approximately Elevation 110 (Metro Datum), about 30 feet in depth. The shoring will comprise an area of approximately 5,000 SF. Shoring will likely be removed after construction.
- Tank and pump station construction. Construction for the tank as well as the wet well and pump room of the 3.5 mgd pump station will be cast in place concrete. The storage tank will require approximately 1,300 CY, supported most likely on a gravel pad. The wet well and pump room of the pump station will require approximately 600 CY, also supported by a gravel pad. Approximate top and bottom elevations will be determined by hydraulic conditions. For purposes of this alternative, a bottom slab elevation at approximately Elevation 103 (Metro datum) has been assumed for the storage tank. The pump station is assumed to include two-stage, dry-pit centrifugal pumps with variable frequency drives and ancillary equipment including utility water, odor control, electrical infrastructure, HVAC equipment and standby power. Based on preliminary hydraulic analysis, the approximate bottom of the wet well and pump room will be Elevation 110. Ancillary tank equipment

includes flushing gates and channel gates, mechanically or electrically operated, and submersible drainage pumps.

- Truck Hauling. Hauling of excavated soil away from the site, and hauling of materials to the site will be required for construction. Approximately 1,300 one way truck trips will be required for excavation hauling and delivery of concrete only. Most of these truck trips will occur in the first 12 months of construction and taper off over the following months during a total construction duration of 18 months. The number of trips will be dependent on contractor planning and sequencing.
- Ancillary Facilities. Ancillary facilities would be located within the pump station which is approximately 60 by 50 feet in plan. The pump station would be approximately one-story above grade as allowed by code. In addition, the facility requires site paving and fencing. Odor control will include ventilation fans and carbon vessels. The odor control equipment will operate continuously to support the pump station and storage tank during wet weather. Site paving and fencing will enclose an operations and access area of about 4,500 SF around the tank. Some additional area on top of the tank may also be paved as required by final design decisions.

3.4 Other Technical Considerations

3.4.1 Alternative 1A

Additional Alternative 1A technical considerations include:

- The capacity of the existing 15-inch outfall to handle combined sewer overflows in the future needs to be assessed.
- Potential locations for construction staging need to be examined and the county needs to determine if they will acquire a temporary construction easement (TCE) or require the contractor to obtain a TCE during construction.
- The anticipated useful life of the existing North Beach Pump Station and force main needs to be considered.

3.4.2 Alternative 1B

Additional Alternative 1B technical considerations include:

- The capacity of the existing 15-inch outfall to handle combined sewer overflows in the future needs to be assessed.
- Potential locations for construction staging need to be examined and the county needs to determine if they will acquire a TCE or require the contractor to obtain a TCE during construction.
- The anticipated useful life of the existing North Beach Pump Station and force main needs to be considered.

3.4.3 Alternative 1D

Additional Alternative 1D technical considerations include:

- The capacity of the existing 15-inch outfall to handle combined sewer overflows in the future needs to be assessed.
- Potential locations for construction staging need to be examined and the county needs to determine if they will acquire a TCE or require the contractor to obtain a TCE during construction.
- Increased operation and maintenance costs due to high-head, two-stage pumping should be carefully assessed for life cycle costing.
- Modifications to accommodate gravity sewers that are directly connected to the North Beach Force Main are required and should be assessed.
- Modification of Carkeek Pump Station operation would need to be addressed during final design and construction to prevent impacts on downstream facilities.

4.0 COST ESTIMATES

Appendix 2 contains the construction cost estimate as of the date of this memorandum.

5.0 ALTERNATIVE EVALUATIONS

Appendix 3 includes the evaluation criteria and evaluation matrix for the three alternatives under consideration.

Appendix 3 also contains the risk assessments developed by the project team in July 2010.

APPENDIX 1 – Alternative Graphics

- Alternative 1A
- Alternative 1B
- Alternative 1D

North Beach Alternative 1A: Rectangular Bottom of the Basin Storage

Project Elements:

- 0.23 MG underground storage tank
- Underground pumping equipment to drain stored flows
- Underground odor control and electrical facilities

Benefits:

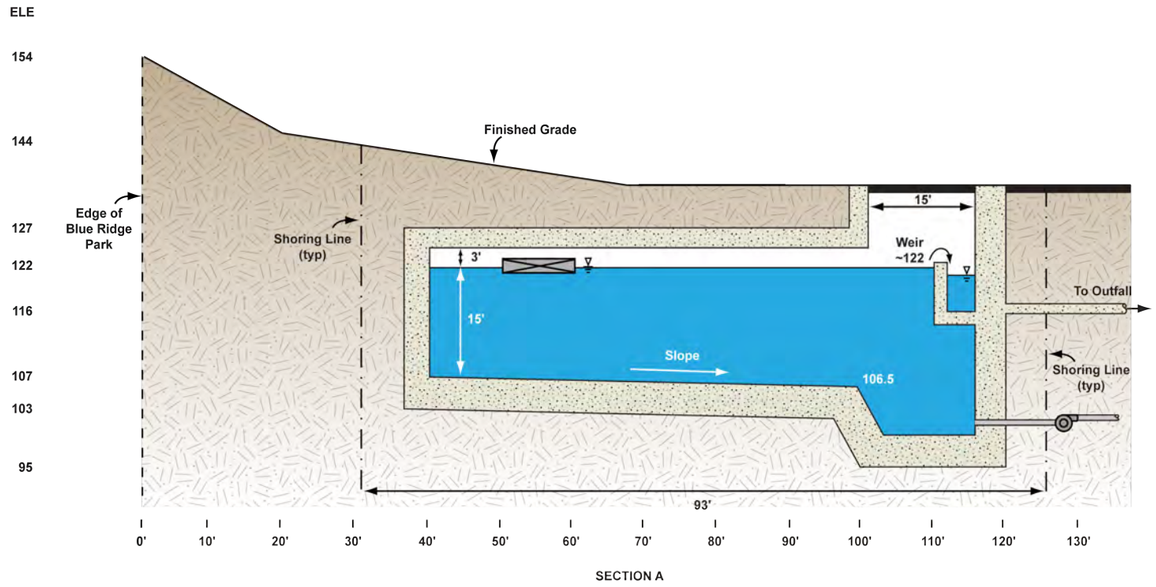
- Facility location where peak flows can be captured passively
- Similar to other King County operating facilities
- Efficient, safe access for operations and maintenance staff

Challenges:

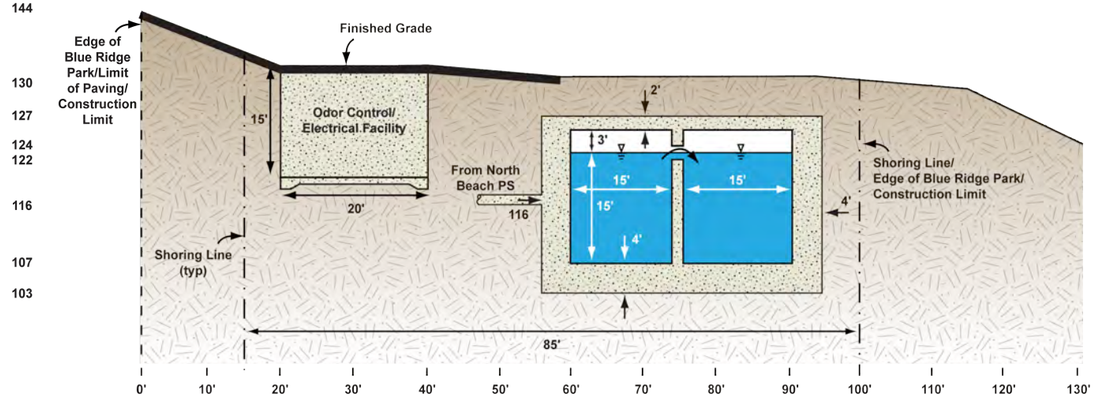
- Easement or acquisition of private park required
- Requires shoreline permit
- Access to Blue Ridge Park restricted during construction
- Shoreline zone is Conservancy Recreation

Planning Level Estimate:

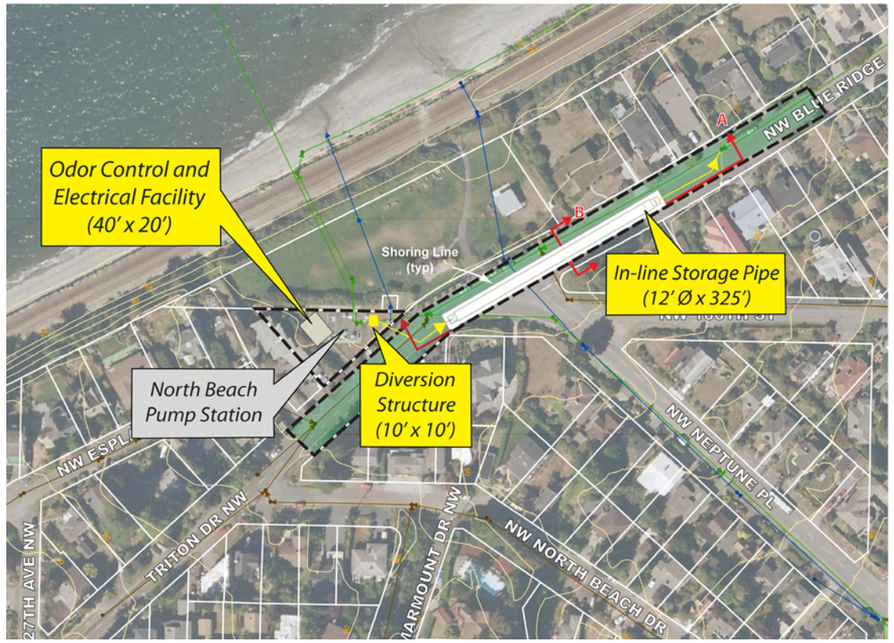
- $10.95 million

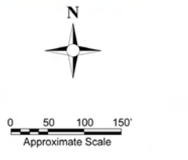


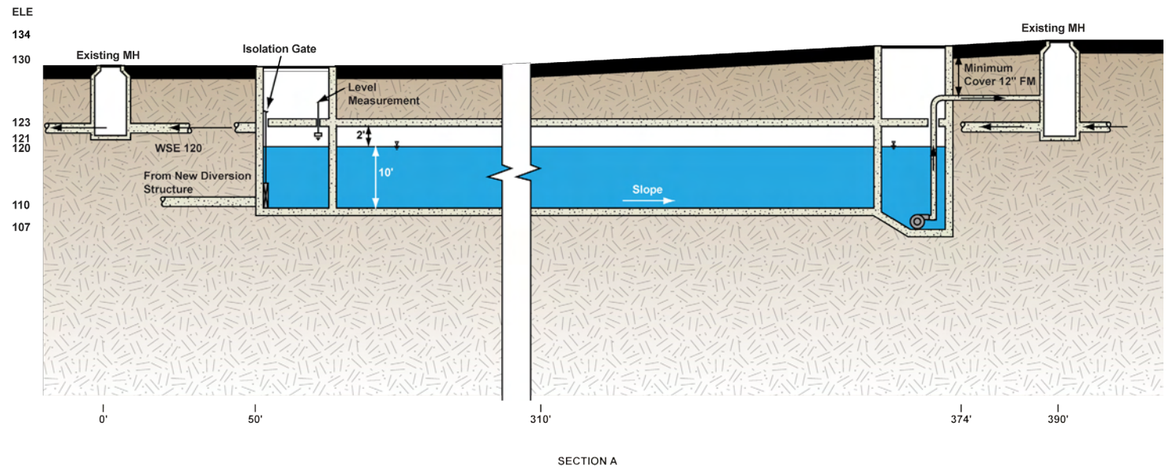
SECTION A



SECTION B







SECTION A

North Beach Alternative 1B: Pipeline Bottom of the Basin Storage

Project Elements:

