

*King County Puget Sound Beach CSO Control Projects
Alternative Screening Workshop for Magnolia Basin*

Alternative Screening Workshop for South Magnolia Basin

Dec. 9, 2009; Dec. 17, 2009; and Jan. 27, 2010

King Street Center

Summary of Discussion

Attendance

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

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 series of meetings on Dec. 9, 2009 and Dec. 17, 2009 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 Magnolia 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.

December 9, 2009 Workshop – “Straw Poll”

Materials Available for Workshop

1. Final revised Magnolia Basin Alternatives summary sheets (1 for each alternative)
2. Final revised table of selection factors ratings and descriptions of Low, Moderate, and High impact

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3. Final revised Alternative Rating Sheets for Magnolia Basin (summary & expanded to include description of ratings)
4. Summary of major changes to Barton, Murray, and Magnolia Basin Alternatives and overall selection factors
5. Inventory of Available Property and Property Profiles

Workshop Approach/Agenda

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 Magnolia 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.

Workshop Outcome

The straw poll provided staff with an initial, visual survey of how their colleagues viewed the alternatives, and provided valuable insight into the reasons for their views. This initial survey and the written thoughts were used to start an in-depth discussion of the alternatives at the Dec. 17, 2009 workshop.

December 17, 2010 – *Initial Magnolia Alternatives Narrowing*

Materials Available for Workshop

1. Preliminary planning level cost information for comparison purposes for Magnolia Basin
2. Initial Straw Poll Results

Workshop Approach/Agenda

1. Review of Initial Straw Poll Results for Murray (Allen de Steiguer, Carollo)

2. Initial Magnolia 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 (Allen de Steiguer, Carollo Engineers)

- 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

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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:

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

King County staff decided to recommend four alternative means for further development. The capacity available in the King County sewer system downstream of the South Magnolia basin had been reconsidered, and there is chance that downstream capacity could make Alternative 2A (Conveyance out of Basin to downstream treatment) more feasible than originally thought. Staff decided that more information about downstream capacity is needed before deciding whether to develop Alternative 2A in more detail. If downstream capacity is confirmed to be adequate, Alternative 2A will be developed in more detail along with the three other recommended alternatives. If downstream capacity is found to be inadequate, only the three other recommended alternatives will be developed in more detail.

The engineering basin lead, Allen de Steiguer, for the South Magnolia Basin supported these choices.

Follow-up Evaluation and January 27, 2010 Follow-up Meeting

The conveyance out of basin to downstream treatment alternative (Alternative 2A) was refined by adding in-line storage to provide management flexibility for downstream flows and eliminate the need for pumping.

Meeting Approach/Agenda

Alternative 5A was subjected to additional investigation and the results were presented at the January 27, 2010 project team meeting. The project team considered impervious area disconnection (installation of storm sewers) and green stormwater infrastructure (rain gardens; bioswales) in the South Magnolia basin. Hydraulic modeling indicated that there is not enough connected impervious area available throughout the entire basin to eliminate the need for “gray” infrastructure (storage or treatment). Analysis showed that the required storage volume could be reduced by 50-60% if large areas of connected street runoff and roof runoff were disconnected from the CSO system.

Meeting Outcome

King County staff recommended that Alternative 5A not be further developed at this time since it involves considerably higher costs and does not substantially reduce the challenges of constructing the remaining necessary storage at the bottom of the basin.

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Staff recommended that the following alternative means for CSO control be considered for further development:

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

Summary of Workshop Process Discussion for Magnolia Basin

Considerations for Magnolia Basin

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

Considerations for Magnolia Basin CSO Control Alternatives

<p><i>Alternative 1A: Single Rectangular Storage Tank – Bottom of Basin</i> (Recommended for further development)</p>

Design Engineering

- All of the peak flow is captured using passive technology. This is the least technically complex means to meet the CSO control requirement.
- Single storage facility requires lowest level of complexity to operate, control, and maintain compared to other CSO control approaches.
- Project requires construction of a relatively large facility sited at the base of steep slopes; facility may require permanent slope reinforcement uphill of the facility.
- Geotech reports are critical to project costs, permitting, and feasibility.

Cost

- Low cost compared to other South Magnolia CSO control alternatives.

Land Use/Permitting

- Location is out of the shoreline zone.
- Potential to use property owned by the City of Seattle Dept. of Parks and Recreation.
- Construction might be required in city park. The Seattle Dept. of Parks and Recreation has a policy that opposes the use of parks for certain types of utilities. This could impact the project schedule.

