

Meeting Notes

Barton, Murray, Magnolia, North Beach CSO Facilities Project

E00022E06

**King County Department of Natural Resources and Parks
Wastewater Treatment Division**

Date of Meeting: September 17, 2009 **Date of Notes:** September 21, 2009 **Work Order No:** 7562A.10

Time: 1:00 pm

Location: KSC 603

Purpose: Murray Non-Technical Criteria Review

Meeting # 100-52

Attendees: County

Hien Dung
Sue Meyer
Shahzad Namini
Chris Okuda
John Phillips
Monica Van Der Vieren
Mary Wohleb
Kart Zimmer

SPU

Sahba Mohandessi

Consultant

Ellen Blair
Jennifer Corrigan
Allen de Steiguer
Kevin Dour
Jeff Lykken
Brian Matson
Lloyd Skinner
Bob Wheeler

Distribution: Attendees

ACTION ITEMS

Item #	Action	Action By	Due By
1.	Modify comment form to add column to indicate which ones county needs to respond to.	Carollo team	9/22/09
2.	Review/comment on Memo, "Technical Considerations for Alternatives Development"	County team	9/24/09
3.	Criteria information needs response by basin.	Category leads	10/12/09

DISCUSSION

1. The county provided an updated on public meetings.
 - a. Barton/Murray open houses are scheduled for October 7 and 8.
2. The Carollo team presented highlights of responses to comments by the county on the initial nine alternatives.
 - a. Comment #5; need to consider how to get public participation in peak flow reduction; consider risk of success. Need to be more specific in response to comments.
 - b. Comment #10; opportunity to transfer flows to Delridge basin not as great as Barton basin.
 - c. Comment #21; prepare information on how long to get rights of entry.
 - d. Comment #25; Actiflo is no longer a pilot process, but considered available for full scale.

- e. Comment #26; Is there a more programmatic approach to sizing end of pipe treatment alternatives.
2. The Carollo team provided detailed graphics of the initial nine alternatives.
 - a. Alt. 1C; team indicated that lengths of pipe storage in the two locations could be modified.
 - b. Alt. 1D; team noted that some of the length of pipe would have to be tunneled due to depth.
 - c. Alt. 1E; team noted that this storage tank could be located almost anywhere in the basin, though an undeveloped site next to a water reservoir is shown. Team recognized that lower in the basin would be better from an energy and cost standpoint.
 - d. Alt. 1F; relative sizes of pipe storage would vary depending on how large a tank would be feasible on the site shown.
 - e. Alt. 3A; team noted the reduced feasible area for the treatment plant due to footprint shape and area constraints.
 3. The Carollo team provided review of information needed to inform alternatives evaluation for the initial nine alternatives.
 - a. Category leads to be responsible for getting together resources to provide information.
 - b. Information is needed by second week in October.
 4. The Carollo team asked for comments on the usefulness of the Technical Memorandum, "Technical Considerations for Alternatives Development."
 - a. The team was confused about the purpose of the table. Carollo team to review and revise the memo.

END OF NOTES
MEETING 100-52
9/17/09

**MURRAY BASIN
INITIAL ALTERNATIVES MATRIX**

Control Approach	Location	Alternatives								
		1A	1B	1C	1D	1E	1F	1G	3A	5A
		Rectangular Storage at Bottom of Basin	Circular Storage in Vicinity of Murray Avenue and Lincoln Park Way	Distributed Storage Along Beach Drive and Murray Avenue SW	Pipe Storage at Bottom of Basin by Tunneling	Upper Basin Storage	Combined Pipe/Rectangular Storage at Bottom of Basin	Convey and Treat at Alki	End of Pipe Treatment at Bottom of Basin	Peak Flow Reduction Combined with Storage
	Location	Bottom of Basin	Mid-Basin	Mid-Basin/ROW	Bottom of Basin/ROW	Upper Basin	Bottom of Basin/ROW	Bottom of Basin	Bottom of Basin	
1. Peak Flow Storage										
"Rectangular Storage"		X				X	X			
"Circular Storage"			X							
"Pipe Storage"				X	X		X			
2. Convey and Treat								X		
3. End of Pipe Treatment									X	
4. Stormwater Flow Reduction										
5. Combined Approach										X



Legend

- Combined Sewer System
- Storm Sewer System
- Sanitary Sewer System
- 2' Topographic Contour

0 50' 100' 150' 200'

Approximate Scale

Potential Area for Storage Tank Placement

175' x 90' x 16.5' Rectangular Storage

Electrical/Controls

Lowman Beach Park

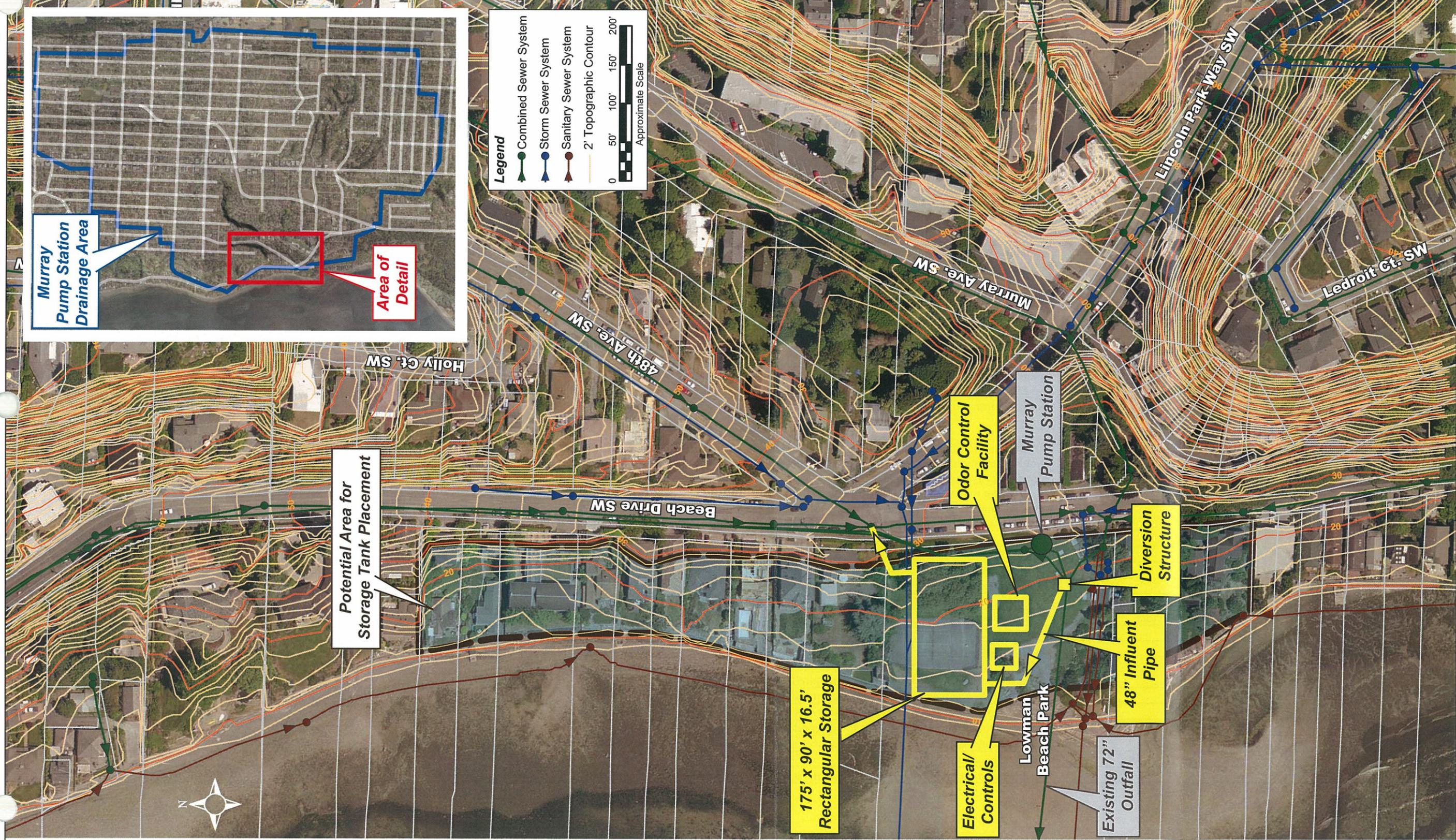
Odor Control Facility

Murray Pump Station

48" Influent Pipe

Diversion Structure

Existing 72" Outfall



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Department of Natural Resources and Parks
 Wastewater Treatment Division