- Underground diversion structure to direct flows to storage
- 0.23 MG underground storage pipeline in right-of-way
- Underground pumping equipment to drain stored flows in the in-line storage pipe
- Odor control and electrical facilities located on King County property

Benefits:

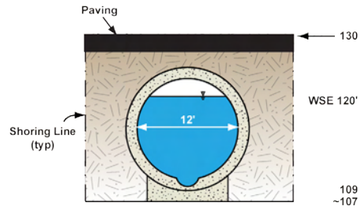
- Facility location where peak flows can be captured passively
- Similar to other King County operating facilities
- No apparent need to use or acquire private property

Challenges:

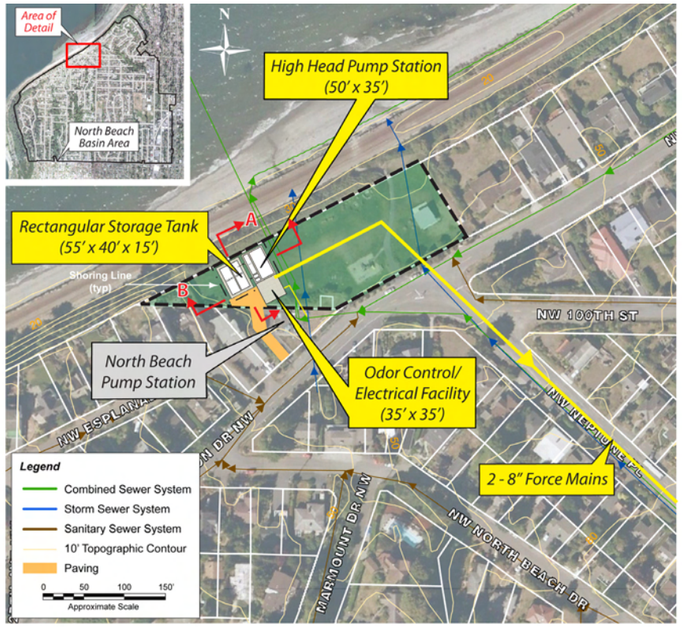
- Location in narrow street will result in access limitations to residences during extended construction period
- Long-term street access is needed for operations & maintenance activities

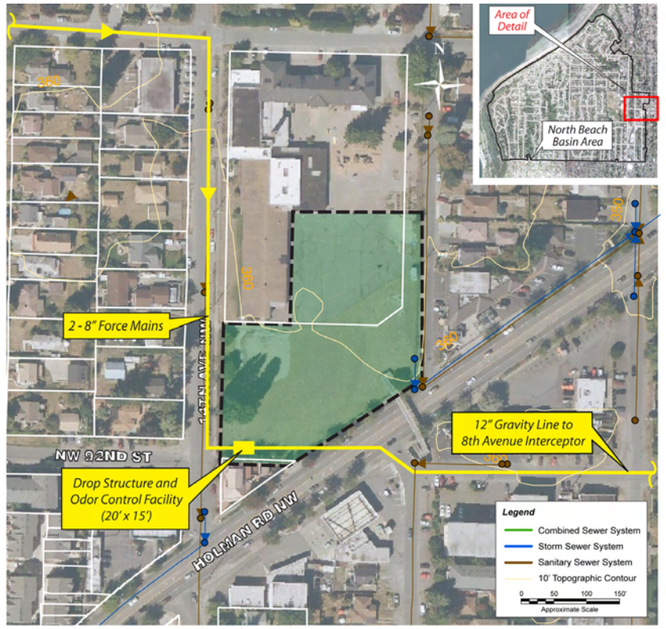
Planning Level Estimate:

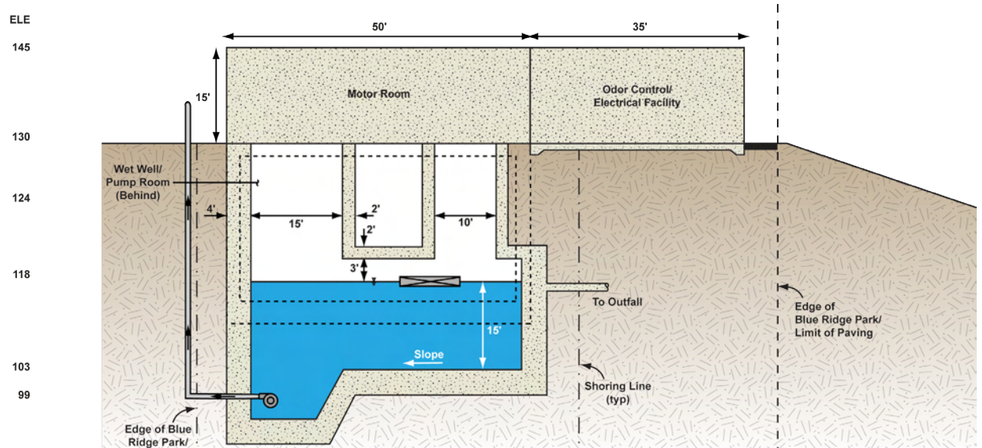
- $9.83 million

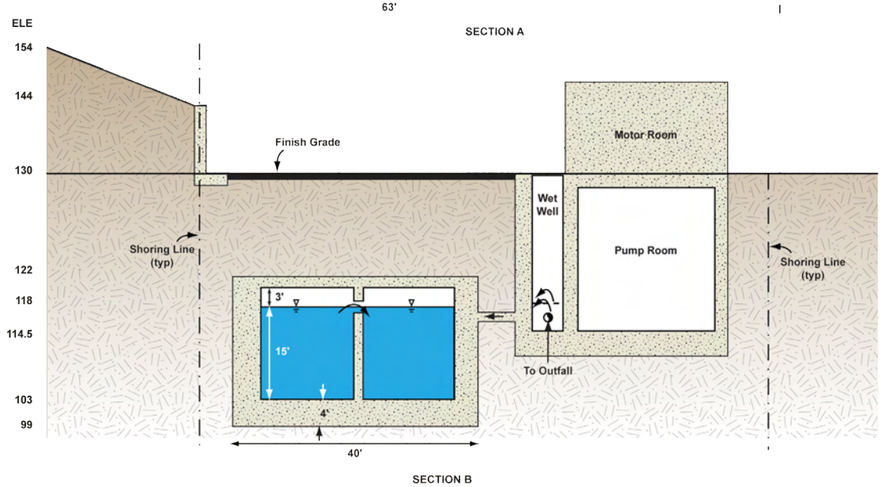


SECTION B









North Beach Alternative 1D: Centralized Storage at Bottom of Basin with Conveyance to 8th Avenue Interceptor

Project Elements:

- 3.5 mgd Pump Station at bottom of basin (300+ feet of head)
- 0.15 MG underground storage tank at bottom of basin
- Above ground odor control and electrical facilities adjacent to pump station
- 2 - 8" Force Mains from bottom of basin to Holman Rd NW (~5000 linear feet)
- Drop structure and odor control in utility easement
- 12" gravity sewer to 8th Avenue Interceptor (~3000 linear feet)

Benefits:

- Replaces existing force main in tidelands
- Facility located where peak flows can be captured passively
- Similar to other King County operating facilities
- Efficient, safe access for operations and maintenance staff

Challenges:

- Private property acquisition required for this alternative
- Increased O&M costs
- Requires shoreline permit
- Access to Blue Ridge Park restricted during construction
- Shoreline zone is Conservancy Recreation

Planning Level Estimate:

- $34.88 million

carollo
Engineers...Working Wonders With Water™

King County
Department of Natural Resources and Parks
Wastewater Treatment Division

For Internal Discussion Purposes Only

North Beach Alternative 1D
Centralized Storage at Bottom of Basin
with Conveyance to 8th Avenue Interceptor
9/10/10

APPENDIX 2 – Costs

- Alternative 1A Cost Estimate
- Alternative 1B Cost Estimate
- Alternative 1D Cost Estimate
- Life Cycle Cost Summary

THREE ALTERNATIVES COST SUMMARY
NORTH BEACH BASIN

Alternative	Description	Capital Cost	Land Acquisition Cost	Street Use	Project Total Cost	Relative Cost
1A	Rectangular Bottom of Basin Storage	$8,800,000	$600,000	$0	$9,400,000	1.03
1B	Pipeline Bottom of Basin Storage	$8,400,000	$400,000	$350,000	$9,150,000	1.00
1D	Centralized Storage at Bottom of Basin with Conveyance to 8th Avenue Interceptor	$27,400,000	$785,000	$480,000	$28,665,000	3.13

Note:
A relative cost value of 1.0 is the lowest cost of the group of alternatives
Total construction cost includes total direct costs plus 30% allied costs and 45% contingency cost
Project total cost is the sum of total construction cost plus street use and land acquisition cost

1.0 - 2.0
2.0 - 4.0
>4.0

Project:	**King County CSO**				
Subject:	**North Beach Alternative 1A**				
By :	**CEH**				
Date :	**21-Sep-10**				
	Storage Tank				
Capital Cost Estimate					
Item	**Description**	**Quantity**	**Unit**	**Unit cost, $**	**Cost, $**
DIVISION 1 - GENERAL REQUIREMENTS					
	Temporary Traffic Control	1	LS	$78,846	$78,846
	Temporary Erosion & Sediment Control	1	LS	$39,423	$39,423
DIVISION 2 - SITE WORK					
	Equipment Mobilization	1	EA	$10,000	$10,000
	ACP Removal				
	Storage Tank	0	SY	$20	$0
	Odor Control Building	89	SY	$20	$1,778
	Diversion Structure	405	SY	$20	$8,100
	Clearing & Grubbing	0.37	AC	$25,000	$9,183
	Excavation				
	Storage Tank + Odor Control Building	8,887	BCY	$15	$133,300
	Haul/Disposal - Tank+Odor Control Building	7,867	LCY	$11	$86,538
	Shoring				
	Storage Tank	8,856	SF	$42	$375,494
	Odor Control Building	2,700	SF	$42	$114,480
	Diversion Structure	2,700	SF	$42	$113,400
	Dewatering	1	LS	$890,000	$890,000
	Backfill (native)	2,593	BCY	$15	$38,894
	Install 20-inch pipe	200	LF	$700	$140,000
	Pipe Bedding	15	CY	$18	$267
	24" Compacted Gravel Fill - Tank	305	CY	$20	$6,104
	Imported Backfill/Compaction	2,593	CY	$20	$51,859
	AC Surface Restoration	458	SY	$45	$20,600
	Generator fuel tank	1	LS	$12,000	$12,000