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Environmental

- Steep slopes may make permitting the project difficult.
- There will be less environmental impact and permitting will be easier if no marine access is used for construction.

Community Impact

- Project requires construction of a relatively large facility sited at the base of steep slopes; facility may require permanent slope reinforcement uphill of the facility.
- Construction access difficult due to narrow streets; will present access challenges for nearby residents.
- Single storage facility localizes impacts to one area.

O&M

- Access for O&M staff poses traffic control and safety issues. Accessibility would be limited and require traffic control if entry were within the paved road. Site access structures off the roadway could increase project complexity.

Alternative 1B: Dispersed Rectangular Storage Tanks (Not recommended for further development)

Design Engineering

- Technically complex.
- Multiple facilities will create construction disruption at multiple locations in the basin.
- Reduces volume of storage tank at bottom of basin.

Cost

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

Land Use/Permitting

- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Geotech reports may revise expectations for permitting

Environmental

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

Community Impact

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

O&M

- Multiple facilities will require more maintenance and are not as easy to manage as a single facility.

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- Telemetry and instrumentation will be necessary to predict and capture adequate flows at multiple facilities to meet the CSO control requirement. Telemetry and flow control is more difficult for meeting the CSO control requirement compared to passively capturing basin flow at the bottom of the basin.

Alternative 1C: Dispersed Rectangular Storage Tanks (different configuration) (Not recommended for further development)

Design Engineering

- Technically complex.
- Multiple facilities will create construction disruption at multiple locations in the basin.
- Reduces volume of storage tank at bottom of basin.

Cost

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

Land Use/Permitting

- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Geotech reports are critical to project costs, permitting, and feasibility.

Environmental

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

Community Impact

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

O&M

- Multiple facilities will require more maintenance and are not as easy to manage as a single facility.
- Telemetry and instrumentation will be necessary to predict and capture adequate flows at multiple facilities to meet the CSO control requirement. Telemetry and flow control is more difficult for meeting the CSO control requirement compared to passively capturing all of basin flow at the bottom of the basin.

Alternative 1D: Pipe Storage in Rights of Way and Rectangular Storage at Bottom of Basin (Not recommended for further development)

Design Engineering

- Technically complex.
- Multiple facilities will create construction disruption at multiple locations in the basin.

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- Reduces volume of storage tank at bottom of basin.

Cost

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

Land Use/Permitting

- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Geotech reports are critical to project costs, permitting, and feasibility.

Environmental

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

Community Impact

- Construction of pipe storage will disrupt use of arterial streets, 34th Ave W and Magnolia Blvd. during construction

O&M

- Multiple facilities will require more maintenance and are not as easy to manage as a single facility.
- Telemetry and instrumentation will be necessary to predict and capture adequate flows at multiple facilities to meet the CSO control requirement. Telemetry and flow control is more difficult for meeting the CSO control requirement compared to passively capturing all of basin flow at the bottom of the basin.

Alternative 1E: Tunnel Storage under Galer St. (Not recommended for further development)

Design Engineering

- Tunneling is a somewhat more complex and risky construction method than cut-and-cover methods proposed for other South Magnolia CSO control alternatives.
- Tunnel alignment is close to planned route of new Magnolia Bridge.

Cost

- High cost compared to other South Magnolia CSO control alternatives.

Land Use/Permitting

- Construction might be required in city park. The Seattle Dept. of Parks and Recreation has a policy that opposes the use of parks for certain types of utilities. This could impact the project schedule.
- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Geotech reports are critical to project costs, permitting, and feasibility.

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Environmental

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

Community Impact

- Fewer community impacts from construction and permanent facilities compared to building rectangular or pipe storage.

O&M

- All of the basin flow is captured passively. Most reliable location to capture the highest volume of peak flows.
- Single storage facility requires lowest level of effort and complexity to operate, control, and maintain.

<i>Alternative 1F1: Rectangular Storage Tank out of Basin (Gravity Sewer) (Recommended for further development)</i>

Design Engineering

- Project components are limited in size in steep slope area.
- Pipeline through hill will require trenchless construction method; adequate area for pipe laydown presents some challenges.
- Storage tank requires special foundation support in poor soils of potential area.