PRELIMINARY DRAFT

Murray CSO Basin Alternative 1A:
 Rectangular Storage at Bottom of Basin

ALTERNATIVE TITLE		1- A - RECTANGULAR STORAGE AT BOTTOM OF BASIN
TECHNICAL SUMMARY		
LOCATION	BOTTOM OF BASIN	
CSO BASIN	MURRAY	
DESCRIPTION	1.0 MG, 175 x 90 x 16.5 feet, buried, rectangular, multi-channel, self cleaning, cast-in-place concrete tank. Flushing chamber with automated flushing gates and drain chambers with submersible pumps. New diversion structure.	
ANCILLARY FACILITIES	40' x 40' carbon scrubber type Odor Control Facility, 30' x30' Electrical/Controls Structure with electrical equipment and controls. Access hatches and above grade structures.	
OPERATIONAL FEATURES	Gravity flow over weir in Diversion Structure into tank, pumped flow out of tank. Tank would be self cleaning using flushing gates. Flow would be pumped to an existing combined sewer manhole located on the Beach Drive.	
SELECTION CRITERIA NOTES		
LAND USE	Zoning	Commercial and Residential. Conditional use permit required.
	Ownership/acquisition	Easement required. May require private property acquisitions.
	Critical Areas	Yes, near shore line. Requires shoreline permit and possibly park permit.
ENVIRONMENT	Shorelines Zone	Yes
	Endangered Species	TBD
TECHNICAL	Complexity and Startup	Routing of flows using overflow weirs, automatic gates, and drain pumps. Facility would be within a single site located adjacent to the Barton Pump Station. The weir would be used for flow measurement and drain pump would be single speed "on/off". All controls and infrastructure would be located within the site.
	Compatibility w/WW system	A new diversion structure would be needed near the existing CSO outfall to divert flow to the new storage tank. Flow would be pumped from storage tank back to an existing sanitary sewer manhole upstream of Murray Pump Station.
	Flexibility	Minimal opportunity to expand. Residential properties are developed within possible tank location. The County has planned a 96.5' x23.5' future generator upgrade project in park.
	Constructability	Geotechnical and construction constraints due to close proximity of shore line. Special shoring and dewatering measures would likely be required. Contractor Staging Issues likely because of space constraints, off site staging would be required. Special construction and permanent measures would be required to stabilize the site such as slurry walls, tiebacks, and permanent dewatering.
O&M	Staffing	Facility can be automatically started and remotely monitored/operated. Drain pump start and shut down would be through county telemetry and control system. Periodic access would be required for equipment exercising and cleaning. The facility requires operator attention during design conditions (e.g. monitoring, sampling, chemical control, etc.). An operator may need to be present periodically for sampling, carbon delivery 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 automated; however, 1-2 personnel may be required. Some procedures of shutdown may need to be conducted immediately; however, most work can be scheduled to be integrated with other staff duties.
	Training	Routine training would be required in accordance with County's standards.
	Access	Inside the park or on private property near the storage tank.
	Process Effects	None anticipated.
COST	Project Cost Factors	Mitigation for local traffic disruption during construction.
	Operation Cost Factors	Carbon for odor control.
	O&M	Carbon replacement, site checks, electricity, equipment and pump replacements and regular maintenance and cleaning.
	External Agency	Seattle Parks
	External Costs	Easement acquisition, site mitigation. Replacement of existing improvements required.
COMMUNITY	Location	Bottom of the basin near residential and park properties.
	Long Term Risk	Minimal impacts to residents from ongoing O & M: staff would be present infrequently (intermittent or only during/after storms).
	Construction	Reduction of usable park space due to proposed structures. Construction would be located near residences and it will be difficult to mitigate impacts such as noise, after hours work, light, vibration, and access.
		Traffic Disruption from Construction Requires disruption of park space or condemning of residential properties for storage tank placement.

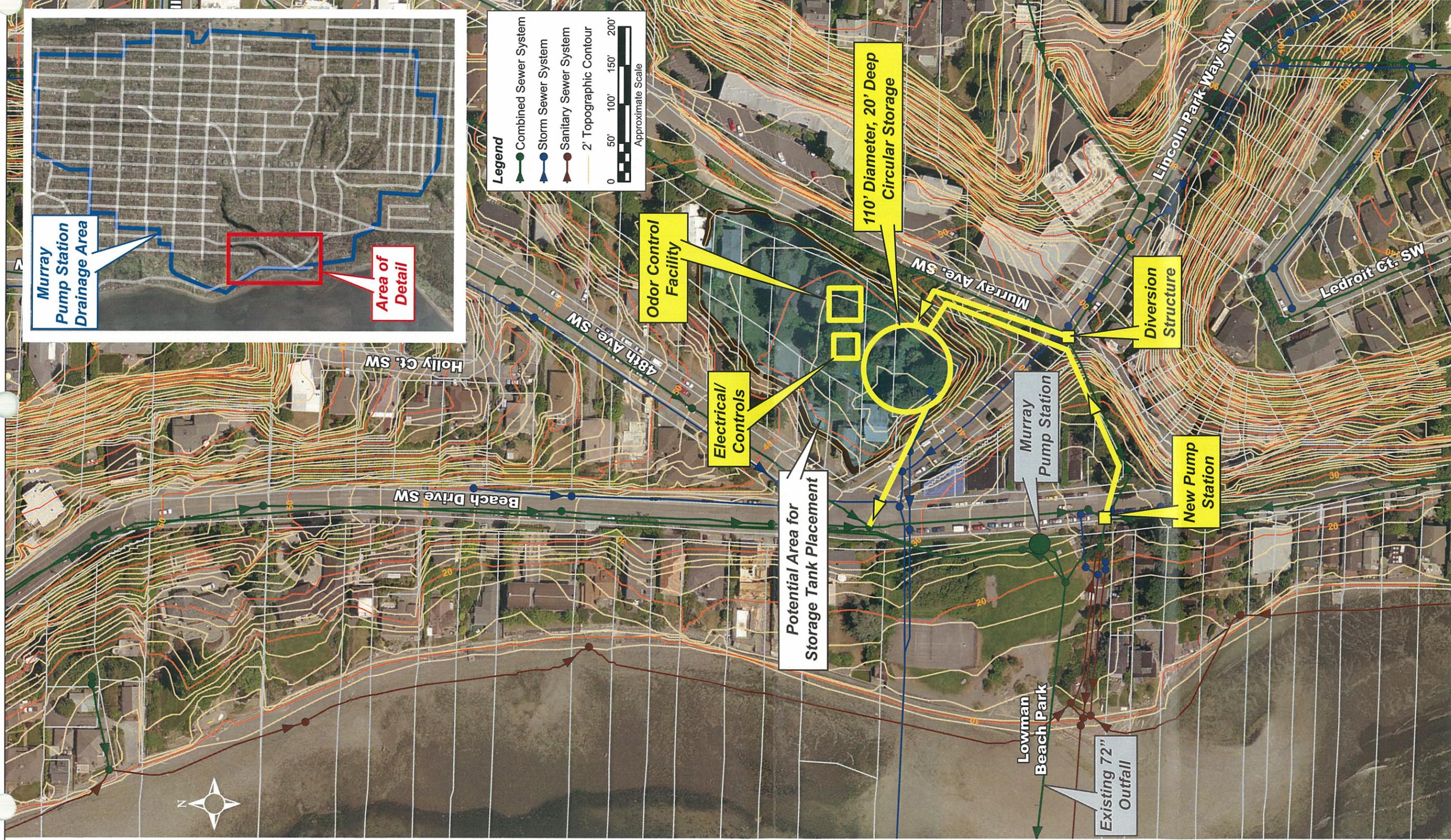


Legend

- Combined Sewer System
- Storm Sewer System
- Sanitary Sewer System
- 2' Topographic Contour

0 50' 100' 150' 200'

Approximate Scale



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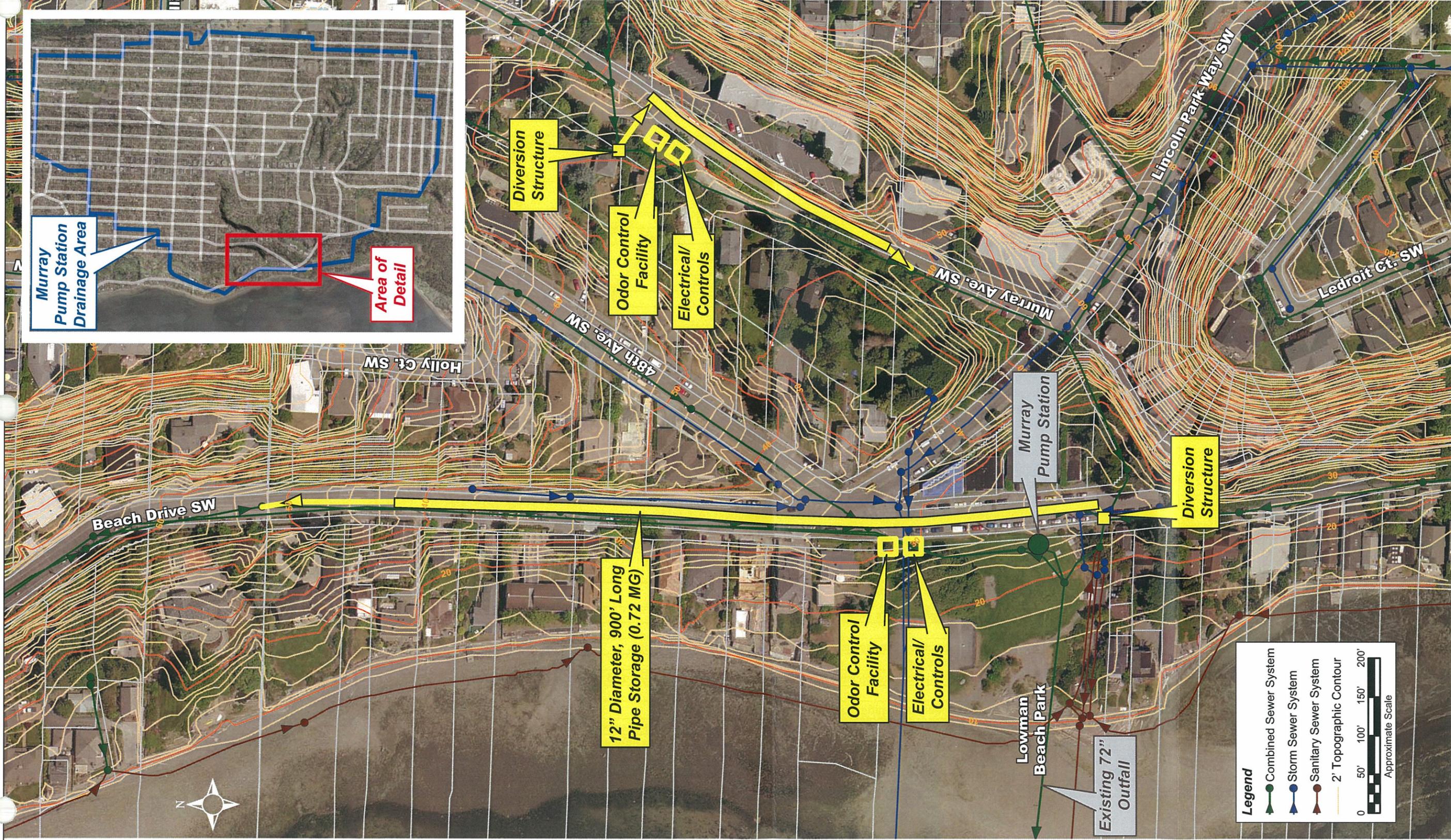


King County
 Department of Natural Resources and Parks
 Wastewater Treatment Division

PRELIMINARY
 DRAFT

Murray CSO Basin Alternative 1B:
 Circular Storage in Vicinity of Murray Avenue
 and Lincoln Park Way

