



King County

Department of Natural Resources and Parks
Wastewater Treatment Division

Murray Basin CSO Alternatives (Community-suggested and King County-suggested)

Alternative	Alternative Description	Key Components	Notes	Additional Facility Information	Short Term Community Impacts
CAG 1  Sep 9 th workshop group recommendation	Install storage in Lincoln Park parking lot (mid-park location), size it large enough to manage overflows from Barton and Murray.	<ul style="list-style-type: none"> • Barton pump station expansion • 1.26 mg storage tank in Lincoln Park parking lot • New pump station at Murray or <u>0.10 mgd storage</u> at bottom of Murray basin • New forcemains (4,600 feet from Murray to parking lot and 2,500' from Barton PS to parking lot) • 		<ul style="list-style-type: none"> • Assumes .10 mg storage, open cut installation in street at bottom of basin 	<ul style="list-style-type: none"> • Barton footprint expansion – construction noise, dust, ferry and Fauntleroy traffic and detours • Construction of storage in Beach Drive (open cut construction – traffic, lane closures, truck traffic, noise, dust) • Force main construction – traffic, lane closures, noise, dust • Tank construction in parking lot – parking impacts, truck traffic, noise, dust, traffic
CAG 2	Install storage in Lincoln Park	<ul style="list-style-type: none"> • 1.25 mg storage in Lincoln Park at one of four potential locations <ul style="list-style-type: none"> ○ Tank near Colman pool (Point Williams) ○ Tank under mid-park parking lot ○ Tank under south parking lot ○ Deep tunnel storage at foot of Lincoln bluff • 0.10 mg storage at bottom of Murray basin • Current pump station (ps) at Lowman Beach <ul style="list-style-type: none"> ○ PS option – retire Lowman Beach PS and install new PS in Murray triangle property 	<ul style="list-style-type: none"> • Option of retiring Lowman Park PS might be considered mitigation for use of Lincoln Park for storage • Options that locate the storage anywhere in Lincoln Park other than near Colman Pool also require a new pump station in the vicinity of Colman Pool. 	<ul style="list-style-type: none"> • Assumes .10 mg storage, open cut installation in street at bottom of basin • Potential private property acquisition for triangle location 	<ul style="list-style-type: none"> • Construction of storage in Beach Drive (open cut construction – traffic, lane closures, noise, dust) • Construction of forcemains (open cut construction) – traffic impacts on Beach drive; park user impacts along shoreline – detours, walking path closure • Construction of storage in Lincoln Park - noise, dust, limited park use around construction site, truck traffic, parking impacts
CAG 3	Explore combination of green infrastructure and additional storage in Barton to reduce peak flows to Murray	<ul style="list-style-type: none"> • Implement roadside rain gardens in sub-basin 416 (Barton) • Implement residential RainWise basin wide in Barton basin (31 acres) • 0.5 mg storage tank at bottom of basin near Barton Pump Station • Hold pumping capacity at Barton Pump station to 22 mgd • 0.6 mg of storage at the bottom of the Murray basin 	<ul style="list-style-type: none"> • Consider green infrastructure components of this alternative in all alternatives 	<ul style="list-style-type: none"> • Assumes private property acquisition for 0.5 mg storage near Barton Pump Station • Potential locations for Murray basin storage – street tunnel, private property, Lowman Park 	<ul style="list-style-type: none"> • Construction of storage in Barton basin – noise, dust, traffic, truck traffic • Construction of storage in Murray basin – noise, dust, traffic, possible park impacts, truck traffic, parking • Construction of rain gardens – noise, dust, traffic, sidewalk closures, loss of parking