Project:	**King County CSO**				
Subject:	**North Beach Alternative 1A**				
By :	**CEH**				
Date :	**21-Sep-10**				
	Storage Tank				
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
	Storage Tank				
	Base Slab	642	CY	$300	$192,600
	External Walls	756	CY	$500	$378,000
	Internal Walls	70	CY	$500	$35,000
	Top Elevated Slab	228	CY	$800	$182,400
	Miscellaneous fill/appurtenances	20	CY	$500	$10,000
	Crane Mobilization	1	EA	$22,000	$22,000
	Crane Rental	175	HR	$1,500	$262,500
	Crane Crew	175	HR	$240	$42,000
	Odor Control and Electrical Bldg				
	Top Elevated Slab	30	CY	$800	$23,704
	External Walls	67	CY	$500	$33,333
	Internal Walls	11	CY	$500	$5,556
	Base slab	30	CY	$300	$8,889
DIVISION 4 - MASONRY					
	N/A				
DIVISION 5 - METALS					
	Hatches	10	EA	$10,000	$100,000
DIVISIONS 7 & 8 - ARCHITECTURAL					
	N/A				

Project:	**King County CSO**				
Subject:	**North Beach Alternative 1A**				
By :	**CEH**				
Date :	**21-Sep-10**				
	Storage Tank				
Capital Cost Estimate					
Item	**Description**	**Quantity**	**Unit**	**Unit cost, $**	**Cost, $**
DIVISION 15 - MECHANICAL					
	Storage Tank				
	Tipping Bucket	2	LS	$25,000	$50,000
	Drain Gates	2	LS	$10,000	$20,000
	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	$300,000	$300,000
	Standby Generator	1	LS	$60,000	$60,000
	Telemetry	1	LS	$50,000	$50,000
	Subtotal				*$4,060,547*
	Escalation to time of construction	14.60%			$592,840
	Total estimated construction cost				$4,653,387
	Contingency	45%			$2,094,024
	Engineering Design	15%			$698,008
	Construction Management	15%			$698,008
	Sales Tax	9.5%			$641,004
	Total Estimated Capital Cost				$8,784,000

Project:	**King County CSO**				
Subject:	**North Beach Alternative 1B**				
By :	**CEH**				
Date :	**21-Sep-10**				
	Storage Pipe				
Capital Cost Estimate					
Item	**Description**	**Quantity**	**Unit**	**Unit cost, $**	**Cost, $**
DIVISION 1 - GENERAL REQUIREMENTS					
	Temporary Traffic Control	1	LS	$285,946	$285,946
	Temporary Erosion & Sediment Control	1	LS	$35,743	$35,743
DIVISION 2 - SITE WORK					
	Equipment Mobilization	1	EA	$10,000	$10,000
	ACP Removal				
	Storage Pipe	795	SY	$20	$15,900
	Odor Control Building	89	SY	$20	$1,780
	Diversion Structure	11	SY	$20	$220
	Clearing & Grubbing	0	AC	$12,000	$0
	Excavation				
	Storage Tank	6,091	BCY	$15	$91,361
	Diversion Structure	405	BCY	$25	$10,125
	Haul/Disposal - Tank	5,332	LCY	$11	$58,655
	Shoring				
	Storage Pipe	23,943	SF	$42	$993,635
	Dewatering	1	LS	$890,000	$890,000
	Backfill (native)	1,825	BCY	$15	$27,374
	Intall 12-ft Diam RCP storage pipe	325	LF	$1,000	$325,000
	Install 20-inch pipe	200	LF	$700	$140,000
	Pipe Bedding	15	CY	$18	$267
	24" Compacted Gravel Fill - Storage Pipe	589	CY	$20	$11,778
	Imported Backfill/Compaction - Storage Pipe	1,825	CY	$20	$36,498
	AC Surface Restoration	805	SY	$45	$36,245
	Generator fuel tank	1	LS	$12,000	$12,000

Project:	**King County CSO**				
Subject:	**North Beach Alternative 1B**				
By :	**CEH**				
Date :	**21-Sep-10**				
	Storage Pipe				
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
	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					
	Fencing - Diversion Structure	200	LF	$8	$1,600
	Hatches	8	EA	$10,000	$80,000
	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

Project:	**King County CSO**				
Subject:	**North Beach Alternative 1B**				
By :	**CEH**				
Date :	**21-Sep-10**				
	Storage Pipe				
Capital Cost Estimate					
Item	**Description**	**Quantity**	**Unit**	**Unit cost, $**	**Cost, $**
DIVISIONS 7 & 8 - ARCHITECTURAL					
	N/A				
DIVISION 15 - MECHANICAL					
	Storage Tank				
	Tipping Bucket	1	LS	$25,000	$25,000
	Drain Gates	1	LS	$10,000	$10,000
	Level Sensor	1	LS	$5,000	$5,000
	Pumps	3	LS	$5,000	$15,000
	Miscellaneous Mechanical	1	LS	$13,500	$13,500
	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	$300,000	$300,000
	Standby Generator	1	LS	$60,000	$60,000
	Telemetry	1	LS	$50,000	$50,000
	Subtotal				*$3,896,015*
	Escalation to time of construction	14.60%			$568,818
	Total estimated construction cost				$4,464,834
	Contingency	45%			$2,009,175
	Engineering Design	15%			$669,725
	Construction Management	15%			$669,725
	Sales Tax	9.5%			$615,031
	Total Estimated Capital Cost				$8,428,000

Project:	**King County CSO**				
Subject:	**Magnolia Alternative 1D**				
By :	**CEH**				
Date :	**21-Sep-10**				
Capital Cost Estimate					
Item	**Description**	**Quantity**	**Unit**	**Unit cost, $**	**Cost, $**
DIVISION 1 - GENERAL REQUIREMENTS					
	Access	1	LS	$427,506	$427,506
	Temporary Erosion & Sediment Control	1	LS	$106,876	$106,876
DIVISION 2 - SITE WORK					
	Equipment Mobilization	1	EA	$10,000	$10,000
	ACP Removal				
	Pipelines	16,970	SY	$20	$339,407
	Clearing & Grubbing	0.20	AC	$25,000	$5,000
	Excavation				
	Storage Tank + Pump Station	6,148	BCY	$25	$153,708
	Diversion Structure	405	BCY	$25	$10,125
	Drop Structure	222	BCY	$25	$5,556
	Pipelines	18,904	BCY	$25	$472,593
	Haul/Disposal				
	Tank + Pump Station	6,414	LCY	$11	$70,559
	Diversion Structure	506	LCY	$11	$5,569
	Drop Structure	278	LCY	$11	$3,056
	Pipelines	3,998	LCY	$11	$43,977
	Shoring				
	Storage Tank + Pump Station	13,764	SF	$42	$583,594
	Diversion Structure	1,944	SF	$42	$82,426
	Drop Structure	233	SF	$42	$9,800
	Dewatering	1	LS	$2,150,000	$2,150,000
	8" PVC Gravity Sewer	5,800	LF	$100	$580,000
	8" PVC Forcemain	11,600	LF	$125	$1,450,000
	24" Compacted Gravel Fill - Tank + Pump Station	293	CY	$20	$5,852
	Pipe backfill above zone	15,705	CY	$18	$282,696
	Pipe bedding/zone and compaction	2,879	CY	$20	$57,583
	AC Surface Restoration				
	Storage Tank	244	SY	$45	$11,000
	Pipelines	16,970	SY	$45	$763,667
	Driveway	347	SY	$45	$15,615

Project:	**King County CSO**				
Subject:	**Magnolia Alternative 1D**				
By :	**CEH**				
Date :	**21-Sep-10**				
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
	Drop Structure				
	Base Slab	44	CY	$300	$13,333
	External Walls	52	CY	$500	$25,926
	Top Elevated Slab	22	CY	$800	$17,778
	Storage Tank				
	Base Slab	459	CY	$300	$137,700
	External Walls	607	CY	$500	$303,500
	Internal Walls	45	CY	$500	$22,500
	Top Elevated Slab	155	CY	$800	$124,000
	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
	Retaining Wall	83	CY	$400	$33,333
DIVISION 4 - MASONRY					
	Odor Control Bldg				
	grade	2,400	SF	$38	$91,200
	Drop Structure				
	grade	300	SF	$38	$11,400
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
	Drop Structure				
	Metal Decking	2,400	SF	$6	$14,400
	Roof Joists, 8-ft OC Fabricated Steel	12,000	LB	$3	$36,000
	Miscellaneous Plates/Shapes	11,000	LB	$3	$33,000
	Metal Roof	2,400	SF	$6	$14,400
	Fencing - Diversion Structure	200	LF	$8	$1,600
	Fencing - Drop Structure	200	LF	$8	$1,600
	Hatches	8	EA	$10,000	$80,000

Project:	**King County CSO**				
Subject:	**Magnolia Alternative 1D**				
By :	**CEH**				
Date :	**21-Sep-10**				
Capital Cost Estimate					
Item	**Description**	**Quantity**	**Unit**	**Unit cost, $**	**Cost, $**
DIVISIONS 7 & 8 - ARCHITECTURAL					
	Roofing, doors, windows, finishes, etc	1	LS	$24,000	$24,000
DIVISION 15 - MECHANICAL					
	Storage Tank				
	Tipping Buckets	2	LS	$25,000	$50,000
	Drain Gates	2	LS	$10,000	$20,000
	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	2	EA	$65,000	$130,000
	Odor Control Equipment				
	Scrubber, Fan, Sound Enclosure	2	LS	$25,000	$50,000
	Pump Station	1	LS	$1,500,000	$1,500,000
DIVISION 16 - ELECTRICAL					
	Electrical				
	Electrical	1	LS	$1,068,764	$1,068,764
	Standby Generator	1	LS	$100,000	$100,000
	Telemetry	1	LS	$267,191	$267,191
	Subtotal				*$12,657,979*
	Escalation to time of construction	14.60%			$1,848,065
	Total estimated construction cost				$14,506,044
	Contingency	45%			$6,527,720
	Engineering Design	15%			$2,175,907
	Construction Management	15%			$2,175,907
	Sales Tax	9.5%			$1,998,208
	Total Estimated Capital Cost				$27,384,000

WTD Business Case Evaluation Results

North Beach CSO Life Cycle Cost

WTD Borrowing Cost as Discount Rate (1)

Scenario	Lifetime	Initial Capital Outlay	Total Project Life Costs (2)	Total Project Life Benefits	Net Project Life Costs	Average Project Annual Cost	Annual Costs over(under) Status quo
Status Quo							
"Status Quo"	0	$0	$0	$0	$0	$0	
Alternatives							
"Alt 1A"	20	$8,800,000	$9,055,525	$0	$9,055,525	$563,714	$563,714
"Alt 1B"	20	$8,400,000	$8,878,647	$0	$8,878,647	$552,703	$552,703
"Alt 1D"	20	$27,400,000	$28,689,414	$0	$28,689,414	$1,785,939	$1,785,939

Budget Office Discount Rate (3)

Scenario	Lifetime	Initial Capital Outlay	Total Project Life Costs (2)	Total Project Life Benefits	Net Project Life Costs	Average Project Annual Cost	Annual Costs over(under) Status quo
Status Quo							
"Status Quo"	0	$0	$0	$0	$0	$0	
Alternatives							
"Alt 1A"	20	$8,800,000	$8,970,829	$0	$8,970,829	$558,441	$558,441
"Alt 1B"	20	$8,400,000	$8,719,994	$0	$8,719,994	$542,827	$542,827
"Alt 1D"	20	$27,400,000	$28,262,024	$0	$28,262,024	$1,759,333	$1,759,333

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.

