Bowser Village Wastewater Servicing Study: Overview

The 2010 Bowser Village Centre Plan supports the development of common wastewater systems that can be expanded to serve the Bowser Village area. Bowser Village was also identified in a 2013 study as having the most potential to evolve into a compact complete community, and therefore it warrants the investment to service it with a community wastewater system.

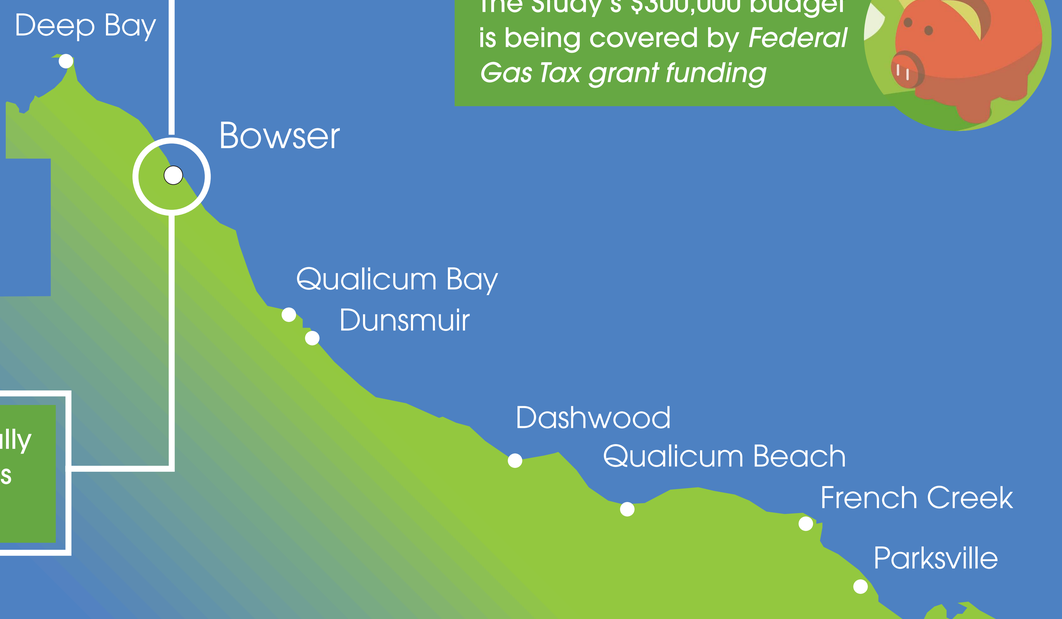
The **Bowser Village Wastewater Servicing Study** was developed to gain a comprehensive understanding of the costs, benefits, and concerns of providing sewer servicing to Bowser.

The Study's scope is to provide the **detailed design** and cost estimates for potential **collection and treatment** systems and the **preliminary design** and cost estimates for both **marine and ground disposal** options for treated wastewater disposal.

The Study focuses specifically on *Bowser Village Centre* as the potential service area

In consideration of the **many interests and stakeholders in the region**, the RDN is engaging with First Nations, stakeholders, and residents throughout the process. Once this Study is complete, there are still several stages required before a project of this nature could be considered for construction: including **public approval, grant funding, and finalized design.**

The Study's $300,000 budget is being covered by *Federal Gas Tax grant funding*



Project information and updates are available at **www.rdn.bc.ca/bowser**

Bowser Village Wastewater Servicing Study: Collection System

Preliminary design for sewage collection includes a gravity collection system and 3 pump stations to pump from low points in the gravity collection systems.