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CAG 4	Separate all sewer and stormwater flows in the basins	<ul style="list-style-type: none"> Requires construction of new MS4 system in southeast corner of Murray basin to remove 10 acres of street and roof runoff Requires disconnecting over 1200 homes and 230 non-residential properties in Murray Basin Requires construction of new MS4 system in northeast corner of Barton basin to remove 26 acres of street runoff Requires disconnecting over 1550 homes and 80 non-residential properties in the Barton basin Would require some level of water quality treatment in areas with new MS4 systems (i.e. swales, ponds, etc.) 	<ul style="list-style-type: none"> This alternative would address a small portion of stormwater in both basins – likely less than 15% of total stormwater in Murray and a similarly small % in Barton Assumes county-funded incentives to participants for private property disconnects Requires almost 100% private property participation to achieve intended results 	<ul style="list-style-type: none"> Requires location for water quality treatment facilities – swales, ponds, etc. 	<ul style="list-style-type: none"> Localized construction impacts to residences and businesses having their drains disconnected Construction of stormwater (MS4) collection system in public right of way and local connections – traffic, dust, noise, detours, sidewalk closures
CAG 5 (similar to KC 1E)  Sep 9 th workshop group recommendation	Use upgraded Barton Pump Station and pump overflow volumes up the hill to a higher point in the Murray Basin (example – Gatewood Elementary)	<ul style="list-style-type: none"> 1.26 mg storage tank in Gatewood Elementary School playground Barton pump station expansion New peak flow pump station at Murray and new forcemain from pump station to storage facility or <u>0.10 mg storage</u> at bottom of Murray basin New forcemain starting at Barton, up Fauntleroy to Gatewood Elementary 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Assumes .10 mg storage, open cut installation in street at bottom of basin 	<ul style="list-style-type: none"> Construction of storage in Beach Drive (open cut construction – traffic, lane closures, noise, dust) Barton footprint expansion – construction noise, dust, truck traffic, ferry and Fauntleroy traffic and detours Construction of storage in Gatewood Elementary – noise, dust, traffic, temporary loss of use of playfield, truck traffic) Force main construction on Fauntleroy – traffic, lane closures, noise, dust, parking
CAG 6 (similar to KC 2A)  Sep 9 th workshop group recommendation	Use Barton Pump Station to pump to Alki and Murray continues to pump north in a separate pipe	<ul style="list-style-type: none"> 0.10 mg storage at bottom of Murray basin New forcemain starting at Lowman Beach Park, up Beach Drive to Alki (13,500' of force main) Barton pump station expansion Expansion of Alki Wet Weather Treatment Facility and outfall pipe 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Assumes .10 mg storage, open cut installation in street at bottom of basin 	<ul style="list-style-type: none"> Construction of storage in Beach Drive (open cut construction) – traffic, lane closures, noise, dust Barton footprint expansion – construction noise, dust, ferry and Fauntleroy traffic and detours Force main construction on Beach Drive– traffic, lane closures, noise, dust, parking Alki Treatment Plant construction – Noise, dust, parking, truck traffic Outfall pipe – marine impacts
CAG 7	***Original Language*** Combine green stormwater infrastructure and storage in Murray Basin to reduce needed size of storage	<ul style="list-style-type: none"> Roadside rain gardens would mitigate approximately 10 acres of impervious area (approx 0.15 mg of storage reduction) Requires 0.85 mg of storage at bottom of basin in Murray Implementation of basin-wide public participation program installing GSI techniques such as residential rain gardens and rainwater cisterns (Rainwise) could further reduce storage by 0.14 mg Requires 0.71 mg storage at bottom of basin in Murray 	<ul style="list-style-type: none"> <i>Workshop recommendation:</i> Rephrase this option as “Combine green stormwater infrastructure and storage in Murray Basin to improve reliability of storage solution and to provide data about reliability of GSI as CSO solution for future CSO projects” and include in all alternatives. Eliminate proposed reduction in storage sizes. 	<ul style="list-style-type: none"> Potential locations for Murray basin storage – street tunnel, private property across from Lowman Park, Lowman Park, Murray triangle (partial private property) Requires new pump station at bottom of Murray basin to pump up to storage if at Murray triangle (6 – 10 mgd) – located either at Lowman Park or across street on private property 	<ul style="list-style-type: none"> Localized construction impacts to residences and businesses having their drains disconnected Construction of rain gardens – noise, dust, traffic, sidewalk closures, loss of parking