(3) Discount rate net of inflation, per the King County Budget Office. 7.00%

The option with the largest net equivalent annualized cost is the financially preferred option.

Describe Alternate 1A:--->	Bottom of Basin Storage Tank w/ Conveyance to Carkeek PS " " " "
"Alt 1A"	

Lifetime (in years)--->	20	Please provide
First year of O&M costs --->	2015	the appropriate
Electricity Supplier (SCL or PSE) --->	SCL	information in the
Indicate "Plant" or "Off-Site" --->	Off-site	shaded areas

See instructions below

All project costs through

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Current year (from Results summary sheet)																			
Total Benefits (from below)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital and O&M	$8,813,639	$13,775	$13,913	$14,052	$14,192	$14,334	$14,478	$14,622	$14,769	$14,916	$15,065	$15,216	$15,368	$15,522	$15,677	$15,834	$15,992	$16,152	$16,314
Debt-related and O&M	$737,446	$561,582	$561,720	$561,859	$561,999	$562,141	$562,285	$562,429	$562,576	$562,723	$562,872	$563,023	$563,175	$563,329	$563,484	$563,641	$563,799	$563,959	$564,121
Risk (from below)	$0	$0	$0	$0	$0	$0	$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	$0	$0	$0	$0	$0	$0
Capital outlays	$8,800,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Debt issuance	$176,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Debt service	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807	$547,807
		$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	$0
					$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Energy use	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Natural Gas	$0	$0	$0	$0	$0	$0	$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	0	0	0	0	0	0
Electricity	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Electricity Use kwh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demand kW or kVa	0	0	0	0	0	0	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	$0	$0	$0	$0	$0	$0
Sodium hypochlorite required in gal.	0	0	0	0	0	0	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	0	0	0	0	0	0
Other chemical costs - enter $	$0	$0	$0	$0	$0	$0	$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	$0	$0	$0	$0	$0	$0
Other Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Labor	$13,639	$13,775	$13,913	$14,052	$14,192	$14,334	$14,478	$14,622	$14,769	$14,916	$15,065	$15,216	$15,368	$15,522	$15,677	$15,834	$15,992	$16,152	$16,314
Labor Hours	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276

Benefits

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of benefits 1, 2, etc."

UNCERTAINTIES

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of uncertainties 1, 2, etc."

RISKS

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of risks 1, 2, etc."

Describe Alternate 1A:--->

"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)	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054
Total Benefits (from below)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital and O&M	$16,477	$16,642	$16,808	$16,976	$17,146	$17,317	$17,490	$17,665	$17,842	$18,020	$18,201	$18,383	$18,567	$18,752	$18,940	$19,129	$19,320	$19,514	$19,709	$19,906	$20,105	$20,306
Debt-related and O&M	$564,284	$16,642	$16,808	$16,976	$17,146	$17,317	$17,490	$17,665	$17,842	$18,020	$18,201	$18,383	$18,567	$18,752	$18,940	$19,129	$19,320	$19,514	$19,709	$19,906	$20,105	$20,306
Risk (from below)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$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	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital outlays	$0	$0	$0	$0	$0	$0	$0	$0	$0	$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	$0	$0	$0	$0	$0	$0	$0	$0	$0
Debt service	$547,807	$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	$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	$0	$0	$0	$0	$0	$0	$0	$0	$0
Energy use	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	$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	0	0	0	0	0	0	0	0	0
Electricity	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Electricity Use kwh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demand kW or kVa	0	0	0	0	0	0	0	0	0	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												
Sodium hypochlorite required in gal.	0	0	0	0	0	0	0	0	0	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	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	$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	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Labor	$16,477	$16,642	$16,808	$16,976	$17,146	$17,317	$17,490	$17,665	$17,842	$18,020	$18,201	$18,383	$18,567	$18,752	$18,940	$19,129	$19,320	$19,514	$19,709	$19,906	$20,105	$20,306
Labor Hours	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276
Benefits																						
1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of benefits 1, 2, etc."

UNCERTAINTIES																						
1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of uncertainties 1, 2, etc."

RISKS																						
1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of risks 1, 2, etc."

Describe Alternate 1A:--->

"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)	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Total Benefits (from below)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital and O&M	$20,509	$20,714	$20,921	$21,130	$21,342	$21,555	$21,771	$21,988	$22,208	$22,430	$22,655	$22,881	$23,110
Debt-related and O&M	$20,509	$20,714	$20,921	$21,130	$21,342	$21,555	$21,771	$21,988	$22,208	$22,430	$22,655	$22,881	$23,110
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	$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	$0	$0
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Energy use	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Electricity Use kwh	0	0	0	0	0	0	0	0	0	0	0	0	0
Demand kW or kVa	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemical spending													
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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Labor	$20,509	$20,714	$20,921	$21,130	$21,342	$21,555	$21,771	$21,988	$22,208	$22,430	$22,655	$22,881	$23,110
Labor Hours	276	276	276	276	276	276	276	276	276	276	276	276	276

Benefits

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of benefits 1, 2, etc."

UNCERTAINTIES

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of uncertainties 1, 2, etc."

RISKS

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of risks 1, 2, etc."

Describe Alternate 1B:--->	Bottom of Basin Storage Pipe w/ Conveyance to Carkeek PS
	" "
"Alt 1B"	" "
	" "

Lifetime (in years)--->	20	Please provide
First year of O&M costs --->	2015	the appropriate
Electricity Supplier (SCL or PSE) --->	SCL	information in the
Indicate "Plant" or "Off-Site" --->	Off-Site	shaded areas

See instructions below

	All project costs through 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Current year (from Results summary sheet)																			
Total Benefits (from below)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital and O&M	$8,425,548	$25,803	$26,061	$26,322	$26,585	$26,851	$27,119	$27,390	$27,664	$27,941	$28,220	$28,503	$28,788	$29,075	$29,366	$29,660	$29,957	$30,256	$30,559
Debt-related and O&M	$716,454	$548,710	$548,968	$549,228	$549,492	$549,757	$550,026	$550,297	$550,571	$550,848	$551,127	$551,409	$551,694	$551,982	$552,273	$552,567	$552,863	$553,163	$553,465
Risk (from below)	$0	$0	$0	$0	$0	$0	$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	$0	$0	$0	$0	$0	$0
Capital outlays	$8,400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Debt issuance	$168,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Debt service	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907	$522,907
		$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	$0
					$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Energy use	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Natural Gas	$0	$0	$0	$0	$0	$0	$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	0	0	0	0	0	0
Electricity	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Electricity Use kwh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demand kW or kVa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Chemical spending	$0	$0	$0	$0	$0	$0	$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	0	0	0	0	0	0
Bisulfide required in gal.	0	0	0	0	0	0	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	$0	$0	$0	$0	$0	$0
Materials and Supplies	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Labor	$25,548	$25,803	$26,061	$26,322	$26,585	$26,851	$27,119	$27,390	$27,664	$27,941	$28,220	$28,503	$28,788	$29,075	$29,366	$29,660	$29,957	$30,256	$30,559
Labor Hours	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517

Benefits

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of benefits 1, 2, etc."

UNCERTAINTIES

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of uncertainties 1, 2, etc."

RISKS

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of risks 1, 2, etc."

Describe Alternate 1B:--->

"Alt 1B"

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)	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055
Total Benefits (from below)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital and O&M	$30,864	$31,173	$31,485	$31,799	$32,117	$32,439	$32,763	$33,091	$33,422	$33,756	$34,093	$34,434	$34,779	$35,126	$35,478	$35,832	$36,191	$36,553	$36,918	$37,287	$37,660	$38,037	$38,417
Debt-related and O&M	$553,771	$31,173	$31,485	$31,799	$32,117	$32,439	$32,763	$33,091	$33,422	$33,756	$34,093	$34,434	$34,779	$35,126	$35,478	$35,832	$36,191	$36,553	$36,918	$37,287	$37,660	$38,037	$38,417
Risk (from below)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$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	$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	$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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Debt service	$522,907	$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	$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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Energy use	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$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	0	0	0	0	0	0	0	0	0	0
Electricity	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Electricity Use kwh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Demand kW or kVa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Chemical spending	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$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	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	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	$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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Labor	$30,864	$31,173	$31,485	$31,799	$32,117	$32,439	$32,763	$33,091	$33,422	$33,756	$34,093	$34,434	$34,779	$35,126	$35,478	$35,832	$36,191	$36,553	$36,918	$37,287	$37,660	$38,037	$38,417
Labor Hours	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517	517

Benefits

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of benefits 1, 2, etc."

UNCERTAINTIES

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of uncertainties 1, 2, etc."

RISKS

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of risks 1, 2, etc."

Describe Alternate 1B:--->

"Alt 1B"

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)	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
Total Benefits (from below)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital and O&M	$38,801	$39,189	$39,581	$39,977	$40,377	$40,781	$41,188	$41,600	$42,016	$42,436	$42,861	$43,289
Debt-related and O&M	$38,801	$39,189	$39,581	$39,977	$40,377	$40,781	$41,188	$41,600	$42,016	$42,436	$42,861	$43,289
Risk (from below)	$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
Capital outlays	$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
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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Energy use	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Natural Gas	$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
Electricity	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Electricity Use kwh	0	0	0	0	0	0	0	0	0	0	0	0
Demand kW or kVa	0	0	0	0	0	0	0	0	0	0	0	0
Total Chemical spending	$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
Bisulfide required in gal.	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
Materials and Supplies	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Costs	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Labor	$38,801	$39,189	$39,581	$39,977	$40,377	$40,781	$41,188	$41,600	$42,016	$42,436	$42,861	$43,289
Labor Hours	517	517	517	517	517	517	517	517	517	517	517	517

Benefits

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of benefits 1, 2, etc."

UNCERTAINTIES

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of uncertainties 1, 2, etc."

RISKS

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of risks 1, 2, etc."