ALTERNATIVE TITLE		1 - B - CIRCULAR STORAGE AT INTERSECTION OF MURRAY AVE SW AND LINCLON PARKWAY SW
TECHNICAL SUMMARY		
LOCATION	INTERSECTION OF MURRAY AVE SW AND LINCLON PARKWAY SW	
CSO BASIN	MURRAY	
DESCRIPTION	1.0 MG, 110' diameter, 20 feet deep, circular caisson storage tank. A new diversion structure at the intersection of Murray Ave SW and Lincoln Parkway SW to divert flows to the new storage tank. New ancillary pump station at Beach Drive SW to pump the excess peak flow from the Barton Pump Station to the new storage facility.	
ANCILLARY FACILITIES	When Barton Pump Station would be pumping 33 MGD during peak flows, Murray Pump Station can only pump 31.5 MGD. Therefore, a new 1.5 mgd pump station would be required near Murray Pump Station to pump excess flows to the new storage tank during peak flow events. 40' x 40' carbon scrubber type Odor Control Facility, 30' x30' Electrical/Controls Structure with electrical equipment and controls. Access roads, fencing around surface structures.	
OPERATIONAL FEATURES	Gravity flow and pumped flow into storage tank, pumped flow out of tank.	
SELECTION CRITERIA NOTES		
LAND USE	Zoning	Vacant and residential
	Ownership/acquisition	Vacant land City of Seattle and/or may need to acquire land from residential property owners.
	Critical Areas	The Site has steep slopes.
ENVIRONMENT	Shorelines Zone	TBD-Possible creek crossing.
	Endangered Species	TBD
TECHNICAL	Complexity and Startup	Routing of flows using overflow weirs, automatic gates, and drain pumps. Facility would be within a single site located approximately 300 ft upstream of the Barton Pump Station. The weir in the diversion structure and a flow meter in the ancillary pump station would be used for flow measurement. Drain pumps would be single speed "on/off". Ancillary pump station may be variable speed. Controls and infrastructure would be located at storage facility and in the ancillary pump station. Part of the site has steep slopes. Special construction and permanent measures are needed to stabilize the site using caissons, slurry walls, tiebacks, etc.
	Compatibility w/WW system	A new diversion structure at the intersection of Murray Ave SW and Lincoln Parkway SW to divert flows by gravity to the new storage tank. New 1.5 mgd ancillary pump station near Murray Pump Station to pump excess flows to the new storage tank.
	Flexibility	Minimum opportunity for expansion.
	Constructability	Geotechnical and construction constraints due to steep slopes in the proposed area. Special measures required. Contractor Staging Issues. Possible creek crossing in the proposed area may require relocation.
O&M	Staffing	Facility can be automatically started and remotely monitored/operated. Drain pump start and shut down would be through county telemetry and control system. Periodic access would be required for equipment exercising and cleaning. The facility requires operator attention during design conditions (e.g. monitoring, sampling, chemical control, etc.). An operator may need to be present periodically for sampling, carbon delivery 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 automated; however, 1-2 personnel may be required. Some procedures of shutdown may need to be conducted immediately, however, most work can be scheduled to be integrated with other staff duties.
	Training	Routine training would be required in accordance with County's standards.
	Access	Within the site.
	Process Effects	TBD
COST	Project Cost Factors	Mitigation for local traffic disruption during construction.
	Operation Cost Factors	Carbon for odor control.
	O&M	Carbon replacement, site checks, electricity, equipment and pump replacements and regular maintenance and cleaning.
	External Agency	TBD
	External Costs	Land acquisition, mitigation.
COMMUNITY	Location	Site located in residential neighborhood.
	Long Term Risk	Minimal impacts to community from ongoing O & M: staff would be present infrequently (intermittent or only during/after storms).
	Construction	Construction would be located near residences and it would be difficult to mitigate impacts such as noise, after hours work, light, vibration, and access. Traffic Disruption from Construction.



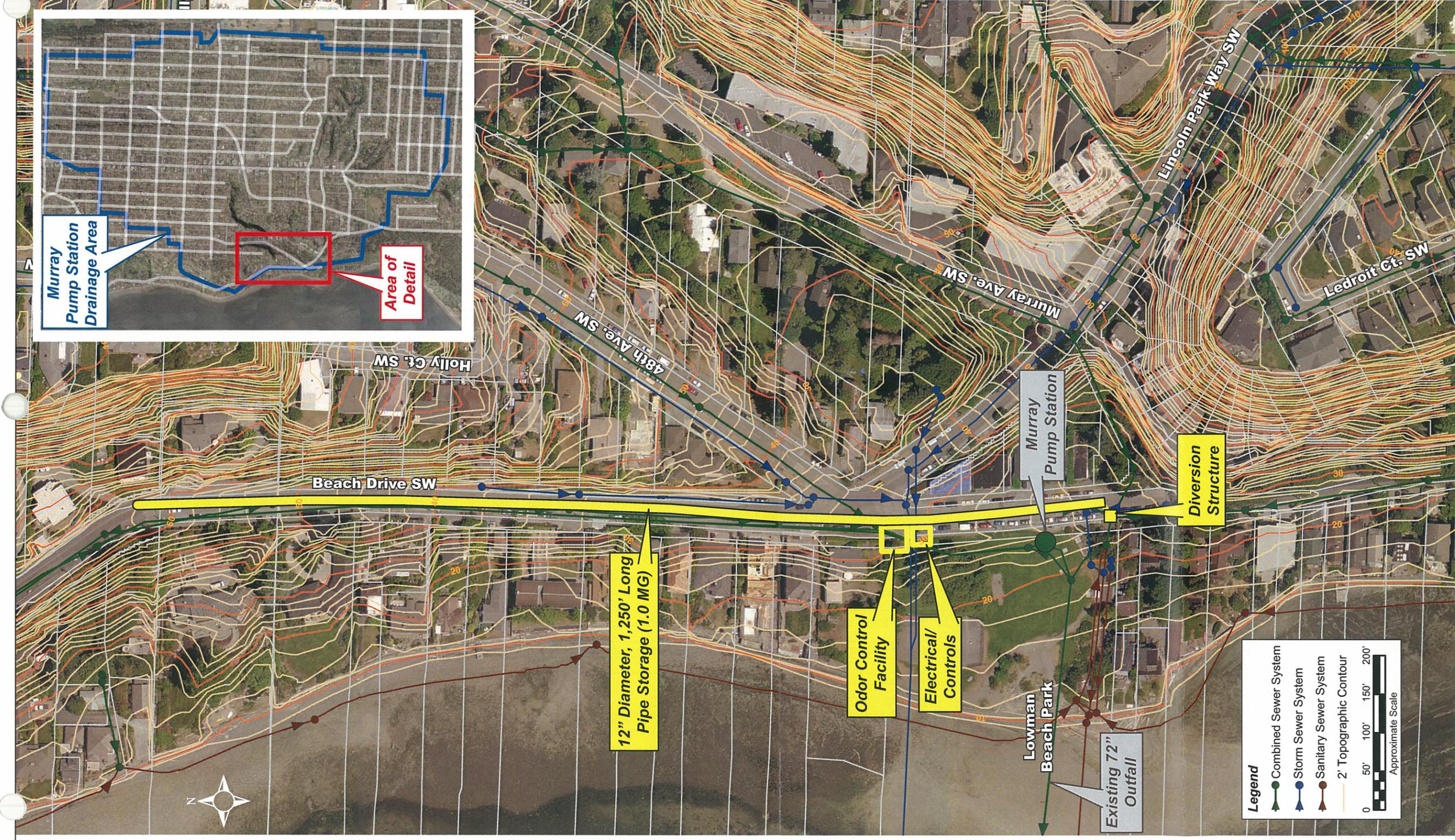
Legend

- Combined Sewer System
- Storm Sewer System
- Sanitary Sewer System
- 2' Topographic Contour

0 50' 100' 150' 200'

Approximate Scale

ALTERNATIVE TITLE		1 - C - DISTRIBUTED STORAGE ALONG BEACH DRIVE AND MURRAY AVENUE SW
TECHNICAL SUMMARY		
LOCATION	BEACH DRVIE AND MURRAY AVE SW	
CSO BASIN	MURRAY	
DESCRIPTION	Requires approximately 900 LF of 144" (12-foot) diameter reinforced concrete pipe on Beach Drive SW Road and 350 LF of 12-foot diameter pipe on the Murray Ave SW for storing the 1.0 MG. The storage pipe on Murray Ave SW would be tributary to 75% of the peak flow coming to the basin. About 0.28 MG will be stored on the Murray Ave SW road and the remaining 0.72 MG will be stored at the bottom of the basin. Major components include: Diversion structures, flushing chamber with flushing gates and drain chamber with submersible pumps. Flow control sensors and instrumentation.	
ANCILLARY FACILITIES	Surface access structures or manholes on the Beach Drive and Murray Ave SW along the length of the pipe line for regular operation and maintenance. Drain pumps. 30' x 30' carbon odor control facility, 30' x 30' electrical/control structure at the Beach Drive SW Road and 20' x 20' carbon odor control facility, 20' x 20' electrical/control structure at the Murray Avenue SW Road	
OPERATIONAL FEATURES	Diversion through weirs and automatic gates. Controlled by telemetry.	
SELECTION CRITERIA NOTES		
LAND USE	Zoning	Street Right-of-Way.
	Ownership/acquisition	Easement required.
	Critical Areas	Located on Road right-of-way.
ENVIRONMENT	Shorelines Zone	No
	Endangered Species	TBD
TECHNICAL	Complexity and Startup	Similar to other County storage tanks.
	Compatibility w/WW system	A new diversion structure near Barton Pump station and one on Murray Ave SW would be required to divert peak flow to the new storage pipe. The alternative may also require modifications to the operational methods for existing infrastructure.
	Flexibility	Minimum opportunity for expansion.
	Constructability	The north end of the pipe on the Beach Drive road would be approximately 40' deep due to existing ground elevation. Special measures would be required for tunneling. Geotechnical and construction constraints due to location of the pipe on the Right-of-Way. Site is constrained, requiring careful construction sequencing, with several move-in, move-out stages to accommodate specialty contractors as well as conventional construction. Might require deep excavation for a portion of pipe. Contractor would require provide offsite staging and operations. Relocation of sanitary sewer, water and other underground utilities may be required along Beach Drive and Murray Ave SW.
O&M	Staffing	Facility can be automatically started and remotely monitored/operated. Drain pump start and shut down would be through county telemetry and control system. Periodic access would be required for equipment exercising and cleaning. The facility requires operator attention during design conditions (e.g. monitoring and control, etc.). An operator may need to be present periodically for sampling, carbon delivery 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 automated; however, 1-2 personnel may be required. Some procedures of shutdown may need to be conducted immediately; however, most work can be scheduled to be integrated with other staff duties.
	Training	Routine training would be required in accordance with County's standards.
	Access	Surface access, or from structure located outside of travelled roadway.
	Process Effects	None anticipated.
COST	Project Cost Factors	Mitigation for local traffic disruption and temporary access during construction.
	Operation Cost Factors	Carbon for odor control unit.
	O&M	Carbon replacement, site checks, electricity, equipment and pump replacements and regular maintenance and cleaning.
	External Agency	SDOT/SPU
	External Costs	Land / Easement Acquisition, mitigation.
COMMUNITY	Location	Site located on Beach Drive SW Right-of-Way and Murray Ave SW. Visible to surrounding residences.
	Long Term Risk	Minimal impacts to community from ongoing O & M: staff would be present infrequently (intermittent or only during/after storms).
	Construction	Construction would be located on Beach Drive and Murray Ave SW right-of-way. Temporary access would be needed for residents along Beach Drive Road. It would be difficult to mitigate impacts such as noise, after hours work, light, vibration, and access.
		Traffic Disruption from Construction