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CAG 8	Install distributed storage at the following locations: Dry cleaners on California Avenue, Gatewood Elementary School, 48 th & Holly, Solstice Park and divert existing flooding problem on Graham St. to storage at dry cleaner	<ul style="list-style-type: none"> Tanks located at 4 locations in upper basin Telemetry and control required to monitor flow and anticipate a potential CSO event OR <u>size tanks large enough to manage all peak flow</u> Additional storage required at bottom of Murray basin 	<ul style="list-style-type: none"> Current facility sizing does not consider potential storage size reductions resulting from reducing Barton pump station flow, although are not anticipated to be major reductions 	<ul style="list-style-type: none"> Assumes 1.0 mg of storage at 4 upper basin locations Assumes minimum of 0.5 mgd storage in bottom of Murray Basin Potential locations for Murray basin storage – street tunnel, private property, Lowman Park 	<ul style="list-style-type: none"> Construction of storage in bottom of basin – private property demolition and/or park impact, traffic delays, noise, dust, loss of parking Storage tanks construction at up-basin locations – traffic, parking, noise, dust, lane closures, truck traffic, simultaneous construction at four to five sites, temporary loss of playfield use
CAG 9 New from Sep 9 th workshop Combo of CAG 3, CAG 7 and KC1B	<ul style="list-style-type: none"> Explore combination of green infrastructure and additional storage in Barton to reduce peak flows to Murray. Implement green stormwater infrastructure in Murray Basin to provide additional CSO control reliability. Provide remaining required Murray storage volume at intersection of Murray Ave SW and Lincoln Parkway SW 	<ul style="list-style-type: none"> Implement roadside rain gardens in sub-basin 416 (Barton) Implement residential RainWise in Barton basin Storage at bottom of Barton basin Expanded storage at Old Fautleroy School in Barton basin Reduce Barton Pump Station pumping capacity from currently planned upgrade capacity of 33 mgd. Build storage at the bottom of the Murray basin at intersection of Murray Ave SW and Lincoln Parkway SW New peak flow pump station required near Murray Pump Station to pump Murray basin flows to storage Implement GSI in Murray basins consisting of roadside rain gardens to remove up to 10 acres of stormwater from street runoff and implementation of public participation program installing GSI techniques such as residential rain gardens and rainwater cisterns (Rainwise) 	<ul style="list-style-type: none"> Assumes GSI not relied on to reduce storage in Murray but included to increase reliability of CSO system and provide data about reliability of GSI as CSO solution for future CSO projects 	<ul style="list-style-type: none"> Bottom of basin storage in Barton in private property Murray basin storage location at Murray Triangle (partial private property acquisition required) Requires new pump station at bottom of Murray basin to pump up to storage if at Murray triangle (6 – 10 mgd) – located either at Lowman Park or across street on private property 	<ul style="list-style-type: none">
KC 1A	1.0 mg rectangular storage at bottom of Murray basin	<ul style="list-style-type: none"> 1.0 mg storage tank sited in Lowman Park 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Odor control and emergency generator be installed (below grade) 	<ul style="list-style-type: none"> Construction in park – temporary loss of use of park, parking, traffic, noise, dust, truck traffic, possible loss of trees
KC 1B	1.0 mg circular storage at intersection of Murray Ave SW and Lincoln Parkway SW	<ul style="list-style-type: none"> 1.0 mg storage tank New peak flow pump station required near Murray Pump Station to pump excess Barton PS and Murray basin flows to storage 	<ul style="list-style-type: none"> Option of partial storage tunnel combined with storage on city-owned portion of Murray Triangle Does not currently include any reduced flow measures from Barton 	<ul style="list-style-type: none"> Assumes new pump station located in Lowman Park or on private property across street from park Installation of pipes between Murray pump station and new storage 	<ul style="list-style-type: none"> Open cut street construction between Murray PS and new storage New pump station - private property demolition and/or park impact, traffic delays, noise, dust, loss of parking
KC 1C	Distributed storage along Beach Drive and Murray Avenue SW	<ul style="list-style-type: none"> 900 lf of pipe open cut in Beach Drive SW 350 lf of pipe open cut in Murray Ave SW 		Not Technically Feasible	
KC 1D	Pipe storage at bottom of Murray basin by tunneling	<ul style="list-style-type: none"> 1,250 lf of pipe tunneled under Beach Drive 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Assumes tunneling shafts (pits) at start and end of tunneling segment(s) 	<ul style="list-style-type: none"> Tunneling shafts on Beach Drive – noise, vibration, traffic, lane closures, dust, truck traffic, parking