Describe Alternate 1D:--->	Centralized Storage at Bottom of Basin w/ Conveyance to 8th Ave Interceptor	
	" "	
"Alt 1D"	" "	
	" "	
Lifetime (in years)--->	20	Please provide
First year of O&M costs --->	2015	the appropriate
Electricity Supplier (SCL or PSE) --->	SCL	information in the
Indicate "Plant" or "Off-Site" --->	Off-Site	shaded areas

See instructions below

All projects costs through

		2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Current year (from Results summary sheet)																								
Total Benefits (from below)		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital and O&M		$27,468,822	$69,510	$70,205	$70,907	$71,616	$72,332	$73,056	$73,786	$74,524	$75,269	$76,022	$76,782	$77,550	$78,326	$79,109	$79,900	$80,699	$81,506	$82,321	$83,144	$83,976	$84,816	$85,664
Debt-related and O&M		$2,322,494	$1,775,182	$1,775,877	$1,776,579	$1,777,288	$1,778,004	$1,778,728	$1,779,458	$1,780,196	$1,780,941	$1,781,694	$1,782,454	$1,783,222	$1,783,997	$1,784,781	$1,785,572	$1,786,371	$1,787,178	$1,787,993	$1,788,816	$83,976	$84,816	$85,664
Risk (from below)		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital outlays		$27,400,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Debt issuance		$548,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Debt service		$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$1,705,672	$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	$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
Total Energy use		$15,898	$16,057	$16,218	$16,380	$16,544	$16,709	$16,876	$17,045	$17,216	$17,388	$17,562	$17,737	$17,915	$18,094	$18,275	$18,458	$18,642	$18,829	$19,017	$19,207	$19,399	$19,593	$19,789
	Natural Gas	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$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	0	0	0	0	0	0	0	0	0	0	0
	Electricity	$15,898	$16,057	$16,218	$16,380	$16,544	$16,709	$16,876	$17,045	$17,216	$17,388	$17,562	$17,737	$17,915	$18,094	$18,275	$18,458	$18,642	$18,829	$19,017	$19,207	$19,399	$19,593	$19,789
	Electricty Use kwh	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000
	Demand kW or kVa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Chemical spending		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$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	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	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	$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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Costs		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Labor		$52,923	$53,453	$53,987	$54,527	$55,072	$55,623	$56,179	$56,741	$57,309	$57,882	$58,460	$59,045	$59,635	$60,232	$60,834	$61,442	$62,057	$62,677	$63,304	$63,937	$64,577	$65,222	$65,875
	Labor Hours	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071

Benefits

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of benefits 1, 2, etc."

UNCERTAINTIES

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of uncertainties 1, 2, etc."

RISKS

1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

"Additional description of risks 1, 2, etc."

Describe Alternate 1D:--->

"Alt 1D"

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)	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Total Benefits (from below)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital and O&M	$86,520	$87,385	$88,259	$89,142	$90,033	$90,934	$91,843	$92,761	$93,689	$94,626	$95,572	$96,528	$97,493
Debt-related and O&M	$86,520	$87,385	$88,259	$89,142	$90,033	$90,934	$91,843	$92,761	$93,689	$94,626	$95,572	$96,528	$97,493
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	$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	$0	$0
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Energy use	$19,987	$20,187	$20,389	$20,593	$20,798	$21,006	$21,216	$21,429	$21,643	$21,859	$22,078	$22,299	$22,522
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	$19,987	$20,187	$20,389	$20,593	$20,798	$21,006	$21,216	$21,429	$21,643	$21,859	$22,078	$22,299	$22,522
Electricty Use kwh	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000
Demand kW or kVa	0	0	0	0	0	0	0	0	0	0	0	0	0
Total 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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Labor	$66,533	$67,199	$67,871	$68,549	$69,235	$69,927	$70,627	$71,333	$72,046	$72,767	$73,494	$74,229	$74,972
Labor Hours	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071
Benefits													
1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
"Additional description of benefits 1, 2, etc."													
UNCERTAINTIES													
1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
"Additional description of uncertainties 1, 2, etc."													
RISKS													
1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
"Additional description of risks 1, 2, etc."													

Current year (from Results summary sheet)	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062
Total Benefits (from below)	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Capital and O&M	$98,468	$99,453	$100,447	$101,452	$102,466	$103,491	$104,526	$105,571	$106,627	$107,693	$108,770	$109,858	$110,956
Debt-related and O&M	$98,468	$99,453	$100,447	$101,452	$102,466	$103,491	$104,526	$105,571	$106,627	$107,693	$108,770	$109,858	$110,956
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	$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	$0	$0
	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Energy use	$22,747	$22,974	$23,204	$23,436	$23,671	$23,907	$24,146	$24,388	$24,632	$24,878	$25,127	$25,378	$25,632
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	$22,747	$22,974	$23,204	$23,436	$23,671	$23,907	$24,146	$24,388	$24,632	$24,878	$25,127	$25,378	$25,632
Electricty Use kwh	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000	238000
Demand kW or kVa	0	0	0	0	0	0	0	0	0	0	0	0	0
Total 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	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Labor	$75,721	$76,478	$77,243	$78,016	$78,796	$79,584	$80,380	$81,183	$81,995	$82,815	$83,643	$84,480	$85,325
Labor Hours	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071	1071
Benefits													
1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
"Additional description of benefits 1, 2, etc."													
UNCERTAINTIES													
1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
"Additional description of uncertainties 1, 2, etc."													
RISKS													
1.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
2.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
3.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
4.	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
"Additional description of risks 1, 2, etc."													

APPENDIX 3 – Evaluations

- Evaluation Criteria
- Evaluation Matrix
- Risk Assessments

Barton, Murray, Magnolia and North Beach CSO Projects
Alternatives Analysis
PRELIMINARY DRAFT CRITERIA
Version 8 February 2010

Category	Sample Criteria	Sample Questions	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**				
		1. Will location of new facilities be consistent with Seattle's short and long-term planning policies?	Yes	Partly consistent	Potentially inconsistent with policies
[REV 11/23/09]	**2. Seattle Municipal Code**				
		1. Is the location and type of construction consistent with Seattle's Municipal Code (SMC) and the Growth Management Act (GMA) requirements?	Yes	Partly consistent	Inconsistent; requires change to code or major exception to existing regulations
[REV 11/23/09]	**3. Shoreline Master Program**	1. Will location of facilities be consistent with the City of Seattle 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]		1. Will descretionary permits be required?	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]		2. Will multiple departmental reviews from City of Seattle be required?	1 departmental review only	2 departmental reviews required	3 or more departmental reviews required
[REV04/05/10] **NEW QUESTION**		3. Are above-ground structures at the site (e.g. odor control/electrical) consistent with City of Seattle height restrictions?	Yes	Consistent with Conditions (CCU required)	No - prohibited
[REV 11/23/09]		4. Wil the site location require marine access or in-water work? If so, will multiple work closures be imposed due to the presence of important fish/wildlife habitat?	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.
		5. Will traffic and noise impacts be potentially significant due project location?	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**				
		1. Ability to acquire property rights within project timeline *(Can we get it?)*	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
		2. Potential acquisition variables that impact cost *(How will it costs impact probability of success?)*	Owner accepts appraised value, or King County offers listed price	Owner requests additional compensation that is supported	Significant costs of acquisition probable
		3.Impacts on stakeholders & current use *(Who is impacted? = level of impact)*	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**				
		1. Will construction of the alternative impact archaeological 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]		2. Will construction of the alternative impact historic resources?	Historic properties not 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**				
		1. Will construction or operation of the alternative adversely affect fish and wildlife or their habitat?	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.	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]		1. Will construction of the alternative impact wetlands, streams, or shoreline areas?	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]		1. Will construction of the alternative disturb contaminated soils or sediments?	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.
		2. Will construction of the alternative require disruption of steep slopes or increase the likelihood of landslides?	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**				
		1. Will operation of the alternative result in the discharge of a new source of untreated stormwater to a surface waterbody?	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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Category	Sample Criteria	Sample Questions	Scale		
			Low Impact (rating of 3)	Moderate Impact (rating of 2)	High Impact (rating of 1)
TECHNICAL					
	1. Technical Complexity				
		1. Does Implementation require complex flow measurement, algorithms, or PLC programming and infrastructure to direct flow to the alternative storage or treatment facility? Will the technology reliably meet CSO control objectives using the required controls? (Note: Re-worded to clarify.)	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.
		2. How many individual sites are included in the alternative and what is the consistency of technical and construction approach across the sites?	There is one site included in the alternative. All controls and infrastrcture 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]		1. Do the standards of other agencies affect the design and operation of the facility?	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
[REV 3/01/10]		2. Is the alternative stand alone or does its implementation affect other parts of the WW system including the West Point Treatment Plant?	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				
		1. Can the alternative meet changing control criteria?	Yes, with minimal modification of controls.	Yes, with moderate modification of controls.	Yes, but significant modification of complex controls likely.
[REV 3/01/10]		2. Can the alternative be easily modified to meet future flow conditions?	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.
[REV 3/01/10]	**4. Contructability/Implementation Schedule**				
		1. Are construction risks associated with groundwater, steep slopes, or soil materials significant?	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 stablize the site such as caissons, slurry walls, tiebacks, permanent dewatering.
[REV 3/01/10]		2. Are construction risks associated with access, staging, availability of specialty contractors, availability of power, etc. significant? (All construction requires some type of staging. Here we are rating alternatives based on the ease of close staging? This is a usual contractor secured item AND is a short duration item. Staging areas should not impact permanent decisions.	Site is not constrained. Adequate area for access and staging and operation of special equipment can be accomodated. 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. Constractor 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.
		3. Can the alternative meet the project schedule?			
O&M					
	1. Staffing				
[REV 03/01/10]		1. Can the facility be easily (automatically) started up? Can the facility operate autonomously under the design conditions?	The facility can be automatically started. The facility can operate autonomously under the design conditions.	The facility can be automatically started. The facility may requires 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]		2. What level of staffing is required for operation and shutdown (how often is the facility used, how long is the facility in use, how many operators are required, what level of operator experience is required, what are travel times)? What are peak staff requirements?	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]		3. Does the alternative impact downstream treatment facility processes?	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]		4. Does the alternative require hi labor annual type cleaning requirements or does the design allow for passive post event cleanup systems?	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.

Category	Sample Criteria	Sample Questions	Scale		
			Low Impact (rating of 3)	Moderate Impact (rating of 2)	High Impact (rating of 1)
	2. Training				
[REV 03/01/10]		1. What level and frequency of training is required? Is the existing staff familiar with the technology? Is similar equipment in use in the West Section?	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.
		2. Are similar control approaches specified with identical components? Can the facilities be used to simulate an event for testing and training?	Similar control approaches are specified with identical components at each facility. Control procedures are similar to exsting 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 exsting 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 exsting West Section facilities. The facilities can not be used to simulate an event during testing and training.
	3. Reliability				
[REV 03/01/10]		1. How complex is the system (number and type of components)? How complex are the startup procedures and controls? Are redundant control systems provided? Is dedicated backup power available ?	The alternative has a single control facility with one or two inlet/outlet structures.. Startup procedures are passive or automated remotely with redundant control systems and backup power.	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.
		2. Proven technology? Are the control systems routinely used for similar facilities and similar applications?	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]		1. What is the level of normal maintenance? How many mechanical/instrumentation components are required?	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]		2. Are facility components accessible? Is there access and staging for chemical, vactor and boom trucks? Are traffic control procedures required for routine maintenance?	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]		3. Do the facilities require interaction with other agencies?	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				
		1. Does the facility have access requirements in the right of way or require confined space entry? Are traffic control procedures required? Does access require street use permit or lane closure?	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 right of way 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 EFFECTIVNESS					
[REV 12/08/09]	**1. Relative Project Costs**				
		1. Are the Project Costs relatively clost to one another (i.e. project cost is not a differentiating factor in selecting an alternative), or is there a high degree of variability in Project Cost between the alternatives?	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**				
		1. Are the Life-Cycle Costs relatively clost to one another (i.e. life-cycle cost is not a differentiating factor in selecting an alternative), or is there a high degree of variability in Life-Cycel Cost between the alternatives?	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.