Cost

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

Land Use/Permitting

- Storage tank is located outside basin in area with industrial zoning.
- Storage tank could be located within Seattle Dept. of Parks and Recreation property.
- The Seattle Dept. of Parks and Recreation has a policy that opposes the use of parks for certain types of utilities. This could impact the project schedule.
- Construction traffic and other construction impacts will be concentrated in area with industrial zoning.
- Geotech reports are critical to project costs, permitting, and feasibility

Environmental

- Avoids building storage in constrained, environmentally sensitive area at 32nd Ave W.

Community Impact

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

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O&M

- Facility has lower level of complexity and fewer limiting operations and control and maintenance efforts compared to most of the other S. Magnolia CSO control alternatives.
- A manhole or regulator structure would be located in steep slope area.
- Single storage facility and gravity pipeline require low level of effort and complexity to operate, control, and maintain.

Alternative 1F2: Rectangular Storage Tank out of Basin (Pump Station/Force Main) (Not recommended for further development)

Design Engineering

- More complex technically, higher cost, and creates more new, permanent facilities than Alternative 1F1 but provides no additional operational benefits compared to Alternative 1F1.
- Storage tank requires special foundation support in poor soils of potential area.

Cost

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

Land Use/Permitting

- Storage tank is located outside basin in area with industrial zoning.
- Geotech reports are critical to project costs, permitting, and feasibility.

Environmental

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

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 1F3 – Rectangular Storage Tank out of Basin (Convert existing sewer) (Not recommended for further development)

Design Engineering

- More complex technically, higher cost, and creates more new, permanent facilities than Alternative 1F1 but provides no additional operational benefits compared to Alternative 1F1.
- Conversion of existing sewer to force main may present unexpected construction challenges.

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- 12 MGD pump station for peak flows needed.
- Storage tank requires special foundation support in poor soils.

Cost

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

Land Use/Permitting

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

Environmental

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

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.

<p><i>Alternative 2A – Conveyance out of Basin to downstream treatment (Recommended for further development with some refinements)</i></p>
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Design Engineering

- Potential reduction or elimination of storage volumes.
- Potential need for new pump station and sewer construction.
- Pump station would be located on steep slope.
- Construction access limited and neighborhood traffic/access impacts would occur.
- Members of the project team will verify whether there is downstream capacity in the King County system before deciding whether to develop Alternative 2A in more detail.

Cost

- Low cost compared to other South Magnolia CSO control alternatives.
- Low risk of cost estimate changing dramatically compared to other South Magnolia CSO control alternatives.

Land Use/Permitting

- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Geotech reports are critical to project costs, permitting, and feasibility.

Environmental

- Soils in the Port of Seattle area may be contaminated.

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Community Impact

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

O&M

- System is simple to operate and utilizes existing infrastructure.

<i>Alternative 3A – End of Pipe Treatment (Not recommended for further development)</i>

Design Engineering

- Technically complex.
- Eliminates need for storage.

Cost

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

Land Use/Permitting

- Permitting effluent discharge to Puget Sound could delay the project schedule.
- There will be less environmental impact and permitting will be easier if no marine access is used for construction.

Environmental

- Construction and permanent facility located in constrained, environmentally sensitive area at 32nd Ave W

Community Impact

- Community members may object to treatment facility in residential neighborhood.
- Construction access difficult due to narrow streets; will present access challenges for nearby residents.

O&M

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

<i>Alternative 5A – Peak flow Reduction w/ Storage (After further evaluation, not recommended for further development)</i>
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Design Engineering

- Reduces storage volume required and size of facility in steep slope area.
- Efficient use of existing stormwater infrastructure.
- The King County CSO Program is interested in roof drain disconnects as a way to control CSOs. Other agencies have had success with roof drain disconnects. The City of Seattle has a good roof drain disconnect program and they have offered to partner and cost-share

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with King County to encourage people to redirect their roof drains to the stormwater system in partially separated basins.

- Department of Ecology and EPA have indicated interest in “source control” as a way to control CSOs.
- While it may take some time to achieve peak flow reduction, the disconnect efforts can begin as soon as the Facility Plan is complete.
- May be challenging to identify sufficient stormwater sources that can be disconnected from the system to reliably reduce the storage volume to meet CSO control requirements.
- Project schedule could be considerably delayed because of need to coordinate with City of Seattle and work required on hundreds of private properties.
- The capacity of the City of Seattle municipal storm sewer system is unknown.

