OPTION 1 - Install deeper gravity sanitary sewer system and use existing combined system to carry stormwater.

Option 1: Key Considerations

- Five metres has been established as the maximum practical and economic depth for trench excavation.
- Existing pipe is old and leaks at joints allowing water to enter and escape the pipe.
- Creating a new sanitary sewer system minimizes sewage leakage.
- Requires the least number of pumps on private property. Costs for pumps will be the responsibility of the homeowner. Backup power generators optional.
- Sanitary sewer requires smaller pipe infrastructure (20 cm) than larger stormwater infrastructure (60 cm).
- Deep trench excavation costs more to excavate and install pipes, and is more disruptive to neighbourhoods as it has a longer construction timeframe.
- Trench excavation is invasive and may negatively impact mature trees and landscaping on public and private property.
- Existing pipe is the appropriate size for carrying stormwater.

Catchment	Humber	Rutland
Proposed Sanitary Sewer Pumps	29	39
Existing Sanitary Sewer Pumps	10	7
Number of Properties	150	236

Option 1: Cost Estimate	
Total Project cost	$19.9 M
District of Oak Bay cost	$16.4 M
Range of costs to homeowners with new pump system	$17K* to $20K*
Range of costs to homeowners not requiring new pump system	$8 K* to $11 K*

Note that 17 existing pumped services and 63 existing gravity services are expected to be re-used.

*Homeowner cost estimates are based on a general assessment of the work required on private property and will vary depending on the specific circumstances and actual work required on each property. Costs associated with the archaeological discoveries on private or public property and compliance with the *Heritage Conservation Act* are not included in the cost estimates.

OPTION 2 - Install deeper gravity stormwater system and use existing combined system to carry sanitary sewage.

Option 2: Key Considerations

- Five metres has been established as the maximum practical and economic depth for trench excavation.
- Existing pipe is old and leaks. Using this pipe to carry sanitary sewage minimizes project environmental benefits and would accelerate the need to rehabilitate or replace the existing pipe.
- Requires the least number of pumps on private property. Costs for pumps will be the responsibility of the homeowner. Backup power generators are recommended.
- Existing pipe is larger than required for sanitary sewage conveyance. Lower flows may result in insufficient volume to flush solids from the pipe, odor and solids accumulation may occur requiring more frequent maintenance.
- Deep trench excavation costs more to excavate and install pipes, and is more disruptive to neighbourhoods as it has a longer construction timeframe.
- Trench excavation is invasive and may negatively impact mature trees and landscaping on public and private property.

Catchment	Humber	Rutland
Proposed Stormwater Pumps	32	40
Existing Stormwater Pumps	7	6
Number of Properties	150	236

Option 2: Cost Estimate	
Total Project cost	$20.7 M
District of Oak Bay cost	$17.1 M
Range of costs to homeowners with new pump system	$17K* to $20K*
Range of costs to homeowners not requiring new pump system	$8 K* to $11 K*

Note that 13 existing pumped services and 80 existing gravity services are expected to be reused.

*Homeowner cost estimates are based on a general assessment of the work required on private property and will vary depending on the specific circumstances and actual work required on each property. Costs associated with the archaeological discoveries on private or public property and compliance with the *Heritage Conservation Act* are not included in the cost estimates.

OPTION 3 - Install pumped low pressure sanitary sewer and use existing system as stormwater drain.

Option 3: Key Considerations

- 100% of properties in both catchments would require sanitary sewage pumps. Costs will be the responsibility of the homeowner. Backup power generators optional.
- This option requires a shallow, small diameter pipe that minimizes trench excavation requirements.
- This option is the least disruptive to neighbourhoods and poses the lowest risk to damaging mature trees and landscaping on public and private property.
- Lower capital costs for the District of Oak Bay.
- Higher capital costs for homeowners.
- Existing pipe is old and leaks at joints allowing water to enter and escape the pipe.
- Existing pipe is more suitable for conveying stormwater than sanitary sewage.

Catchment	Humber	Rutland
Proposed Sanitary Sewer Pumps	140	229
Existing Sanitary Sewer Pumps	10	7
Number of Properties	150	236

Option 3: Cost Estimate	
Total Project cost	$13.9 M
District of Oak Bay cost	$6.9 M
Range of costs to homeowners with new pump system	$17K* to $20K*
Range of costs to homeowners not requiring new pump system	N/A

Note that 17 existing pumped services and 63 existing gravity services are expected to be re-used.

*Homeowner cost estimates are based on a general assessment of the work required on private property and will vary depending on the specific circumstances and actual work required on each property. Costs associated with the archaeological discoveries on private or public property and compliance with the *Heritage Conservation Act* are not included in the cost estimates.

OPTION 4 - Hybrid: Install shallow gravity stormwater system. Localized areas serviced by new municipally owned pump stations for roadway runoff. Existing system to carry sanitary sewage.