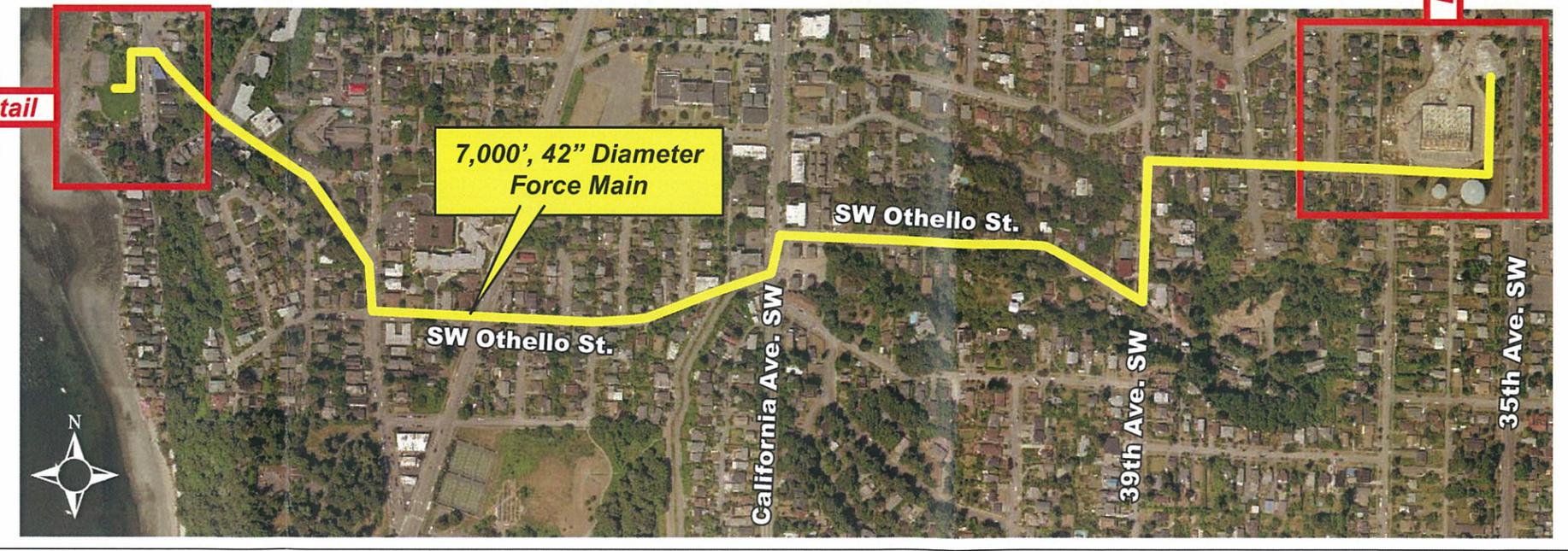
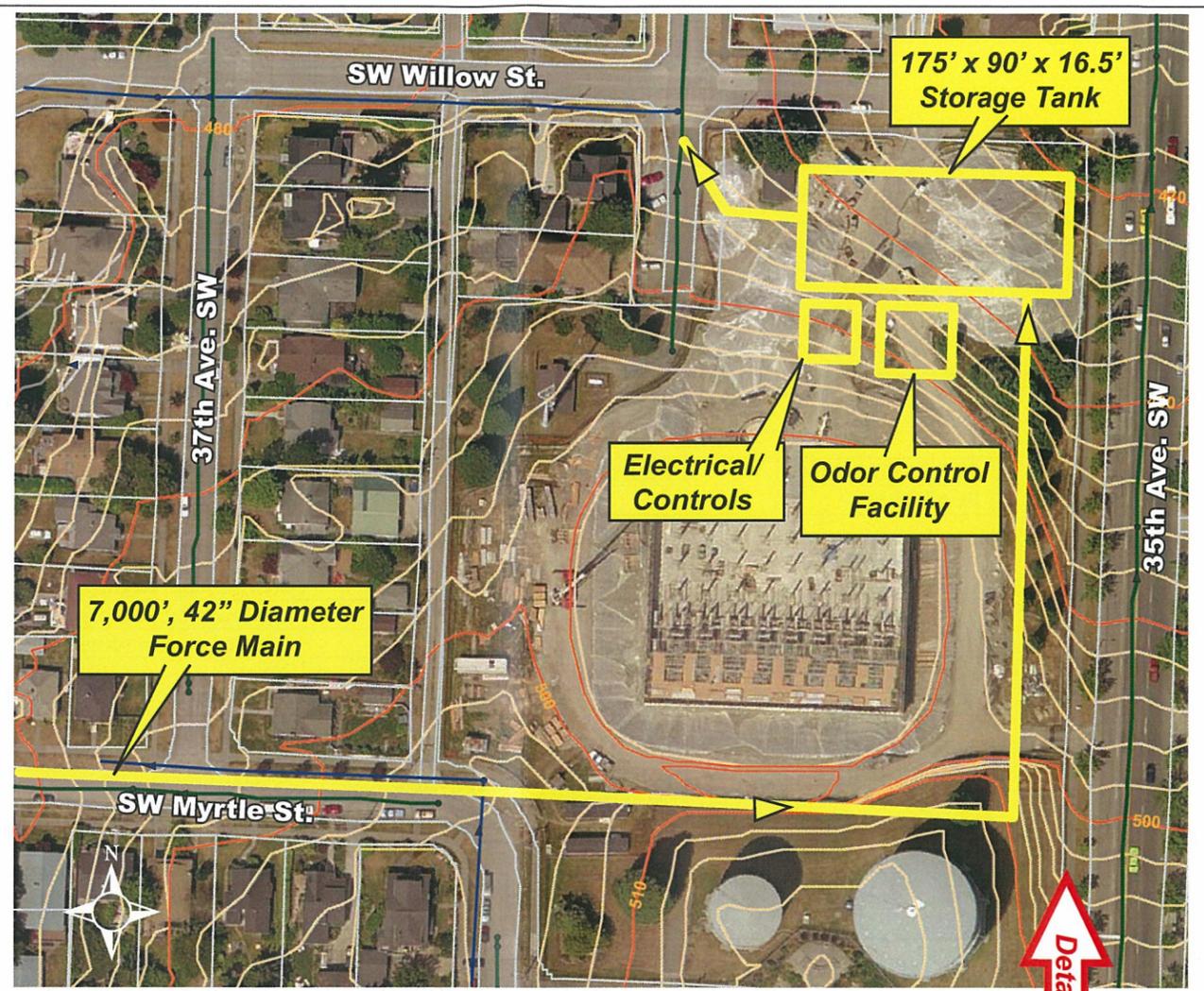
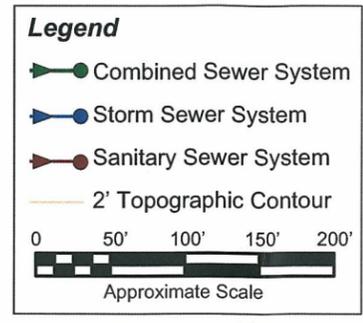
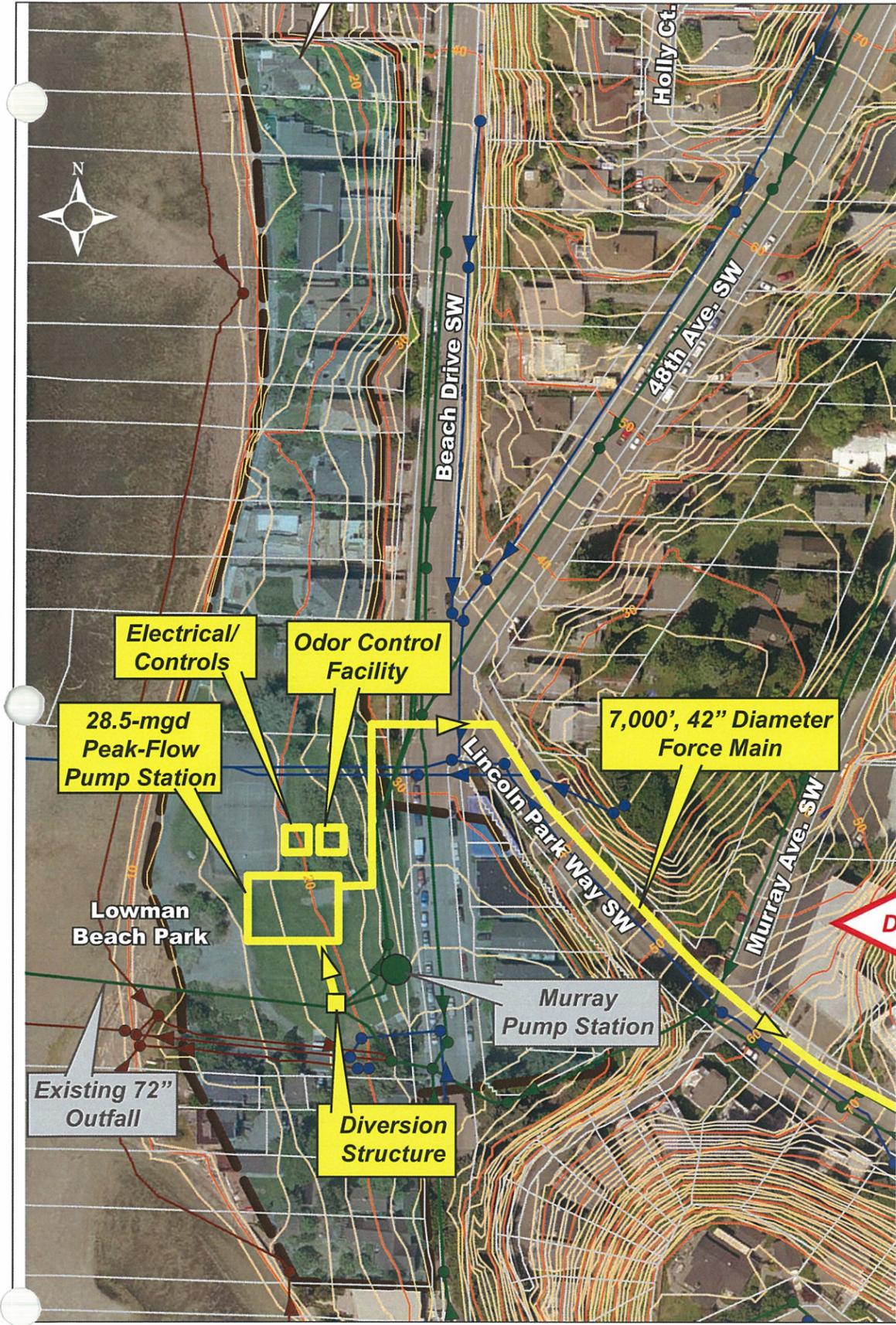
**12" Diameter, 1,250' Long
Pipe Storage (1.0 MG)**