Category	Sample Criteria	Sample Questions	Scale		
			Low Impact (rating of 3)	Moderate Impact (rating of 2)	High Impact (rating of 1)
[REV 12/08/09]	**3. Relative Variability/Risk**				
		1. At this level Project Costs are represented as having a range (low to high). Is there a high degree of variability in the estimated range of Project Cost for a particular alternative? (i.e. are their risk factors that could cause the cost of an alternative to increase significantly?)	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**				
		1. Does facility change or impede surrounding land and marine uses?	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]		1. Can design make the facility compatible with community vision of itself at this stage, before specific conversations with potentially affected parties can occur?	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 is distinct from character, use, community's vision of area and distinction can't be addressed through design.
		2. What are the impacts of O&M activities on the surrounding community?	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**				
		1. What is the construction schedule/duration?	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.
		2. Will construction be carried out in public access areas, including parks, beaches and roadways?	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.
		3. What are anticipated construction impacts to near neighbors? What are	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
		4. How will truck traffic affect area?	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.
		5. What is construction area requirement?	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.
		2. Will construction be carried out in public access areas, including parks, beaches and roadways?	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.
		3. What are anticipated construction impacts to near neighbors? What are the traffic disruptions?	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.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 1A: RECTANGULAR BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1B: PIPELINE BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1D: CENTRALIZED STORAGE AT BOTTOM OF BASIN WITH CONVEYANCE TO 8TH AVENUE INTERCEPTOR	
	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. 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.	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. Because of the small size of the facilities, the alterantive may be consistent with the 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. 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.
2. Seattle Municipal Code	2	Located on or adjacent to existing pump station. Zoning is Single Family Residential. Utility Service Use is permitted as a City Council conditional use.	2	Located on or adjacent to existing pump station. Zoning is Single Family Residential. Utility Service Use is permitted as a City Council conditional use.	2	**Bottom of Basin Site:** Located on or adjacent to existing pump station. Zoning is Single Family Residential. Utility Service Use is permitted as a City Council conditional use. **Holman Road Site:** Zoning is Commercial. Utility Service Uses are permitted in C1-40 zones.
3. Shoreline Master Program	1	The storage tank would be located in a privately-owned park designated "Conservancy Recreation" (CR) in Seattle's Shoreline Master Program. Storage is considered a "Utility Service Use." Utility lines are permitted in CR, but Utility Service Uses are prohibited.	3	Storage is outside of the shoreline zone.	1	The storage tank would be located in a privately-owned park designated "Conservancy Recreation" (CR) in Seattle's Shoreline Master Program. Storage is considered a "Utility Service Use." Utility lines are permitted in CR, but Utility Service Uses are prohibited. Expansion of the pump station is permitted with City Council approval.
4. Permitting Complexity	2	This alternative will require a Shoreline Permit. Affected roadways in residential area with regional transportation (railway) adjacent to site. Will require careful traffic planning to maintain access. Work hours likely to be restricted.	3	This alternative likely does not require a Shoreline Permit. Affected roadways in residential area with regional transportation (railway) adjacent to site. Will require careful traffic planning to maintain access. Work hours likely to be restricted.	2	This alternative will require a Shoreline Permit. Affected roadways in residential area with regional transportation (railway) adjacent to site. Will require careful traffic planning to maintain access. Work hours likely to be restricted.
5. Property Acquisition Complexity	2	Private park zoned single family residential. Partial acquisition required. Concerns regarding acquisition from homeowners association. Approximately 1/4 Ac.	3	Assumes street use of 250 lineal feet for pipeline storage.	2	**Bottom of Basin Site:** Private park zoned single family residential. Partial acquisition required. Concerns regarding acquisition from homeowners association. Approximately 1/2 Ac. **Holman Road Site:** Assumes use of utility easement. Approximately 1/8 Ac. **Pipeline:** Extensive street right of way required.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 1A: RECTANGULAR BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1B: PIPELINE BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1D: CENTRALIZED STORAGE AT BOTTOM OF BASIN WITH CONVEYANCE TO 8TH AVENUE INTERCEPTOR	
	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION	IMPACT RATING	DESCRIPTION
ENVIRONMENT						
1. Cultural Resources	3	No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources. No historic properties within the project area.	3	No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources. No historic properties within the project area.	3	No known archaeological sites or historic resources. Based on site characteristics, the project area has a low probability of containing archaeological resources. No historic properties within the project area.
2. Fish and Wildlife	3	Construction and operation of this alternative would not adversely affect fish and wildlife, or their habitat.	3	Construction and operation of this alternative would not adversely affect fish and wildlife, or their habitat.	3	Construction and operation of this alternative would not adversely affect fish and wildlife, or their habitat.
3. Wetlands, Streams and Shoreline	3	GIS maps show a piped stream crossing through the project area. This rating assumes that construction may relocate the pipe but there would be no adverse impacts to the stream, wetlands or shoreline.	3	GIS maps show a piped stream crossing through the project area. This rating assumes that construction may relocate the pipe but there would be no adverse impacts to the stream, wetlands or shoreline.	3	**Bottom of Basin Site:** Alternative replaces (by abandonment) the force main in the beach and along Piper's Creek with force mains located in areas that are not environmentally sensitive. GIS maps show a piped stream crossing through this project area. This rating assumes that construction may relocate the pipe but there would be no adverse impacts to the stream, wetlands or shoreline. **Holman Road Site:** No wetlands, streams or shoreline in this project area.
4. Soils and Sediments	3	No known contaminated sites. Project area is not within liquifaction zone. No steep slopes and/or known landslide areas. Potential landslide areas are located within project area, but it is assumed that construction of this alternative would not increase the likelihood of landslides.	3	No known contaminated sites. Project area is not within liquifaction zone. No steep slopes and/or known landslide areas. Potential landslide areas are located within project area, but it is assumed that construction of this alternative would not increase the likelihood of landslides.	2	No known contaminated sites in the vicinity of the Blue Ridge Park Site. There are known contaminated sites and potential to encounter contaminated soils in the vicinity of the drop structure and odor control facility site and pipeline alignment near Holman Road. Project area is not within liquifaction zone. No steep slopes and/or known landslide areas. Potential landslide areas are located within project area, but it is assumed that construction of this alternative would not increase the likelihood of landslides.
5. Water Quality	3	No new untreated discharges to surface waters.	3	No new untreated discharges to surface waters.	3	No new untreated discharges to surface waters.
TECHNICAL						
1. Technical Complexity	3	Single site. Simple approach. Gravity overflow from existing pump station wet well to gravity fill tank. Automatic cleaning and emptying after event will require telemetry and local controls. Flows exceeding tank capacity overflow to existing outfall. Undergrounding of support facilities required.	3	Single site. Simple approach. Gravity overflow from existing pump station wet well to gravity fill tank. Automatic cleaning and emptying after event will require telemetry and local controls. Flows exceeding tank capacity overflow to existing outfall. Undergrounding of support facilities likely.	2	Primary facilites on single site. Simplified control approach with pump station sized for baseline flows only with gravity overflow to storage. Automatic cleaning and emptying after event will require telemetry and local controls. Flows exceeding tank capacity overflow to existing outfall. Requires high head pumping
2. Compatibility with Existing WW System	3	Stand alone alternative. Passive diversion from existing overflow line.. Does not affect downstream capacity in county system.	3	Stand alone alternative. Passive diversion from existing overflow line. Does not affect downstream capacity in county system.	2	Stand alone alternative. Re-directs flow now going to Carkeek Pump Station. Passive diversion from new pump station wet well. Flows from new pump station and Carkeek Pump Station need to be limited. Effectively accelerates two future projects (new PS and forcemain). However, benefit is offset by high head pumping.
3. Flexibility/Adaptive Management	2	Storage tank not easily modified for enlargement.	2	Storage tank not easily modified for enlargement.	2	Storage tank and pump station not easily modified for enlargement.
4. Constructability/ Implementation Schedule	2	Risks associated with shoring, groundwater and limited space. Very limited staging and access area due to residential area. Alternative can likely meet the construction schedule. Better constructability in park, but offset (by ranking elsewhere), related to permitting.	2	Risks associated with shoring, groundwater and limited space. Very limited staging and access area due to residential area. Alternative can likely meet the construction schedule.	2	Risks associated with shoring, groundwater and limited space for pump station and storage facility. Limited staging and access area due to residential area. Alternative can likely meet the construction schedule. However, a more compressed design/construction period relative to other alternatives is required because of increased design complexity and construction effort.