Option 4: Key Considerations

- Up to three metres has been established as the maximum depth for shallow trench construction.
- This option requires more properties to have stormwater pumps than Option 2. Costs for pumps will be the responsibility of the homeowner.
- Power outages are a greater risk for stormwater pump systems due to the potential volume of stormwater during wet weather months. Backup power generators would be required.
- Capital costs are higher for homeowners to pump stormwater than sanitary sewage.
- Two new municipal stormwater pump stations would be installed with the costs carried by the District of Oak Bay.
- Shallow trench excavation is less disruptive to neighbourhoods as it will have a shorter construction timeframe than deep trench construction.
- Trench excavation is invasive and may negatively impact mature trees and landscaping on public and private property.
- Shallow trench excavation is less costly than deep trench excavation.
- Existing pipe is old and leaks. Using this pipe to carry sanitary sewage minimizes the project's environmental benefits, and would accelerate the need to rehabilitate the existing pipe.
- Existing pipe is larger than required for sanitary sewage conveyance. Due to lack of flow and adequate volume to flush the pipe, odor and solids accumulation may occur requiring more frequent maintenance.

Catchment	Humber	Rutland
Proposed Stormwater Pumps	65	101
Existing Stormwater Pumps	7	6
Number of Properties	150	236

Option 4: Cost Estimate	
Total Project cost	$14.4 M
District of Oak Bay cost	$10.1 M
Range of costs to homeowners with new pump system	$17K* to $20K*
Range of costs to homeowners not requiring new pump system	$5 K* to $8 K*

Note that 13 existing pumped connections and 40 of 80 existing gravity connections are expected to be re-used.

*Homeowner cost estimates are based on a general assessment of the work required on private property and will vary depending on the specific circumstances and actual work required on each property. Costs associated with the archaeological discoveries on private or public property and compliance with the *Heritage Conservation Act* are not included in the cost estimates.

OPTION 5 - Hybrid: Install shallow gravity sanitary sewer system, with sanitary sewer pumps where necessary. Existing sewer system would carry stormwater.

Option 5: Key Considerations

- Up to three metres has been established as the maximum depth for shallow trench construction.
- This option requires approximately 50% of properties in both catchment areas to install sanitary sewage pumps. Costs will be the responsibility of the homeowner. Backup power generators optional.
- Existing pipe is old and leaks at joints allowing water to enter and escape the pipe.
- Shallow trench excavation is less disruptive to neighbourhoods as it will have a shorter construction timeframe than deep trench construction.
- Sanitary sewage systems require smaller pipe infrastructure (20 cm) than for stormwater infrastructure (60 cm).
- Trench excavation is invasive and may negatively impact mature trees and landscaping on public and private property.
- Shallow trench excavation is less costly than deep trench excavation.
- Existing pipe is more suitable for conveying stormwater than sanitary sewage.

Catchment	Humber	Rutland
Proposed Sanitary Sewer Pumps	60	114
Existing Sanitary Sewer Pumps	10	7
Number of Properties	150	236

Option 5: Cost Estimate	
Total Project cost	$14.6 M
District of Oak Bay cost	$10.3 M
Range of costs to homeowners with new pump system	$17K* to $20K*
Range of costs to homeowners not requiring new pump system	$5 K* to $8 K*

Note that this assumes 17 existing pumped connections and 40 existing gravity connections can be re-used.

*Homeowner cost estimates are based on a general assessment of the work required on private property and will vary depending on the specific circumstances and actual work required on each property. Costs associated with the archaeological discoveries on private or public property and compliance with the *Heritage Conservation Act* are not included in the cost estimates.

OPTION 6 - Hybrid: Install shallow gravity sanitary sewer system, with localized community sanitary sewer pumping stations where necessary. Existing sewer system would carry stormwater.

Option 6: Key Considerations

- Up to three metres has been established as the maximum depth for shallow trench construction.
- Fewer properties in both catchment areas will require sanitary sewage pumps than in Option 5. Costs will be the responsibility of the homeowner. Backup power generators optional.
- Existing pipe is old and leaks at joints allowing water to enter and escape the pipe.
- Two new municipal sanitary sewer pump stations would be installed with the costs carried by the District of Oak Bay.
- Shallow trench excavation is less disruptive to neighbourhoods as it will have a shorter construction timeframe than deep trench construction.
- Sanitary sewer system requires smaller pipe infrastructure (20 cm) than stormwater infrastructure (60 cm).
- Shallow trench excavation is less costly than deep trench excavation.

Catchment	Humber	Rutland
Proposed Sanitary Sewer Pumps	40	96
Existing Sanitary Sewer Pumps	10	7
Number of Properties	150	236

Option 6: Cost Estimate	
Total Project cost	$15.4 M
District of Oak Bay cost	$11.6 M
Range of costs to homeowners with new pump system	$17K* to $20K*
Range of costs to homeowners not requiring new pump system	$5 K* to $8 K*

Note that this assumes 17 existing pumped connections and 40 existing gravity connections can be re-used.

*Homeowner cost estimates are based on a general assessment of the work required on private property and will vary depending on the specific circumstances and actual work required on each property. Costs associated with the archaeological discoveries on private or public property and compliance with the *Heritage Conservation Act* are not included in the cost estimates.