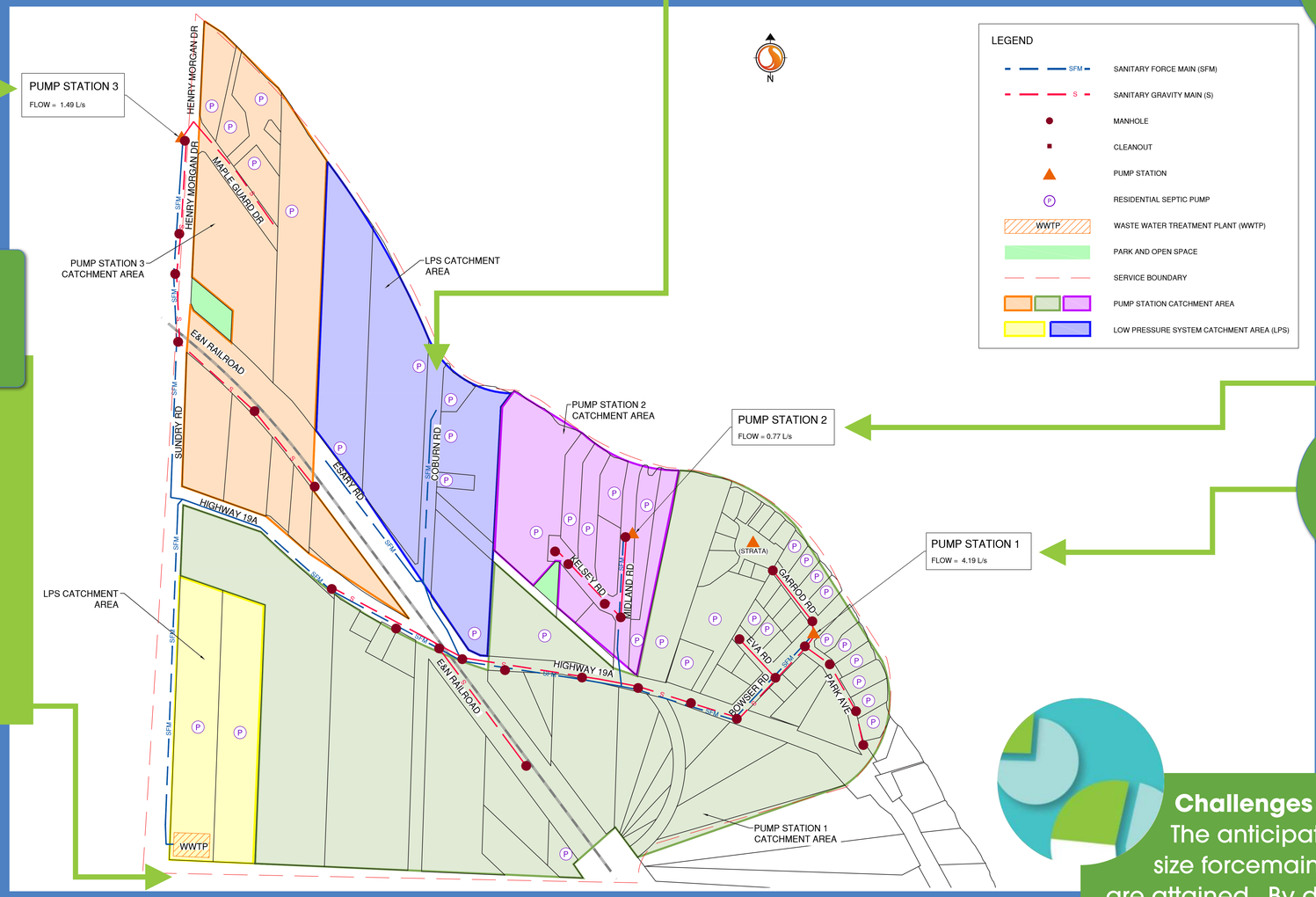
Estimated Cost = $5 Million
(3 pump stations, forcemains, gravity sewers and individual grinder pumps)

Pump Station #3

Proposed to be located on Henry Morgan Drive and will collect sewage from 9 hectares. A small diameter forcemain will connect into the forcemain from Pump Station #1 at the cross road between Sundry Road and Highway 19A.

Low Pressure System* along Coburn Road

Individual pump packages will be located along the properties adjacent to Coburn Road and will collect sewage from approximately 7.6 ha of properties.



Low Pressure Systems* by Wastewater Treatment Plant

Low Pressure Systems will be utilized for the two adjoining properties to where the treatment plant is anticipated to be located. It is anticipated that two separate low pressure pump packages will be installed, one for each parcel.

Pump Station #2

Proposed to be installed on Midland Road. The catchment area for this pump station is approximately 4.6 ha in size. This pump station will connect into the forcemain originating from Pump Station #1.

Pump Station #1

Proposed to be located at the north end of Bowser Road. Pump Station #1 will have the largest collection area of approximately 25 ha.

Challenges

The anticipated initial and future flows require the different size forcemains to ensure that minimum scour velocities are attained. By designing the pump stations to the OCP target densities, the wet wells would be oversized.