Legend

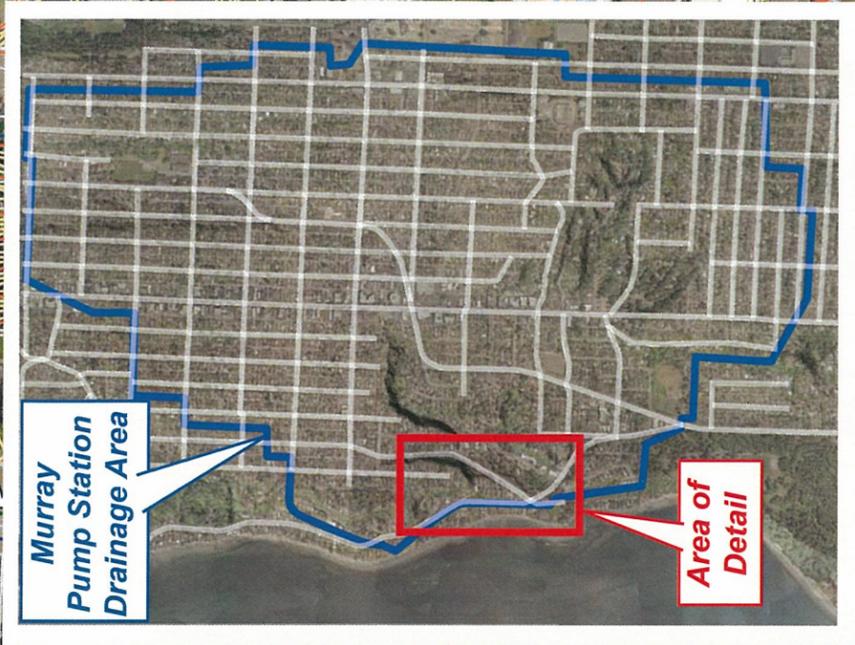
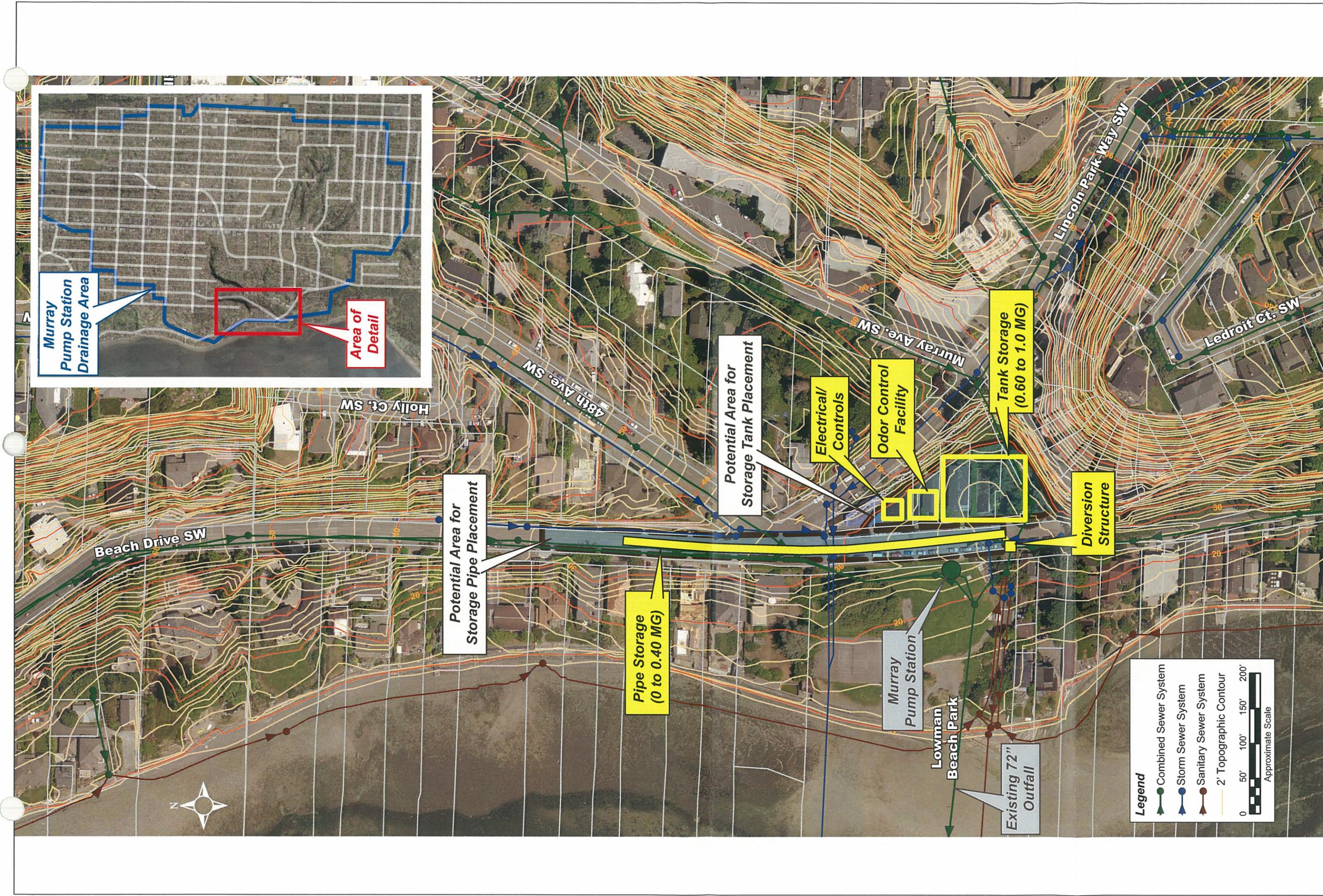
- Combined Sewer System
- Storm Sewer System
- Sanitary Sewer System
- 2' Topographic Contour

0 50' 100' 150' 200'
Approximate Scale

ALTERNATIVE TITLE		1- D - PIPE STORAGE AT BOTTOM OF BASIN BY TUNNELING
TECHNICAL SUMMARY		
LOCATION	BEACH DRIVE ROAD SW	
CSO BASIN	MURRAY	
DESCRIPTION	Requires approximately 1,350 LF of 144" (12-foot) diameter reinforced concrete pipe for storage of 1.0 MG. Major components include: a flushing chamber with flushing gates and drain chamber with submersible pumps. Flow control sensors and instrumentation. A new diversion structure with control gates near the existing CSO outfall to divert flow to the new storage pipe.	
ANCILLARY FACILITIES	40' x 40' carbon scrubber type Odor Control Facility, 30' x30' Electrical/Controls Structure with electrical equipment and controls. Surface access structures or manholes on the Beach Drive along the length of the pipe line for regular operation and maintenance. Drain pumps.	
OPERATIONAL FEATURES	Gravity flow into tank, pumped flow out of tank.	
SELECTION CRITERIA NOTES		
LAND USE	Zoning	Zoning would be commercial use where the pump station would be located in the park and road right-of-way for force main. Requires conditional use permit and permit from Seattle DOT.
	Ownership/acquisition	Easement required.
	Critical Areas	Located on Road right-of-way.
ENVIRONMENT	Shorelines Zone	No
	Endangered Species	TBD
	Complexity and Startup	Similar to other County storage tanks.
TECHNICAL	Compatibility w/WW system	A new diversion structure would be required near the existing CSO outfall to divert peak flow to the new storage pipe. The alternative may also require modifications to the operational methods for existing infrastructure.
	Flexibility	Minimum opportunity for expansion.
	Constructability	The north end of the pipe would be approximately 60' deep due to existing elevation. Special measures would be required for tunneling. Geotechnical and construction constraints due to location of the pipe on the Right-of-Way. Tunneling portals would block street requiring temporary access and detour measures for local residents along beach drive. Site is constrained, requiring careful construction sequencing, with several move-in, move-out stages to accommodate specialty contractors as well as conventional construction. Contractor would require provide offsite staging and operations. Relocation of sanitary sewer, water and other underground utilities may be required along Beach Drive.
	Staffing	Facility can be automatically started and remotely monitored/operated. Drain pump start and shut down would be through county telemetry and control system. Periodic access would be required for equipment exercising and cleaning. The facility requires operator attention during design conditions (e.g. monitoring and control, etc.). An operator may need to be present periodically for sampling, carbon delivery 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 automated; however, 1-2 personnel may be required. Some procedures of shutdown may need to be conducted immediately; however, most work can be scheduled to be integrated with other staff duties.
O&M	Training	Routine training would be required in accordance with County's standards.
	Access	Surface access, or from structure located outside of travelled roadway.
	Process Effects	None anticipated.
COST	Project Cost Factors	Mitigation for local traffic disruption and temporary access during construction.
	Operation Cost Factors	Carbon for odor control unit.
	O&M	Carbon replacement, site checks, electricity, equipment and pump replacements and regular maintenance and cleaning.
	External Agency	SDOT, SPU
COMMUNITY	External Costs	Land / Easement Acquisition, mitigation.
	Location	Site located on Beach Drive Right-of-Way. Visible to surrounding residences.
CONSTRUCTION	Long Term Risk	Minimal impacts to community from ongoing O & M: staff would be present infrequently (intermittent or only during/after storms).
	Construction	Construction would be located on Beach Drive right-of-way. Access along the pipe alignment would be blocked by tunnel portals. Temporary access would need to be developed for those residents along Beach Drive located between the portals. It would be difficult to mitigate impacts such as noise, after hours work, light, vibration, and access.
		Traffic Disruption from Construction