Cost

- Low cost compared to other South Magnolia CSO control alternatives.
- Low risk of cost estimate changing dramatically compared to other South Magnolia CSO control alternatives.

Land Use/Permitting

- There will be less environmental impact and permitting will be easier if no marine access is used for construction.
- Geotech reports may revise expectations for permitting.

Environmental

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

Community Impact

- Many community members have expressed interest in demand management approaches.
- Some community members are concerned that demand management approaches could exacerbate problems with unstable slopes.

O&M

- Combined approach that results in a single facility requiring operation/maintenance effort.
- Maintenance access to the storage facility is an issue. Access would be restricted if entry were within the paved road or special provisions would be required so the structures could be accessed from the side of the road a safe distance from the paved area.

Barton, Murray, Magnolia and North Beach CSO Projects
 Alternatives Analysis

MAGNOLIA BASIN ALTERNATIVES
 PRELIMINARY DRAFT

CATEGORY / CRITERIA	ALTERNATIVE 1A: RECTANGULAR STORAGE,		ALTERNATIVE 1B: DISPERSED RECTANGULAR STORAGE		ALTERNATIVE 1C: DISPERSED RECTANGULAR		ALTERNATIVE 1D : DISPERSED PIPE/TANK STORAGE		ALTERNATIVE 1E: OUT OF BASIN STORAGE TUNNEL		ALTERNATIVE 1F1: OUT OF BASIN RECTANGULAR STORAGE -		ALTERNATIVE 1F2: OUT OF BASIN RECTANGULAR		ALTERNATIVE 1F3: OUT OF BASIN RECTANGULAR STORAGE - Pump		ALTERNATIVE 2A: CONVEY AND TREAT		ALTERNATIVE 3A - END OF PIPE TREATMENT, BOTTOM OF		ALTERNATIVE 5A: PEAK FLOW REDUCTION WITH BOTTOM OF	
	IMPACT RATING		IMPACT RATING		IMPACT RATING		IMPACT RATING		IMPACT RATING		IMPACT RATING		IMPACT RATING		IMPACT RATING		IMPACT RATING		IMPACT RATING		IMPACT RATING	
LAND USE AND PERMITTING																						
1. City of Seattle Comprehensive Plan	2		2		2		2		2		2		2		2		2		1		2	
2. Seattle Municipal Code (SMC/Zoning)	2		2		2		2		2		2		2		2		2		1		3	
3. Shoreline Master Program Compatibility	3		3		3		3		2		2		2		2		2		3		3	
4. Permitting Complexity	2		2		2		2		2		2		2		2		2		1		2	
5. Property Acquisition Complexity	1		1		1		1		1		1		1		1		1		1		1	
ENVIRONMENT																						
1. Cultural Resources	3		2		3		3		2		2		2		2		2		3		2	
2. Fish and Wildlife	1		1		1		1		1		3		1		1		1		1		1	
3. Wetlands, Streams, and Shorelines	1		1		1		1		1		3		1		3		1		1		1	
4. Soils and Sediments	1		1		1		1		2		3		1		1		1		1		1	
5. Water Quality	3		3		3		3		3		3		3		3		3		3		1	
TECHNICAL																						
1. Technical Complexity	3		2		2		1		3		3		2		2		3		2		2	
2. Compatibility with Existing WW system	3		3		3		1		3		3		3		3		3		3		3	
3. Flexibility/Adaptive Management	1		2		2		2		3		3		2		2		2		1		1	
4. Constructability/Impleme	1		1		1		1		3		3		2		2		2		1		1	
O&M																						
1. Staffing	3		3		3		2		3		3		3		3		3		2		3	
2. Training	2		2		2		2		2		2		2		2		3		1		2	
3. Reliability	3		3		3		3		3		3		3		3		3		1		3	
4. Maintenance	3		1		2		1		3		3		3		3		3		2		3	
5. Safety	3		3		3		1		3		3		3		3		3		3		3	
COST EFFECTIVENESS																						
1. Relative Project Costs	3		2		2		2		1		3		1		1		3		3		3	
2. Relative Lifecycle Costs																						
3. Relative Variability/Risk	3		3		3		3		3		3		3		3		3		3		3	
COMMUNITY IMPACT																						
1. Location	2		2		2		2		3		3		3		2		3		1		2	
2. Potential Community Impacts	2		2		2		2		3		3		2		2		2		1		2	
3. Construction Impacts	2		2		2		2		2		2		2		1		1		2		1	