*A low pressure system requires that each property install a pump that will convey wastewater into a community forcemain.

Bowser Village Wastewater Servicing Study: Treatment System

5 secondary treatment process options that would be viable for the Bowser WWTP were evaluated.

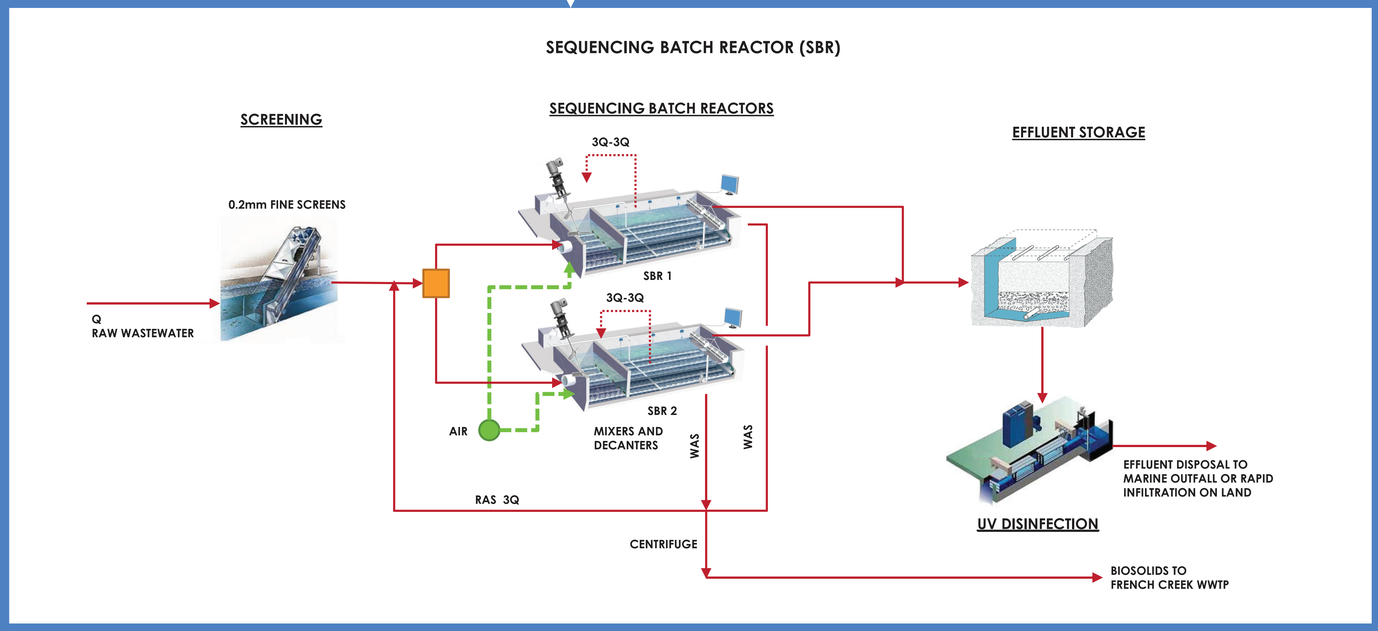
Treatment Options

1. Membrane Bioreactor (MBR),
2. Moving Bed Biofilm Reactor (MBBR)
3. Sequencing Batch Reactor (SBR)
4. Nitrifying / Denitrifying Activated Sludge
5. Upflow Sludge Blanket Filtration (USBF)

These 5 treatment options were **evaluated using 9 criteria**:

1. **Capital Cost**
   Construction costs
2. **Operating Cost**
   Annual operating costs
3. **Expandability**
   The flexibility to expand the process to meet future growth.
4. **Future Regulations**
   The flexibility of the secondary process to meet future regulatory requirements.
5. **Integrated Resource Recovery**
   The potential for the secondary treatment process to offer IRR opportunities (effluent re-use, biosolids re-use, heat recovery, etc.)
6. **Land Area**
   Total relative footprint of land area required for the complete treatment plant.
7. **Odour Potential**
   Potential for odour to be generated in the secondary process.
8. **Reliability**
   Performance experience in similar climates and similar plant sizes.
9. **Operational Flexibility**
   Ability to handle changes in flow and load without impacting effluent quality.