NORTH BEACH BASIN ALTERNATIVES

CATEGORY / CRITERIA	ALTERNATIVE 1A: RECTANGULAR BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1B: PIPELINE BOTTOM OF BASIN STORAGE WITH CONVEYANCE TO CARKEEK PUMP STATION		ALTERNATIVE 1D: CENTRALIZED STORAGE AT BOTTOM OF BASIN WITH CONVEYANCE TO 8TH AVENUE INTERCEPTOR	
	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. Facility should not impact downstream facilities.	2	Facility can be automatically started (gravity overflow) and run autonomously under design conditions. Minimal staffing required for operation and shut down. Additional staffing/supervision needed for cleaning due to location within public right-of-way. Facility should not impact downstream facilities.	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. Facility should not impact downstream facilities.
2. Training	3	Staff familiar with storage facilities. Similar control approaches to other facilities within the system can be specified for consistency.	3	Staff familiar with storage facilities. Similar control approaches to other facilities within the system can be specified for consistency.	3	Staff familiar with pump stations and storage facilities. 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 not critical for ability to store peak flows. Storage is a proven technology for controlling peak flow events.	3	System is not complex. Gravity diversion over a weir. Power not critical for ability to store peak flows. Storage is a proven technology for controlling peak flow events.	3	System is not complex. Gravity diversion over a weir. Power not critical for ability to store peak flows. Storage is a proven technology for controlling peak flow events.
4. Maintenance	3	Alternative requires little maintenances. Minimal telemetry/controls to maintain (typical level sensing and pump system controls). Assumes no entry to storage.	2	Alternative requires little maintenances. Minimal telemetry/controls to maintain (typical level sensing and pump system controls). Assumes limited entry required to facilitate cleaning of pipeline storage.	2	Alternative requires more maintenance due to need for a two-stage pump station. Assumes no entry to storage.
5. Safety	3	No street access required. No traffic control procedures required. No street use/closure permit required.	2	No street access required for typical operations. Infrequent maintenance issues will require traffic control procedures and street use/closure permit.	3	No street access required. No traffic control procedures required. No street use/closure permit required.
COST EFFECTIVENESS						
1. Relative Project Costs	3	Relative Cost = 1.03	3	Relative Cost = 1.00	2	Relative Cost = 3.13
2. Relative Life Cycle Costs	3	Relative Cost = 1.02	3	Relative Cost = 1.00	2	Relative Cost = 3.22
3. Relative Variability/Risk	3	Assumed low. To be confirmed by risk analysis.	3	Assumed low. To be confirmed by risk analysis.	2	Assumed moderate compared to other alternatives. To be confirmed by risk analysis.
COMMUNITY IMPACT						
1. Location	1	Alternative requires acquisition of private property. Facility can be designed to be consistent with community's vision of itself. Does not address PS/FM facilities.	3	Pipeline in street is not visible. Ancillary facilites located within existing North Beach Pump Station site. Design will need to address concerns about light, noise, or odor control. Acquisition of private property is not required for this alternative. Does not address PS/FM facilities.	1	**Bottom of Basin Site:** Siting will require acquisition of private property. Facility will be visible from numerous properties uphill of the site. Design will need to address concerns about light, noise, or odor control. **Holman Road Site:** Facility would be located within existing utility easement. Site is visible but can be designed to be compatible with the surrounding commercial area.
2. Potential Community Impacts	1	Use will require frequent visits by O&M and potential heavy equipment access, primarily following a peak flow event. Assuming portion of Blue Ridge Park can be restored to park activities, some O&M activites may conflict with site uses and adjacent facilities requiring close coordination between O&M and the community.	2	Use will require frequent visits by O&M and potential heavy equipment access, primarily following a peak flow event. Maintenance activity in the right of way may require street closures.	1	Use will require frequent visits by O&M and potential heavy equipment access, primarily following a peak flow event. Assuming portion of Blue Ridge Park can be restored to park activities, some O&M activites may conflict with site uses and adjacent facilities requiring close coordination between O&M and the community. Project eliminates need for a second project to upgrade existing infrastructure.
3. Construction Impacts	1	Siting will affect adjacent properties during construction. Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Work hour and noise restrictions may impact the construction duration. It may be difficult to mitigate impacts through standard construction methods. Blue Ridge Park will be inaccessible during construction.	1	Siting will affect adjacent properties during construction. Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Work hour and noise restrictions may impact the construction duration. It may be difficult to mitigate impacts through standard construction methods. Blue Ridge Park will have limited access during construction.	1	Construction will create noise, dust and construction traffic impacts on local traffic and neighboring residences. Work hour and noise restrictions may impact the construction duration. It may be difficult to mitigate impacts through standard construction methods. Siting will affect adjacent properties during construction. Construction impacts various areas of the basin due to pipeline construction and facilities at two sites. Blue Ridge Park will be inaccessible during construction.

North Beach - CSO Risk Workshop -- Alternative 1A

7/28/2010

Risk Indentification			Risk Type		Risk Qualification			Risk Mitigation / Response
Risk #	Description of Risk Event	Addt'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Description (Accept/Avoid/Transfer/Mitigate)
	Example Threat with Cost Impacts		T	C	H	L	HL	
	Example Opportunity with Schedule Impacts		O	S	M	H	MH	
1.0	**Land Use and Permitting**							
1.03	Challenge to Shoreline Permit application; appeal successful		T	B	H	H	HH	the project would be stopped and another alternative used
1.04	Code revisions due to SMP update will impact proposed uses at the site		O	S	L	M	LM	
1.05	Shoreline permit appealed; appeal unsuccessful	Design continues; risk differs from	T	S	L	M	LM	
1.06	City will not issue permit for storage in "Conservancy Recreation" Shoreline Designation; rezone or code amendment required	Design continues	T	S	H	H	HH	
1.08	City changes zoning rules prohibiting utility structures in Urban Residential zone	We show them in the park	T	B	L	H	LH	
1.09	Unanticipated delays or rejection of contractor procured permits		T	S	L	M	LM	
1.10	County procured construction permits delayed	(e.g. building, street use; clearing and	T	S	H	H	HH	Mitigate: Begin a code amendment process now
1.11	One or more construction codes change during design.		T	B	M	L	ML	
1.18	SDOT delays traffic permit	(includes haul	T	B	L	L	LL	
1.19	Structures cannot be located below-grade	1D will be above	T	C	M	L	ML	This is a project requirement
1.20	Industrial Waste requires that dewatering does not enter active system during peaking events during construction	Alternate discharge point (or Baker Tanks)	T	C	H	L	HL	
1.21	Force main discovered to be in poor shape during design; overlapping projects		T	S	L	M	LM	
2.0	**Environmental**							
2.02	SEPA appeal filed (successful), EIS required		T	B	L	H	LH	If appeal succesful, another alternative would be pursued
2.03	New species listed under ESA - section 7 consultation must be reinitiated		T	B	L	M	LM	
2.05	Archaeological resources found during construction		T	B	L	M	LM	
2.06	SEPA appeal filed (unsuccessful)		T	B	H	M	HM	
3.0	**Technical**							
3.03	Unknown utilities discovered during construction	Public utilities	T	C	M	L	ML	
3.04	Unanticipated difficult soils during construction		T	S	L	L	LL	
3.04	Unanticipated difficult soils during construction		T	S	L	L	LL	
3.09	Design errors and omissions	Delay	T	C	M	M	MM	This is contengency $$
3.11	Private property damage results from construction	Not appplicable to 1A and 1D	T	C	L	L	LL	
3.12	Dewatering volume greater than anticipated		T	B	M	L	ML	
3.15	Limited haul routes require significant restoration		T	B	H	M	HM	
3.21	Existing deep water outfall is not adequate to handle ultimate flow							
4.0	**Operations & Maintenance**							
4.01	Major change in configration after 30% design is completed		T	C	M	L	ML	Note: any major change will cost more
4.09	Auto cleaning not as effected as designed; change out of carbon required more frequently	Life cycle cost impact	T	C	M	L	ML	
5.0	**Community Impacts**							
5.08	Stakeholders request additional meetings to discuss the project (delay tactic)		T	S	H	H	HH	Accept
5.09	Community lobbies for expanded project scope and/or elements	(i.e. force main, pump station; but excludes	T	B	M	L	ML	
5.12	Park access as agreed cannot be maintained during construction; community protests		T	B	M	L	ML	Note: general park access will be agreed prior
5.16	Construction staging impacts community; complaints slow and/or stop work		T	S	H	M	HM	
5.22	Multiple communities have differing agendas; community advisory committee formed		T	C	H	L	HL	
6.0	**Experience/Capability of the Team / Resource Availability**							
6.01	KC Project Manager leaves		T	B	L	M	LM	
6.02	Key Staff leave project	King County or Consultant	T	B	H	M	HM	
6.04	Change in KC management direction / philosophy / policy and/or design criteria after Gate 3		T	B	L	M	LM	
6.05	Team member or contractor has insufficient experience/expertise to perform the work		T	B	M	L	ML	
6.06	Workload impacts ability of consultant or county team member to complete the work on schedule		T	S	M	L	ML	
7.0	**Contractor / Vendor Issues**							
7.02	Small Contractor Supplies (SCS) requirements change.		T	S	H	H	HH	Mitigate: work with KC Small Business Resource Economic Development; get interpretation in
7.03	Bid protest	No rebid	T	B	M	L	ML	
7.04	Final design consultant team uses significantly different design assumptions, causing an Amendment to the Facility Plan design		T	B	L	M	LM	
7.05	Off-site staging required; difficult to negotiate	Assume KC	T	B	H	M	HM	
7.06	Lack of competition increase bids		T	C	L	M	LM	
7.08	Contractor cannot meet noise limits		T	B	H	L	HL	
7.09	Vibration impacts adjacent properties		T	C	H	L	HL	
7.11	Current bid climate lowers bids by 20% or more		O	C	M	M	MM	

North Beach - CSO Risk Workshop -- Alternative 1A

7/28/2010

Risk Indentification			Risk Type		Risk Qualification			Risk Mitigation / Response
Risk #	Description of Risk Event	Addt'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Description (Accept/Avoid/Transfer/Mitigate)
7.12	Bid protest	Rebid	T	B	L	H	LH	
9.0	**Property Acquisition**							
9.01	Blue Ridge Board agrees to grant an easement then changes mind	New board members not receptive to working with	T	B	H	H	HH	Neither of these alternatives would be pursued without easement already being obtained
9.05	Homeowners' review process takes longer than scheduled		T	S	H	M	HM	
9.07	Easement discovered that conflicts with use for project		T	B	L	M	LM	
9.11	Blue Ridge Board sued; all negotiations stopped with KC	Assume design continues	T	S	H	H	HH	Avoid: exercise eminent domain
10.0	**Project Funding**							
10.02	Low rate loan funding opportunities become available		O	C	H	H	HH	This would not deduct from risk cost
10.04	Current economic climate has favorable bid environment.		O	C	H	L	HL	
11.0	**CSO program**							
11.02	The staffing levels to manage and maintain facilities are inadequate for number of CSO facilities added to the system	Permit violations	T	C	M	L	ML	
12.0	**Interfaces**							
12.02	Project compliance schedule in permit not met	No fine; 12/31/13 scheduled for	T	C	L	M	LM	
13.0	**Safety**							
13.03	Auto accident in construction zone	Protected site	T	C	L	L	LL	
13.04	Vandalism or theft at jobsite		T	B	M	L	ML	
13.05	Sewage backup during construction	into basements	T	C	L	L	LL	
13.06	Death due to construction work in confined space	captures risk with	T	C	L	M	LM	
13.07	Injury due to occupational health	During O&M	T	C	H	L	HL	
13.08	Fatality during O&M		T	C	L	H	LH	