WTD Business Case Evaluation Results

Magnolia 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	\$0
Alternatives							
"Alt 1A"	20	\$29,090,000	\$29,876,944	\$0	\$29,876,944	\$1,859,863	\$1,859,863
"Alt 1B"	20	\$37,900,000	\$39,232,249	\$0	\$39,232,249	\$2,442,239	\$2,442,239
"Alt 1C"	20	\$35,090,000	\$36,402,854	\$0	\$36,402,854	\$2,266,107	\$2,266,107
"Alt 1D"	20	\$40,070,000	\$41,623,520	\$0	\$41,623,520	\$2,591,097	\$2,591,097
"Alt 1E"	20	\$52,740,000	\$53,555,644	\$0	\$53,555,644	\$3,333,881	\$1,474,018
"Alt 1F.1"	20	\$30,890,000	\$32,063,935	\$0	\$32,063,935	\$1,996,005	-\$446,233

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	\$0
Alternatives							
"Alt 1A"	20	\$29,090,000	\$29,616,103	\$0	\$29,616,103	\$1,843,626	\$1,843,626
"Alt 1B"	20	\$37,900,000	\$38,790,661	\$0	\$38,790,661	\$2,414,749	\$2,414,749
"Alt 1C"	20	\$35,090,000	\$35,967,694	\$0	\$35,967,694	\$2,239,018	\$2,239,018
"Alt 1D"	20	\$40,070,000	\$41,108,589	\$0	\$41,108,589	\$2,559,042	\$2,559,042
"Alt 1E"	20	\$52,740,000	\$53,285,290	\$0	\$53,285,290	\$3,317,052	\$1,473,426
"Alt 1F.1"	20	\$30,890,000	\$31,674,822	\$0	\$31,674,822	\$1,971,783	-\$442,967

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

WTD Business Case Evaluation Results

Magnolia 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 1F.2"	20	\$45,530,000	\$47,399,079	\$0	\$47,399,079	\$2,950,630	\$2,950,630
"Alt 1F.3"	20	\$47,050,000	\$48,741,121	\$0	\$48,741,121	\$3,034,173	\$3,034,173
"Alt 2A"	20	\$23,420,000	\$24,364,189	\$0	\$24,364,189	\$1,516,690	\$1,516,690
"Alt 3A"	20	\$32,330,000	\$33,390,060	\$0	\$33,390,060	\$2,078,558	\$2,078,558
"Alt 5A"	20	\$24,550,000	\$25,092,713	\$0	\$25,092,713	\$1,562,041	-\$1,388,589

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 1F.2"	20	\$45,530,000	\$46,779,553	\$0	\$46,779,553	\$2,912,064	\$2,912,064
"Alt 1F.3"	20	\$47,050,000	\$48,180,581	\$0	\$48,180,581	\$2,999,279	\$2,999,279
"Alt 2A"	20	\$23,420,000	\$24,051,228	\$0	\$24,051,228	\$1,497,208	\$1,497,208
"Alt 3A"	20	\$32,330,000	\$33,038,692	\$0	\$33,038,692	\$2,056,685	\$2,056,685
"Alt 5A"	20	\$24,550,000	\$24,912,825	\$0	\$24,912,825	\$1,550,843	-\$1,361,221