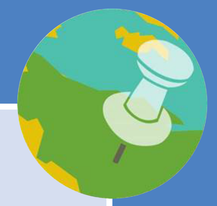
Based on the weighting, the **Sequencing Batch Reactor is best suited for use as the secondary treatment process for Bowser Village**. This technology lends itself well to a site that will not be manned on a continual basis. Sequencing Batch Reactor technology can adapt to changing flow conditions without the need for any operator adjustments



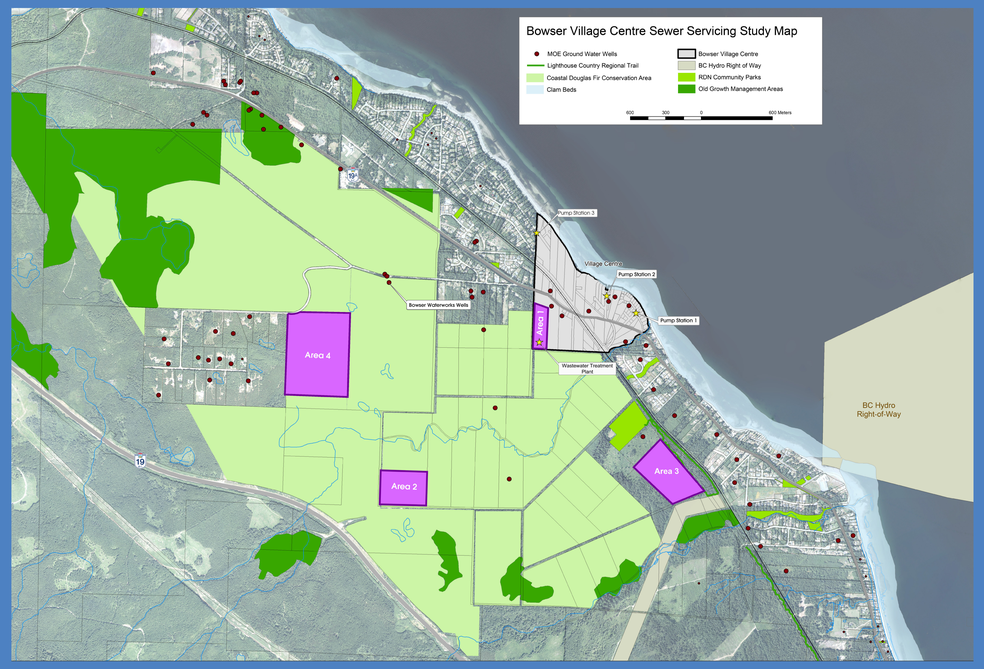
Estimated Cost = $3.4 Million

Bowser Village Wastewater Servicing Study: Ground Disposal

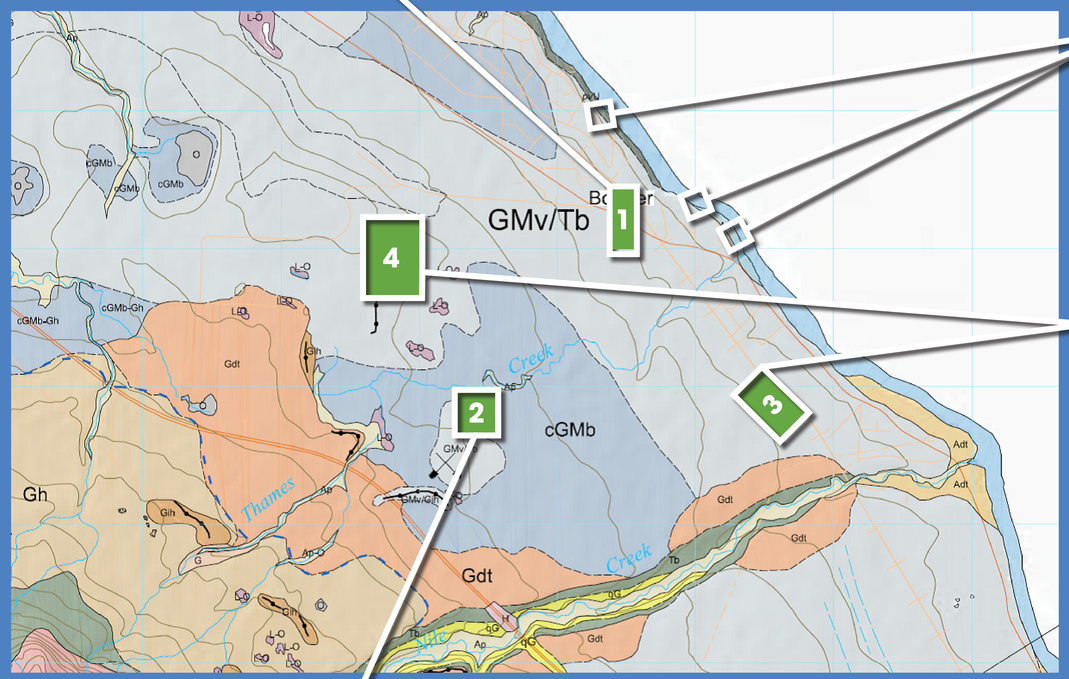
The **local surficial geology is dominated by glacial till**. The till is present beneath varying thicknesses of marine, glociomarine and glaciofluvial deposits. The more significant creeks have down cut through the till to expose Quadra Sand; the local water aquifer.