ALTERNATIVE TITLE		1- E - UPPER BASIN STORAGE
TECHNICAL SUMMARY		
LOCATION	UPPER MURRAY BASIN	
CSO BASIN	MURRAY	
DESCRIPTION	Peak flows from the Murray basin would be conveyed to a rectangular storage tank located up-basin. The figure shows a rectangular storage tank in the vicinity of the existing Myrtle Reservoir for example purposes. This would require a 60 x 75 feet, 28.5 MGD peak flow pump station near existing Murray pump station in Lowman Beach Park. In the example shown in the figure, approximately 7,000 LF of 42" diameter forcemain from Lowman Beach Park to the Myrtle Reservoir (up Lincoln Park Way, SW Othello St, SW Orchard Street, 36th Avenue SW, and SW Myrtle Street).	
ANCILLARY FACILITIES	20' x 20' carbon scrubber type Odor Control Facility, Electrical/Controls would be housed within the pump station building. Surface access structures for air release manholes along the length of the pipe line alignment for operation and maintenance. Electrical/Controls Structure (30' x 30') and carbon scrubber (40' x 40').	
OPERATIONAL FEATURES	Peak flow diversion structure, peak flow wet weather pump station to convey flows to the rectangular storage facility.	
SELECTION CRITERIA NOTES		
LAND USE	Zoning	Park - Commercial use where the pump station would be located and road right-of-way for force main. Seattle Public Utilities Property for rectangular storage is zoned commercial. Requires conditional use permit and permit from Seattle DOT.
	Ownership/acquisition	Easement for new pump station at Lowman Park and easement for new rectangular storage at Myrtle Reservoir.
	Critical Areas	Located on Road Right of Way, Lowman Park, and Myrtle Reservoir.
ENVIRONMENT	Shorelines Zone	Yes
	Endangered Species	TBD
TECHNICAL	Complexity and Startup	Similar to other County Pump Stations, force mains, and storage facilities.
	Compatibility w/WW system	A new diversion structure shall be constructed near the existing CSO outfall to divert flow to the new wet weather pump station.
	Flexibility	Minimum opportunity to expand (limited space in the park and the reservoir site)
	Constructability	In example shown, approximately 1.4 miles of forcemain construction along Lincoln Park Way, SW Othello St, SW Orchard Street, 36th Avenue SW, and SW Myrtle Street. Traffic disruptions during construction, existing utility relocations due to new forcemain construction. Disruption of Lowman Beach Park during construction of peak flow pump station.
O&M	Staffing	Remotely monitored. Pump station automatically started, and shut down. Storage facility remotely monitored and controlled using county telemetry and control system. Periodic access for equipment exercising and cleaning.
	Training	Routine training would be required in accordance with County's standards.
	Access	Inside the Park (pump station), Along the road (forcemain), and Myrtle Reservoir (storage facility in this example).
	Process Effects	None
COST	Project Cost Factors	Mitigation for park restoration, local traffic disruption during construction, and restoration at reservoir site.
	Operation Cost Factors	New pump station, forcemain O & M. Carbon replacement, site checks, electricity, equipment and pump replacement, storage facility cleaning.
	O&M	Electricity, pump station checks and forcemain maintenance.
	External Agency	Seattle Parks, SDOT, SPU
	External Costs	Easement acquisition from Seattle Parks, SDOT, and SPU, mitigation
COMMUNITY	Location	Pump Station visible to surrounding residences, storage facility would have above grade facilities at reservoir site.
	Long Term Risk	O & M Risk: Accessing park site for regular pump station checks and maintenance.
	Construction	Construction would be located on street right-of-way and it would be difficult to mitigate impacts such as noise, after hours work, light, vibration, and access.
		Traffic Disruption from Construction
		Disruption from park use, and SPU use of reservoir site during construction
	Reduction of usable area of park due to proposed above grade structures	