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

**ALTERNATIVES COST SUMMARY
SOUTH MAGNOLIA BASIN**

Alternative	Description	Total Construction Cost	Land Acquisition Cost		Street Use		Project Total Cost		Relative Cost	Risk and Variability	Life Cycle Cost
			Low	High	Low	High	Low	High			
1A	Rectangular Storage at Bottom of Basin	\$29,090,000	\$350,000	\$350,000	\$50,000	\$1,150,000	\$29,490,000	\$30,590,000	1.2	1.04	
1B	Dispersed Storage Tanks	\$37,900,000	\$600,000	\$600,000	\$410,000	\$1,046,000	\$38,910,000	\$39,546,000	1.6	1.02	
1C	Dispersed Storage Tanks	\$35,090,000	\$1,450,000	\$1,450,000	\$56,000	\$992,000	\$36,596,000	\$37,532,000	1.5	1.03	
1D	Dispersed Pipe Storage in Three Locations	\$40,070,000	\$205,000	\$205,000	\$299,000	\$1,032,000	\$40,574,000	\$41,307,000	1.6	1.02	
1E	Tunnel Storage at Bottom of Basin	\$52,740,000	\$760,000	\$760,000	\$100,000	\$1,048,000	\$53,600,000	\$54,548,000	2.2	1.02	
1F.1	Rectangular Storage Out of Basin	\$30,890,000	\$620,000	\$620,000	\$100,000	\$2,300,000	\$31,610,000	\$33,810,000	1.3	1.07	
1F.2	Rectangular Storage Out of Basin	\$45,530,000	\$775,000	\$775,000	\$100,000	\$2,960,000	\$46,405,000	\$49,265,000	1.9	1.06	
1F.3	Rectangular Storage Out of Basin	\$47,050,000	\$775,000	\$775,000	\$100,000	\$2,300,000	\$47,925,000	\$50,125,000	1.9	1.05	
2A	Convey and Treat	\$23,420,000	\$1,360,000	\$1,360,000	\$100,000	\$1,648,000	\$24,880,000	\$26,428,000	1.0	1.06	
3A	End of Pipe Treatment	\$32,330,000	\$350,000	\$350,000	\$50,000	\$1,150,000	\$32,730,000	\$33,830,000	1.3	1.03	
5A	Stormwater Disconnection	\$24,550,000	\$350,000	\$350,000	\$100,000	\$1,648,000	\$25,000,000	\$26,548,000	1.0	1.06	

Note:

Total construction cost includes total direct costs plus 30% allied costs and 50% contingency cost
Project total cost range is the sum of total construction cost plus permit and land acquisition cost

NOTE:

1.0 - 1.2
1.3 - 1.6
>1.6

**MAGNOLIA BASIN
REAL ESTATE COST ESTIMATE**

Alternative	Description of Alternative and/or Requirement for Property	Estimated Footprint	Estimated Real Estate Cost	Estimated Cont Use Permit Fee for Parks Property Only	Description of Street Use	Estimated LF or SF in ROW	Duration of Project use of ROW	Estimated Street Use Fee		ESTIMATED TOTAL
								In Stages	Entire Project	
1A	Rectangular Storage Tank + odor control & electrical facilities (Off ROW at 32nd Ave W- Magnolia Park)	50,000 SF (1 park property via revocable use permit @ \$350k)		\$350k	32nd- Access, staging and construction	500 LF	5-24 months	50k	1.15M	\$850k- 1.5M
1B	Dispersed Storage Tanks + odor control & electrical facilities- 2 locations (Off ROW at 32nd Ave W- Magnolia Park; and under M. Playfield Tennis Courts)	36,000 SF (15,000 SF M. Playfield prop @\$450k + 21,000 SF M. Park property via revocable use permit @ \$150k)	\$450k	\$150k	32nd- Access, staging and construction	500 LF	5-21 months	50k	986k	\$1M- 1.7M
					McGraw (32nd to 34th)- Construction of sewer & 12'- dia. manholes	1,100 LF	2-11 months	180k	30k	
					34th (McGraw- Smith)- Construction of sewer & 12'- dia. manholes	1,100 LF	2-11 months	180k	30k	
1C	Dispersed Storage Tanks + odor control & electrical facilities- 2 locations (Off ROW at 32nd Ave W- Magnolia Park; and SE of M. Playfield)	36,000 SF (15,000 SF SE of M. Playfield prop @\$1.3M + 21,000 SF M. Park property via revocable use permit @ \$150k)	\$1.3M	\$150k	32nd- Access, staging and construction	500LF	5-21 months	50k	986k	\$1.5- 2.5M
					32nd and Clise Pl- Construction of sewer & 12'- dia. manholes	200LF	2 months	6k	6k	
1D	Dispersed Pipe Storage + odor control & electrical facilities- 3 locations (Off ROW at 32nd Ave W; Pipe in 34th; and Pipe in Magnolia Blvd.)	29,000 SF (Seattle Parks property via revocable use permit)		\$205k	32nd- Access, staging and construction	500 LF	5-21 months	50k	986k	\$500k- 1.3M
					34th- Access, staging and construction	1,000 LF	2-10 months	157k	27k	
					Magnolia Blvd- Access, staging & construction.	700 LF	2-7 months	92k	19k	
1E	Tunnel Storage at Bottom of Basin on Seattle Parks ROW + 2 portals (32nd and 23rd)	108,000 SF (Seattle Parks property: 20,000 SF west portal @ \$320K and 88,000 SF east portal @ \$5.8M; via revocable use permit)		\$760k	32nd- Access, staging and construction	500 LF	5-18 months	50k	824k	\$900k- 2.4M
					23rd- Haul and construction access	500 LF	5-18 months	50k	824k	