Due to its **dense, heavily over-consolidated** nature, **glacial till** is characterized by **favourable foundation bearing properties** and a low permeability. This bodes well for the **support and seismic stability** of the proposed treatment plant and pump stations, but **poorly** in terms of opportunities for **sustained large scale ground disposal**.



Treatment Plant Site



Proposed Pump Station Sites

Alternative In-Ground Disposal Sites

Initial In-Ground Disposal Option

Estimated Cost = $1.8 Million

Legend

GMv/Tb = a thin layer (veneer) of marine soils underlain by a blanket of glacial till. Till was deposited sub-glacially and is typically very dense and of low permeability.

cGMb = sandy glaciomarine blanket underlain by marine clay. Glaciomarine deposits were deposited into a marine environment by floating glaciers and meltwater. These deposits are typically found atop of glacial till.

Gdt = glaciofluvial deposits of sand and gravel deposited by meltwater streams

qA = Quadra Sand; pre-glacial (Vashon) deposit locally utilized as a drinking water aquifer.

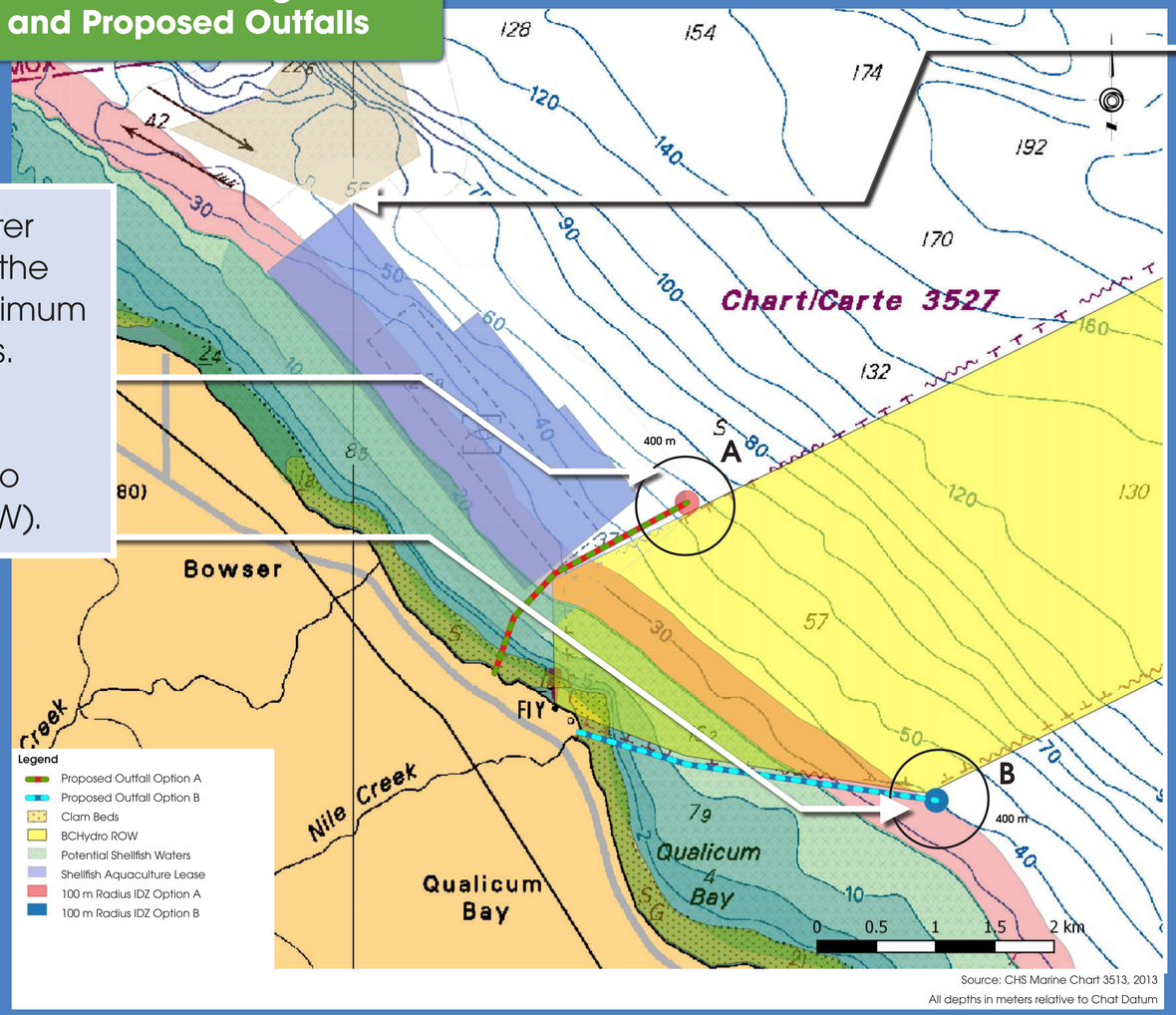
Bowser Village Wastewater Servicing Study: Marine Disposal