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KC 1E (similar to CAG 5)  Sep 9 th workshop group recommendation	Upper Murray basin storage	<ul style="list-style-type: none"> Rectangular storage tank located up basin (example: Gatewood Elementary School Playground) New 28.5 mgd pump station near existing Murray pump station 2,550 lf of forcemain to pump flows from Lowman Park to storage tank 	•	<ul style="list-style-type: none"> Assumes new Murray pump station located on either private property or at Lowman Park 	<ul style="list-style-type: none"> Construction of pump station in bottom of basin – private property demolition and/or park impact, traffic delays, noise, dust, loss of parking Construction of storage in Gatewood Elementary – noise, dust, traffic, temporary loss of use of playfield, truck traffic) Force main construction on Lincoln Park Way SW – traffic, lane closures, noise, dust, parking
KC 1F	Combined pipe and rectangular storage at bottom of Murray basin	<ul style="list-style-type: none"> 0.6 to 1.0 mg storage tank (on acquired property) 0.0 to 0.4 mg storage pipe (under Beach Drive) 	•	<ul style="list-style-type: none"> Assumes private property for storage tank 	<ul style="list-style-type: none"> Construction of storage on private property in bottom of basin – private property demolition, traffic delays, noise, dust, loss of parking Construction of storage in Beach Drive (open cut construction) – traffic, lane closures, noise, dust
KC 2A (similar to CAG 6)  Sep 9 th workshop group recommendation	Convey and treat at Alki	<ul style="list-style-type: none"> New 28.5 mgd pump station near Murray pump station 13,350 lf of forcemain along Beach Drive Upgrade Alki Treatment Facility and outfall 	•	<ul style="list-style-type: none"> Assumes new Murray pump station located on either private property or at Lowman Park 	<ul style="list-style-type: none"> Construction of pump station in bottom of basin – private property demolition and/or park impact, traffic delays, noise, dust, loss of parking Force main construction on Beach Drive– traffic, lane closures, noise, dust, parking Alki Treatment Plant construction – Noise, dust, parking, truck traffic Outfall pipe – marine impacts
KC 3A	End-of-pipe treatment at bottom of Murray Basin	<ul style="list-style-type: none"> New 28.5 mgd, 160' x 80' x 20' buried, rectangular CSO treatment system 	•	<ul style="list-style-type: none"> Assumes in Lowman park Considerably more above ground structure required than for storage 	<ul style="list-style-type: none"> Construction in park – temporary loss of use of park, parking, traffic, noise, dust, truck traffic, possible loss of trees
KC 5A	Peak flow reduction by roof drain disconnection, combined with storage	<ul style="list-style-type: none"> Disconnect 10 acres of roof and street storm water connections from combined sewer system Construction of 6,800 lf of storm sewer pipe along 34th, 35th and 36th Ave SW streets Combine with 1,075 lf storage pipe on Beach Drive SW 		Not Technically Feasible (open cut portion of alternative is not feasible)	