North Beach - CSO Risk Workshop

Alternative 1B

7/28/2010

Risk Indentification			Risk Type		Risk Qualification			Risk Mitigation / Response
Risk #	Description of Risk Event	Addt'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Description (Accept/Avoid/Transfer/Mitigate)
	Example Threat with Cost Impacts		T	C	H	L	HL	
	Example Opportunity with Schedule		O	S	M	H	MH	
1.0	**Land Use and Permitting**							
1.09	Unanticipated delays or rejection of contractor procured permits		T	S	L	M	LM	
1.10	County procured construction permits delayed	(e.g. building, street use;	T	S	L	M	LM	
1.11	One or more construction codes change during design.		T	B	M	L	ML	
1.18	SDOT delays traffic permit	(includes	T	B	M	M	MM	
1.19	Structures cannot be located below-grade	1D will be	T	C	M	L	ML	This is a project requirement
1.20	Industrial Waste requires that dewatering does not enter active system during peaking events during construction	Alternate discharge point (or	T	C	M	L	ML	
2.0	**Environmental**							
2.02	SEPA appeal filed (successful), EIS required		T	B	L	H	LH	If appeal succesful, another alternative would be pursued
2.03	New species listed under ESA - section 7 consultation must be reinitiated		T	B	L	M	LM	
2.05	Archaeological resources found during construction		T	B	L	M	LM	
2.06	SEPA appeal filed (unsuccessful)		T	B	L	M	LM	
3.0	**Technical**							
3.03	Unknown utilities discovered during	Public	T	C	M	L	ML	
3.04	Unanticipated difficult soils during		T	S	L	L	LL	
3.10	Basis of design in error during design phase	(example: modeling leads to	T	B	L	M	LM	(mitigate with sizing factor of safety)
3.11	Private property damage results from construction	Not appplicable	T	C	L	L	LL	
3.12	Dewatering volume greater than		T	B	M	L	ML	
3.15	Limited haul routes require significant		T	B	M	L	ML	
3.20	Conflict with utilities causes alignment change during design		T	B	M	L	ML	
4.0	**Operations & Maintenance**							
4.01	Major change in configration after 30% design is completed		T	C	M	L	ML	Note: any major change will cost more
4.09	Auto cleaning not as effected as designed; change out of carbon required	Life cycle cost impact	T	C	M	L	ML	
5.0	**Community Impacts**							
5.09	Community lobbies for expanded project scope and/or elements	(i.e. force main, pump station; but	T	B	M	M	MM	
5.12	Park access cannot be maintained during construction; community protests		T	B	M	L	ML	Note: general park access will be agreed prior
5.16	Construction staging impacts community; complaints slow and/or stop work		T	S	H	M	HM	
6.0	**Experience/Capability of the Team / Resource**							
6.01	KC Project Manager leaves		T	B	L	M	LM	
6.02	Key Staff leave project	King County or	T	B	M	M	MM	
6.04	Change in KC management direction / philosophy / policy and/or design criteria		T	B	L	M	LM	
6.05	Team member or contractor has insufficient experience/expertise to		T	B	M	L	ML	
6.06	Workload impacts ability of consultant or county team member to complete the		T	S	M	L	ML	
7.0	**Contractor / Vendor Issues**							
7.02	Small Contractor Supplies (SCS) requirements change.		T	S	H	H	HH	Mitigate: work with KC Small Business Resource Economic Development; get interpretation in writing
7.03	Bid protest	No rebid	T	B	M	L	ML	
7.04	Final design consultant team uses significantly different design assumptions, causing an Amendment to the Facility		T	B	L	M	LM	
7.05	Off-site staging required; difficult to	Assume KC	T	B	M	M	MM	
7.06	Lack of competition increase bids		T	C	L	M	LM	
7.08	Contractor cannot meet noise limits		T	B	M	L	ML	
7.09	Vibration impacts adjacent properties		T	C	H	L	HL	
7.11	Current bid climate lowers bids by 20% or		O	C	M	M	MM	
7.12	Bid protest	Rebid	T	B	L	H	LH	
9.0	**Property Acquisition**							
9.07	Easement discovered that conflicts with use for project		T	B	L	M	LM	
10.0	**Project Funding**							
10.02	Low rate loan funding opportunities become available		O	C	H	H	HH	This would not deduct from risk cost

North Beach - CSO Risk Workshop

Alternative 1B

7/28/2010

Risk Indentification			Risk Type		Risk Qualification			Risk Mitigation / Response
Risk #	Description of Risk Event	Addt'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Description (Accept/Avoid/Transfer/Mitigate)
10.04	Current economic climate has favorable bid environment.		O	C	H	L	HL	
11.0	**CSO program**							
11.02	The staffing levels to manage and maintain facilities are inadequate for number of CSO facilities added to the	Permit violations	T	C	M	L	ML	
12.0	**Interfaces**							
12.02	Project compliance schedule in permit not met	No fine; 12/31/13 scheduled	T	C	L	M	LM	
13.0	**Safety**							
13.03	Auto accident in construction zone	Protected	T	C	L	L	LL	
13.04	Vandalism or theft at jobsite		T	B	M	L	ML	
13.05	Sewage backup during construction	into	T	C	L	L	LL	
13.06	Death due to construction work in confined space	captures risk with	T	C	L	H	LH	
13.07	Injury due to occupational health	During O&M	T	C	H	L	HL	
13.08	Fatality during O&M		T	C	L	H	LH	

North Beach - CSO Risk Workshop

Alternative 1D

7/28/2010

Risk Indentification			Risk Type		Risk Qualification			Response
Risk #	Description of Risk Event	Addt'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Description (Accept/Avoid/Transfer/Mitigate)
	Example Threat with Cost Impacts		T	C	H	L	HL	
	Example Opportunity with Schedule		O	S	M	H	MH	
1.0	**Land Use and Permitting**							
1.03	Challenge to Shoreline Permit application; appeal successful		T	B	H	H	HH	the project would be stopped and another alternative used
1.04	Code revisions due to SMP update will impact proposed uses at the site		O	S	L	M	LM	
1.05	Shoreline permit appealed; appeal unsuccessful	Design continues; risk differs	T	S	L	M	LM	
1.06	"Conservancy Recreation" Shoreline Designation; rezone or code amendment required	Design continues	T	S	H	H	HH	
1.08	City changes zoning rules prohibiting utility structures in Urban Residential zone	We show them in the	T	B	L	H	LH	
1.09	Unanticipated delays or rejection of contractor procured permits		T	S	L	M	LM	
1.10	County procured construction permits delayed	(e.g. building, street use;	T	S	H	H	HH	Mitigate: Begin a code amendment process now
1.11	One or more construction codes change during design.		T	B	M	L	ML	
1.18	SDOT delays traffic permit	(includes	T	B	H	L	HL	
1.20	Industrial Waste requires that dewatering does not enter active system during peaking events during construction	Alternate discharge point (or	T	C	M	L	ML	
2.0	**Environmental**							
2.01	Contaminated soils/groundwater encountered during construction greater		T	B	M	L	ML	
2.02	SEPA appeal filed (successful), EIS required		T	B	L	H	LH	If appeal succesful, another alternative would be pursued
2.03	New species listed under ESA - section 7 consultation must be reinitiated		T	B	L	M	LM	
2.05	Archaeological resources found during construction		T	B	L	M	LM	
2.06	SEPA appeal filed (unsuccessful)		T	B	H	M	HM	
3.0	**Technical**							
3.03	Unknown utilities discovered during	Public	T	C	M	L	ML	
3.04	Unanticipated difficult soils during		T	S	L	L	LL	
3.10	Basis of design in error during design phase	(example: modeling leads to	T	B	L	M	LM	(mitigate with sizing factor of safety)
3.11	Private property damage results from construction	Not appplicable	T	C	L	L	LL	
3.12	Dewatering volume greater than anticipated		T	B	M	L	ML	
3.13	Extending utilities to new facilities is more difficult than expected	Power	T	B	M	H	MH	
3.15	Limited haul routes require significant		T	B	M	L	ML	
3.20	Conflict with utilities causes alignment change during design		T	B	M	M	MM	
4.0	**Operations & Maintenance**							
4.01	Major change in configration after 30% design is completed		T	C	M	L	ML	Note: any major change will cost more
4.09	Auto cleaning not as effected as designed; change out of carbon required more	Life cycle cost impact	T	C	M	L	ML	
5.0	**Community Impacts**							
5.08	Stakeholders request additional meetings to discuss the project (delay tactic)		T	S	H	H	HH	Accept
5.12	maintained during construction; community protests		T	B	M	L	ML	Note: general park access will be agreed prior
5.13	Other basin residents use political channels to file complaints about unequal negotiations and/or outreach		T	B	M	H	MH	
5.16	Construction staging impacts community; complaints slow and/or stop work		T	S	H	M	HM	
5.22	agendas; community advisory committee formed		T	C	H	L	HL	
6.0	**Experience/Capability of the Team / Resource**							
6.01	KC Project Manager leaves		T	B	L	M	LM	
6.02	Key Staff leave project	King County or	T	B	H	M	HM	
6.04	Change in KC management direction / philosophy / policy and/or design criteria		T	B	L	M	LM	
6.05	Team member or contractor has insufficient experience/expertise to perform		T	B	M	L	ML	
6.06	Workload impacts ability of consultant or county team member to complete the work		T	S	M	L	ML	

North Beach - CSO Risk Workshop

Alternative 1D

7/28/2010

Risk Indentification			Risk Type		Risk Qualification			Response
Risk #	Description of Risk Event	Addt'l Info	Threat (T); Opportunity (O)	Cost (C); Schedule (S); Both (B)	Probability	Impact	Workshop Rating	Description (Accept/Avoid/Transfer/Mitigate)
7.0	**Contractor / Vendor Issues**							
7.02	Small Contractor Supplies (SCS) requirements change.		T	S	H	H	HH	Mitigate: work with KC Small Business Resource Economic Development; get
7.03	Bid protest	No rebid	T	B	M	L	ML	
7.04	Final design consultant team uses significantly different design assumptions, causing an Amendment to the Facility Plan		T	B	L	M	LM	
7.05	Off-site staging required; difficult to	Assume KC	T	B	H	M	HM	
7.06	Lack of competition increase bids		T	C	L	M	LM	
7.07	Unanticipated long lead time items		T	S	L	H	LH	
7.08	Contractor cannot meet noise limits		T	B	H	L	HL	
7.09	Vibration impacts adjacent properties		T	C	H	L	HL	
7.10	Value Engineering of Facility Plan during design	Not a typical KC policy	O	B	H	M	HM	
7.11	Current bid climate lowers bids by 20% or		O	C	M	H	MH	
7.12	Bid protest	Rebid	T	B	L	H	LH	
9.0	**Property Acquisition**							
9.01	Blue Ridge Board agrees to grant an easement then changes mind	New board members not receptive to working with	T	B	H	H	HH	Neither of these alternatives would be pursued without easement already being obtained
9.05	Homeowners' review process takes longer than scheduled		T	S	H	M	HM	
9.07	Easement discovered that conflicts with use for project		T	B	L	M	LM	
9.10	Existing building encroaches on easement in Crown Hill Park		T	B	H	H	HH	Mitigate: clarify survey data for possible encroachment
9.11	Blue Ridge Board sued; all negotiations stopped with KC	Assume design	T	S	H	H	HH	Avoid: exercise eminent domain
10.0	**Project Funding**							
10.02	Low rate loan funding opportunities become available		O	C	H	H	HH	This would not deduct from risk cost
10.04	Current economic climate has favorable bid environment.		O	C	H	M	HM	
11.0	**CSO program**							
11.02	The staffing levels to manage and maintain facilities are inadequate for number of CSO facilities added to the system	Permit violations	T	C	M	L	ML	
12.0	**Interfaces**							
12.02	Project compliance schedule in permit not met	No fine; 12/31/13 scheduled for last day of construction	T	C	M	M	MM	
12.04	Project in conflict with other SDOT and 3rd party projects in vicinity; site access and construction conflict issues		T	B	M	M	MM	
13.0	**Safety**							
13.03	Auto accident in construction zone		T	C	M	L	ML	
13.04	Vandalism or theft at jobsite		T	B	M	L	ML	
13.05	Sewage backup during construction	into	T	C	L	L	LL	
13.06	Death due to construction work in confined space	captures risk with	T	C	L	M	LM	
13.07	Injury due to occupational health	During O&M	T	C	H	L	HL	
13.08	Fatality during O&M		T	C	L	H	LH	