**MAGNOLIA BASIN
REAL ESTATE COST ESTIMATE**

1F1	Rectangular Storage Tank on 23rd + Force Main from 32nd to 23rd + Diversion Structure on 32nd with HDD Gravity Sewer	88,000 SF (Seattle Parks property- Smith Cove Park @ \$5.8M; via revocable use permit)		\$620k	32nd- Access, staging and construction	500 LF	5-24 months	50k	1.15M	\$720k- 3M
					23rd- Haul & construction access	500 LF	5-24 months	50k	1.15M	
1F2	Rectangular Storage Tank on 23rd + Force Main from 32nd to 23rd + Pump Station on 32nd with HDD Pipe in Steep Slopes	110,500 SF (Seattle Parks property: 22,500 SF east of 32nd @ \$360K and 88,000 SF west @ \$5.8M; via revocable use permit)		\$775k	32nd- Access, staging and construction	500 LF	5-30 months	50k	1.48M	\$7- 9.9M
					23rd- Haul & construction access	500 LF	5-30 months	50k	1.48M	
1F3	Rectangular Storage Tank + odor control & electrical facilities with Diversion Structure on 23rd + Force Main from 32nd to 23rd + Pump Station on 32nd	110,500 SF (Seattle Parks property: 22,500 SF@ \$360K and Smith Cove Park Property @ \$5.8M; via revocable use permit)		\$775k	32nd- Access, staging and construction	500 LF	5-24 months	50k	1.15M	\$900k- 3.1M
					23rd- Haul & construction access	500 LF	5-24 months	50k	1.15M	
2A	Convey and Treat: Discharge at Interbay PS + Diversion Structure with Pump Station on 32nd + 24" Gravity Sewer on 23rd	22,500 SF (Seattle Parks property via revocable use permit @160k) 12,000 SF (23rd Ave- permanent sewer easement) 87,000 SF (Port of Seattle property- permanent sewer easement) + TBD BNSF RR	\$1.2M	\$160k	32nd- Access, staging and construction	500 LF	5-18 months	50k	824k	\$1.5M- 3M
					23rd- Haul & construction access	500 LF	5-18 months	50k	824k	
3A	End-of-Pipe Treatment at Bottom of Basin on 32nd	50,000 SF (Seattle Parks property via revocable use permit)		\$350k	32nd- Access, staging and construction	500 LF	5-24 months	50k	1.15M	\$400k- 1.5M

**MAGNOLIA BASIN
REAL ESTATE COST ESTIMATE**

5A	Rectangular Storage Tank + odor control & electrical facilities	50,000 SF (Seattle Parks property via revocable use permit)		\$350k	32nd- Access, staging and construction	500 LF	5-18 months	50k	824k	\$450k- 2M
					23rd- Haul & construction access	500 LF	5-18 months	50k	824k	

Assumptions: 1) All property and property right acquisition will be per King County acquisition policy

- 2) Estimates are for value of property and use permits only; other acquisition costs such as appraisals, title reports, labor cost to acquire, relocation costs, etc. are not included
- 3) Mitigation Costs not included in these cost estimates.
- 4) Street Calculations
 - a. Based on use of one-half of ROW or 30', assuming street width of 60'
 - b. Estimated cost for construction done "In Stages" assumes 200 LF per stage, with street use fees calculated based on duration of 2 months per stage; these fee calculations are based on the assumption that SDOT will give WTD a fee waiver or fee discount.
 - c. Estimated cost for "Entire Project" assumes that SDOT will use formula per Seattle Municipal Code
- 5) For any alternative w/ storage tank in ROW, cost is for use of street ROW for construction only; no City of Seattle fees for use of ROW for permanent locating of storage tank are assumed
- 6) Real Estate cost estimates for property owned by City of Seattle-Parks Department using its CONTINUING USE PERMIT FEE calculation with an impact value of "1".
- 7) Properties that may be needed for construction staging and feasibility not considered in these estimates; street & continuing use permit fees for these were also not included