The marine environment at Bowser is capable of accepting treated wastewater. The marine environment in this area is expected to have a high assimilative capacity due to ocean volume and tidal action for mixing and dispersion, and presence of marine microorganisms and physicochemical processes for nutrient breakdown.

The waters fronting Bowser include important aquatic resources:

- Intertidal and subtidal bivalve shellfish that are harvested (geoduck beds, scallops, etc.)
- Herring spawning grounds
- Eelgrass beds

Suitable Discharge Zones and Proposed Outfalls



Source: CHS Marine Chart 3513, 2013
All depths in meters relative to Chat Datum

Potential discharge locations are limited to areas outside the shaded areas. Areas north of the shellfish lease are unsuitable due to ecologically sensitive areas.

The Municipal Wastewater Regulation requires that the point of discharge is a minimum of 400 m from shellfish waters. Options for outfall locations in proximity to Bowser occur on either side of the BC Hydro sub-marine right of way (ROW).

Estimated Cost

Option A	Option B
$1.3 Million	$1.8 Million

Bowser Village Wastewater Servicing Study: Summary

Permitting and Approvals

Environmental studies and regulatory permitting activities will be required prior to construction of the proposed work. There will be 6 permits required from various federal/provincial Ministries. The most complex permit application can take up to 30 months to complete. The estimated cost for the studies and permitting activities is $0.3 Million.

Key Points

- Scope of study = Bowser Village Centre.
- Collection system will be a combination of gravity sewers, individual pumps and 3 system wide pumping stations.
- Sequencing Batch Reactor technology is the preferred treatment option for Bowser Village.
- Suitable conditions and locations for ground disposal have not been found.
- The marine environment at Bowser is capable of accepting treated wastewater. Option A outfall is the recommended disposal option.

Capital Cost Estimate

Item	Marine Option A Disposal Cost (Millions)	Marine Option B Disposal Cost (Millions)	Ground Disposal Cost (Millions)
Conveyance — Collection & Pumping	$4.9	$4.9	$4.9
Treatment	$3.4	$3.4	$3.4*
Disposal	$1.3	$1.8	$1.8
Permitting and Approvals	$0.3	$0.3	$0.3
Total	**$9.9**	**$10.4**	**$10.4**
Potential 2/3 Federal/Provincial Funding	–$6.6	–$6.9	–$6.9
Net Cost	**$3.3**	**$3.5**	**$3.5**

*Ground disposal treatment costs could be greater depending on soil conditions and location of the disposal site.

Next Steps

- Consider stakeholder and public comments.
- Progress design to 90%.
- Additional stakeholder and public input.
- Finalize design and estimates.

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We want to hear from you!

Please take the time to fill out a comment card.