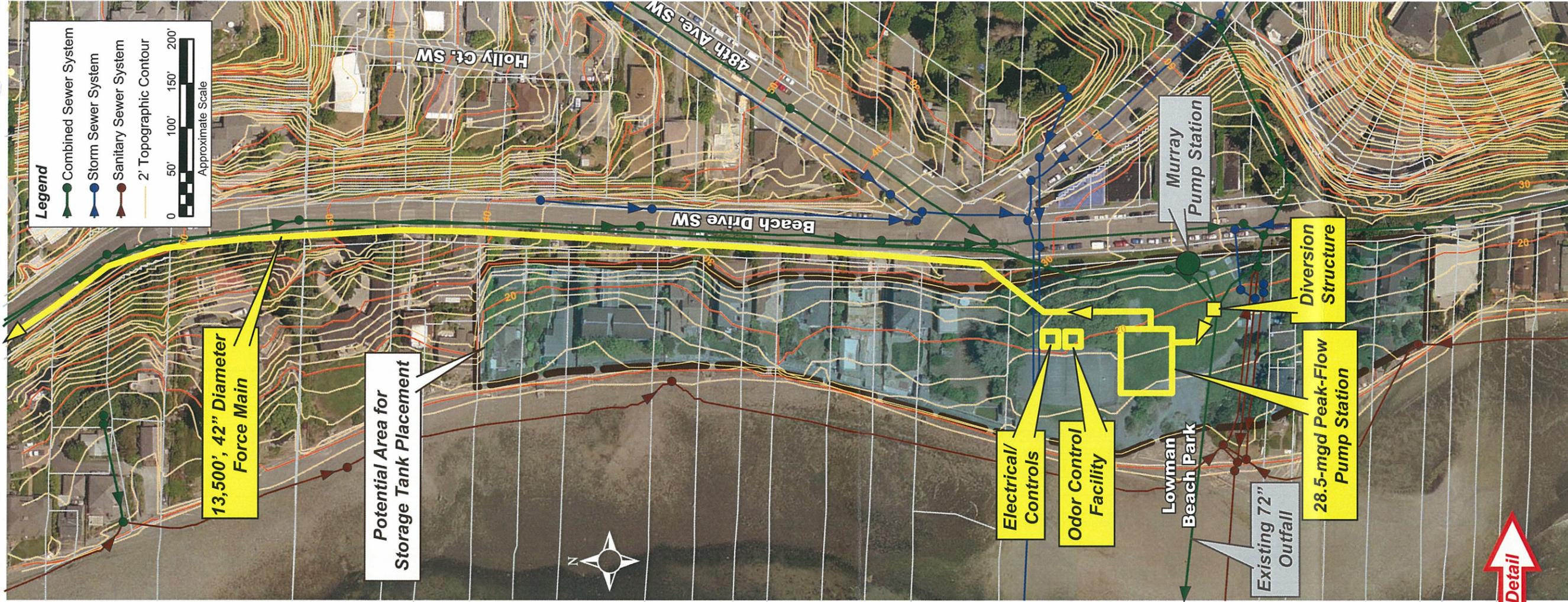


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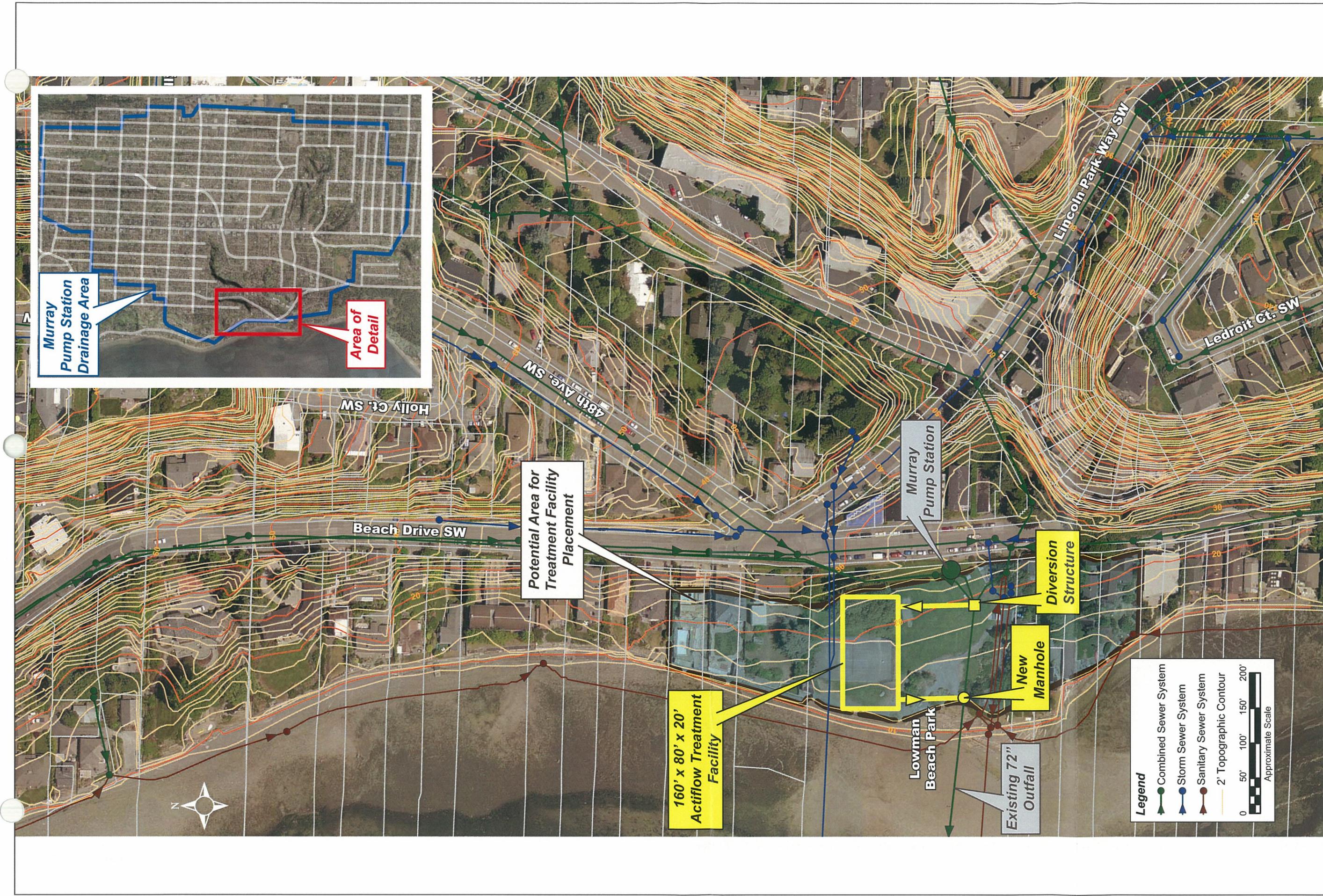
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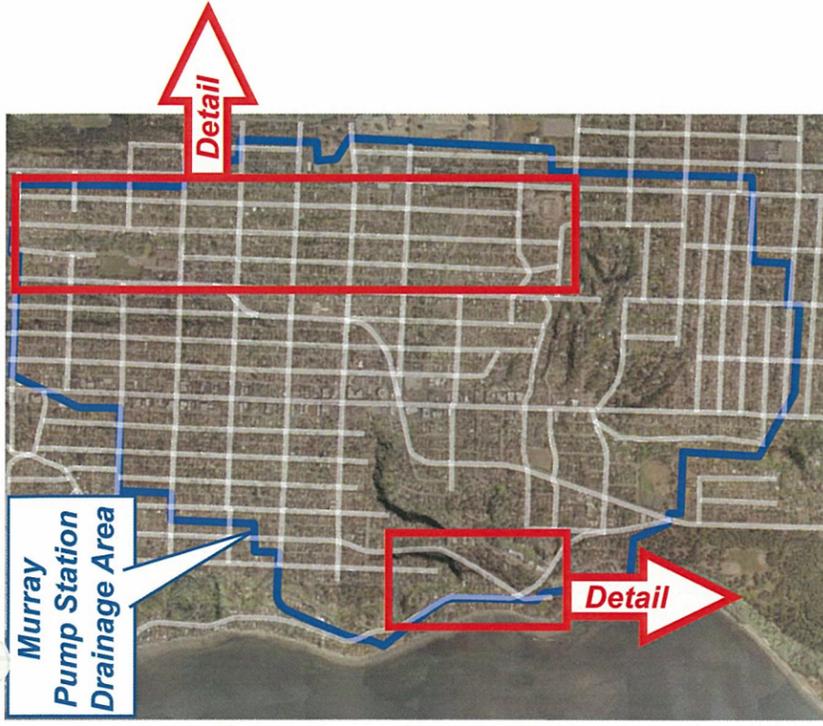
ALTERNATIVE TITLE		1-F- COMBINED PIPE / RECTANGULAR STORAGE TANK AT BOTTOM OF BASIN
TECHNICAL SUMMARY		
LOCATION	BOTTOM OF BASIN	
CSO BASIN	MURRAY	
DESCRIPTION	This is a combined storage alternative with a rectangular tank and pipe storage at the bottom of the basin. Depending upon the layout of the storage tank, approximately 0.6 – 1.0 million gallons can be stored in the storage tank location and the remaining 0.0-0.4 million gallons could be stored in a 12-foot diameter RCP pipe on the Beach Drive SW Road.	
ANCILLARY FACILITIES	Diversion Structure, 30' x 30' Electrical/Controls Structure and 40' x 40' Carbon Odor Control Facility. Surface access structures or manholes along the length of the pipe line alignment for operation and maintenance.	
OPERATIONAL FEATURES	Gravity flow over weir within diversion structure into tank, pumped flow out of tank.	
SELECTION CRITERIA NOTES		
LAND USE	Zoning	Rectangular Storage: Residential (SFR), Pipe Storage: Road Right-of-Way. Conditional use and right-of-way permit required.
	Ownership/acquisition	Easement required.
	Critical Areas	TBD
ENVIRONMENT	Shorelines Zone	No
	Endangered Species	TBD
TECHNICAL	Complexity and Startup	Similar to other storage facilities.
	Compatibility w/WW system	A new diversion structure shall be constructed on the Beach Drive road to divert flow to the new storage facilities.
	Flexibility	Minimum opportunity to expand.
	Constructability	Sites are constrained, requiring careful construction sequencing, with several move-in, move-out stages to accommodate specialty contractors as well as conventional construction. Contractor would require offsite staging and operations. Relocation of sanitary sewer, water and other underground utilities may be required along Beach Drive.
O&M	Staffing	Facility can be automatically started and remotely monitored/operated. Drain pump start and shut down would be through county telemetry and control system. Periodic access would be required for equipment exercising and cleaning. The facility requires operator attention during design conditions (e.g. monitoring and control, etc.). An operator may need to be present periodically for sampling, carbon delivery 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 automated; however, 1-2 personnel may be required. Some procedures of shutdown may need to be conducted immediately; however, most work can be scheduled to be integrated with other staff duties.
	Training	Routine training would be required in accordance with County's standards.
	Access	Surface access from structure located outside of travelled roadway.
	Process Effects	None anticipated
COST	Project Cost Factors	Mitigation for local traffic disruption and temporary access during construction.
	Operation Cost Factors	Carbon for odor control unit
	O&M	Carbon replacement, site checks, electricity, equipment and pump replacements and regular maintenance and cleaning.
	External Agency	SDOT, SPU
COMMUNITY	External Costs	Land/Easement Acquisition, mitigation.
	Location	Sites located on residential lots and Beach Drive Right-of-Way. Highly visible to surrounding residences.
	Long Term Risk	Minimal impacts to community from ongoing O & M: staff would be present infrequently (intermittent or only during/after storms).
	Construction	Construction would be located on Beach Drive right-of-way. It would be difficult to mitigate impacts such as noise, after hours work, light, vibration, and access. Traffic Disruption from Construction



ALTERNATIVE TITLE		2- A - CONVEY AND TREAT TO ALKI
TECHNICAL SUMMARY		
LOCATION	BEACH DRIVE ROAD SW	
CSO BASIN	MURRAY	
DESCRIPTION	Peak flows from the Murray basin would be conveyed to the 63 rd Street pump station where they would continue to flow downstream and be treated at the Alki CSO Treatment Facility. This would require a 60 x 75 feet, 28.5 MGD peak flow pump station near the existing Murray pump station on Lowman Beach Park. Approximately 13,350 LF of 42" diameter forcemain along the Beach Drive road would be needed to convey the flows to the existing 63 rd street pump station. This would also require upgrades to the existing 63 rd Street pump station and the Alki treatment facility to handle the additional flows. Also, capacity of the Alki CSO outfall needs to be evaluated for discharging additional flows to Puget Sound.	
ANCILLARY FACILITIES	20' x 20' carbon scrubber type Odor Control Facility, 20' x20' Electrical/Controls Structure with electrical equipment and controls. Surface access structures or air release manholes on the Beach Drive along the length of the pipe line alignment for operation and maintenance. Upgrades to existing Alki CSO Treatment Facility.	
OPERATIONAL FEATURES	Peak flow diversion structure, peak flow wet weather pump station to convey flows to the Alki CSO Facility.	
SELECTION CRITERIA NOTES		
LAND USE	Zoning	Commercial and residential use where the pump station would be located, road right-of-way for force main. Requires conditional use permit.
	Ownership/acquisition	Easement required. May need to acquire land from property owners.
	Critical Areas	Located on Road Right-of-Way
ENVIRONMENT	Shorelines Zone	Yes
	Endangered Species	TBD
TECHNICAL	Complexity and Startup	Similar to other County Pump Stations.
	Compatibility w/WW system	A new diversion structure shall be constructed near the existing CSO outfall to divert flow by gravity to the new wet weather pump station.
	Flexibility	Minimum opportunity to expand (limited space in the park)
	Constructability	Approximately 2.5 miles of forcemain construction along Beach Drive. Traffic disruptions during construction, existing utility relocations due to new forcemain alignment. Disruption of Lowman Beach Park during construction of pump station.
O&M	Staffing	Remotely monitored, started, and shut down using county telemetry and control system. Periodic access for equipment exercising and cleaning.
	Training	Routine training would be required in accordance with County's standards.
	Access	Inside the Park (pump station), Along the road (forcemain)
	Process Effects	Treatment plant/outfall capacity will need to be increased at the Alki CSO facility.
COST	Project Cost Factors	Mitigation for local traffic disruption during construction.
	Operation Cost Factors	Additional O & M at Alki, New pump station /forcemain O & M.
	O&M	Electricity, pump station checks and forcemain maintenance.
	External Agency	Seattle Parks, SDOT, SPU
COMMUNITY	External Costs	Easement acquisition, mitigation
	Location	Visible to surrounding residences.
	Long Term Risk	O & M Risk: Accessing park site for regular pump station checks and maintenance.
	Construction	Construction would be located on Beach Drive Right-of-Way and it would be difficult to mitigate impacts such as noise, after hours work, light, vibration, and access.
		Traffic Disruption from Construction
		Disruption of park use
		Possible reduction of usable area of park due to proposed above grade structures



ALTERNATIVE TITLE		3-A - END OF PIPE TREATMENT AT BOTTOM OF BASIN
TECHNICAL SUMMARY		
LOCATION	BOTTOM OF BASIN	
CSO BASIN	MURRAY	
DESCRIPTION	28.5 MGD capacity, 160 x 80 x 20 feet, buried, rectangular Actiflo High Rate Clarification (HRC) system in cast-in-place concrete tank. HRC facilities include an Actiflo HRC unit, 10mm prescreening, odor control, electrical and chemical buildings and UV treatment.	
ANCILLARY FACILITIES	Surface access structures such as hatches for regular operation and maintenance. Access roads and fencing around surface structures.	
OPERATIONAL FEATURES	Gravity flow through diversion structure into to treatment unit. May require pumping of treated effluent to existing CSO outfall depending upon hydraulic profile of treatment units.	
SELECTION CRITERIA NOTES		
LAND USE	Zoning	Commercial and residential. Conditional use permit required.
	Ownership/acquisition	May need to acquire land from residential property owners.
	Critical Areas	Yes, near to shore line. Requires shoreline permit and park permit.
ENVIRONMENT	Shorelines Zone	Yes
	Endangered Species	TBD
TECHNICAL	Complexity and Startup	More complex than typical county facilities.
	Compatibility w/WW system	A new diversion structure would be required near the existing CSO outfall to divert flows by gravity to the new Treatment Facility.
	Flexibility	Minimum. The County has a 96.5' x23.5' future generator upgrade project near the site.
	Constructability	Geotechnical and construction constraints due to close proximity of shore line. Special measures required. Contractor Staging Issues. Site has low to medium slopes and requires dewatering if disturbed because excavation would be near to the shore line. Special construction and permanent measures would be required to stabilize the site such as slurry walls, tiebacks, and permanent dewatering.
O&M	Staffing	Remotely monitored, started, and shut down using county telemetry and control system. May require staff monitoring during operation. Periodic access for equipment exercising, solids removal and cleaning.
	Training	Training would be required for operation and maintenance of facility.
	Access	On Site
	Process Effects	TBD
COST	Project Cost Factors	Mitigation for local traffic disruption during construction.
	Operation Cost Factors	Carbon for odor control unit, polymer for high rate clarification and operational cost associated with disinfection.
	O&M	Carbon replacement, site checks, electricity, equipment and pump replacements and regular maintenance and cleaning.
	External Agency	TBD
	External Costs	Easement acquisition, site mitigation.
COMMUNITY	Location	Visible to surrounding residences.
	Long Term Risk	O & M impacts on surrounding community: moderate maintenance would be needed by staff and staff would be onsite to check during large storms.
	Construction	Construction would be located near residences and it would be difficult to mitigate impacts such as noise, after hours work, light, vibration, and access.
		Traffic Disruption from Construction.
		Disruption of park use. Possible reduction of usable park area due to proposed structures, residential neighbors to the South.

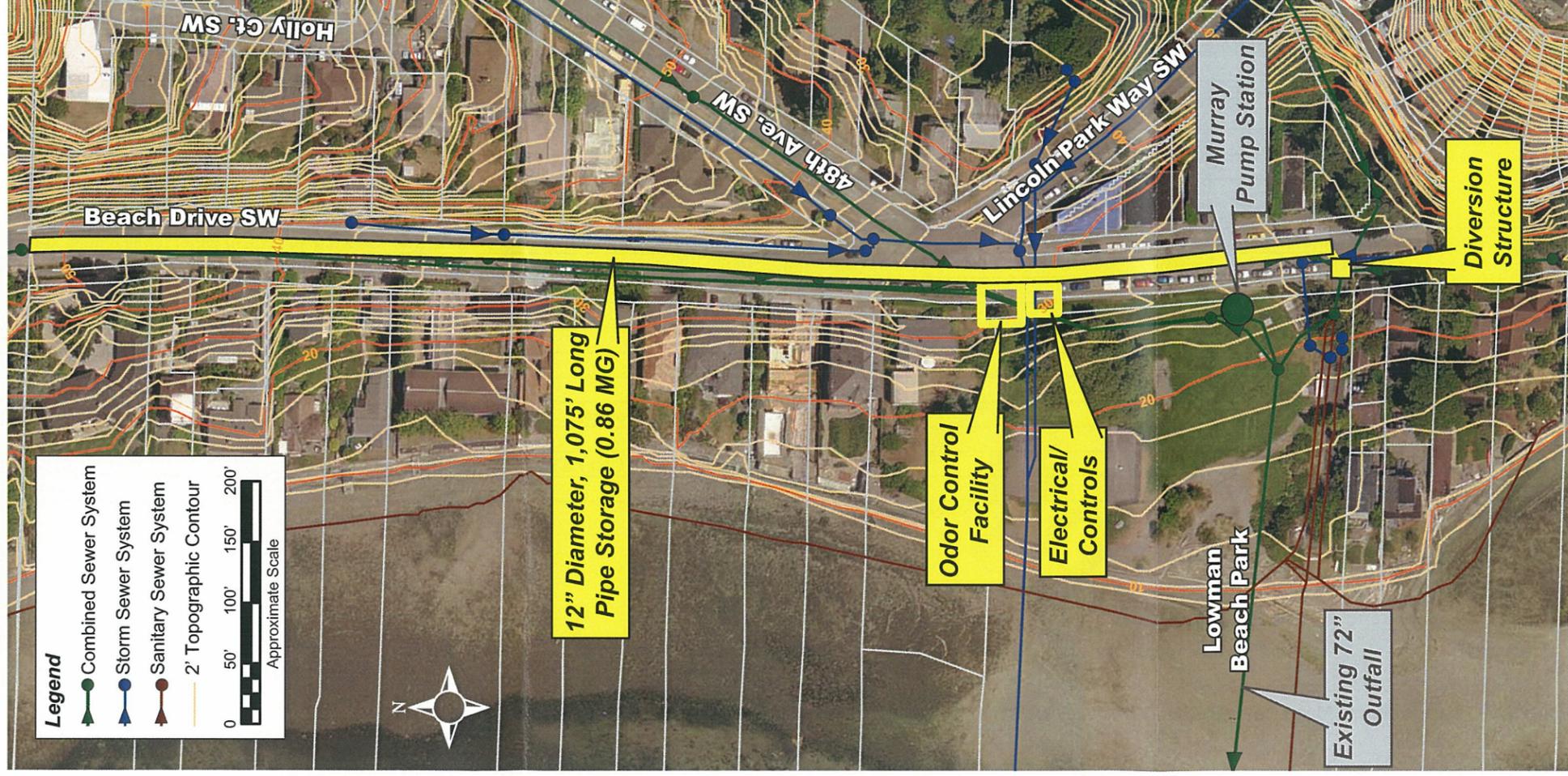


Legend

- Roof to Be Disconnected from Combined Sewer System
- New Storm Drain

10 acres of impervious roof and street right-of-way area disconnected from combined sewer system. 144,000 gallons of control volume reduction.

Approximate Scale



Legend

- Combined Sewer System
- Storm Sewer System
- Sanitary Sewer System
- 2' Topographic Contour

Approximate Scale

ALTERNATIVE TITLE		5- A - PEAK FLOW REDUCTION COMBINED WITH STORAGE
TECHNICAL SUMMARY		
LOCATION	SOUTHEAST AREA OF SUBBASIN M 7 (SUBBASIN 419 FROM GIS REPORT) AND PIPE STORAGE ON BEACH DRIVE SW	
CSO BASIN	MURRAY	
DESCRIPTION	Disconnect approximately 10 acres of roof and street storm water connections from combined sewer system (CSS). This would reduce the control volume by 140,000 MG. The remaining 860,000 MG can be controlled by using a 1,075 LF, 144 inch diameter RCP pipe on Beach Drive SW. Compared to Alternative-1-D, by disconnecting impervious area in sub basin 419, approximately 175 LF of pipe storage could be reduced.	
ANCILLARY FACILITIES	Construction of approximately 6,800 LF of 12-inch diameter storm sewer pipe along 34 th , 35 th and 36 th AVE SW streets (refer to map for storm sewer location) 40' x 40' carbon scrubber type Odor Control Facility, 30' x30' Electrical/Controls Building with electrical equipment and controls. Surface access structures or manholes on the beach drive along the length of the pipe for regular operation and maintenance.	
OPERATIONAL FEATURES	Impervious area disconnections and diversion of flows from roof drains and catch basins into new storm sewers. The existing CSS will be used as the sanitary sewer system. For storage, operational features will be similar to pipe storage Alternative 1D.	
SELECTION CRITERIA NOTES FOR DEMAND MANAGEMENT		
LAND USE	Zoning	Residential (SFR). Conditional use permit required.
ENVIRONMENT	Shorelines Zone	No
	Endangered Species	TBD
CAPACITY	Storm System: Pipeline Diameter Tie-in MS4 Diameter Capacity	12-inch diameter and greater (estimate only, TBD) Varies TBD
	Sanitary System: Pipeline Diameter Downstream SS Capacity	(Reuse existing CSS) Varies 18 inches TBD
CONTROL VOLUME REDUCTION	Total Effective Impervious Area Disconnected	10.0 acres
	Total Control Volume Reduction	140,000 gallons
CONSTRUCTION IMPACTS	Lineal feet of pipe, ft	6,800 LF
O&M	Staffing	Not required.
	Training	Not required.
	Access	N/A
	Process Effects	TBD
COST	Project Cost Factors	Mitigation for local traffic disruption during construction. Concrete pavement panel replacement, side walk repairs, storm lateral connections.
	Operation Cost Factors	Minimum
	O&M	Minimum
	External Agency	Seattle Public Utilities
	External Costs	TBD
COMMUNITY	Location	Highly visible to residences.
	Long Term Risk	Minimum
	Construction	Traffic Disruption on streets during construction.
SELECTION CRITERIA NOTES FOR STORAGE		
Similar to Alternative 1-D for pipe storage.		