TOWN OF TORBAY

WATER SYSTEM SERVICING STUDY

NORTH POND / GREAT POND

JANUARY 11, 2024

CONFIDENTIAL

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PROJECT NO.: WW23021002
DATE: JANUARY 11, 2024

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QUALITY MANAGEMENT

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Signature or Member Number of Member-in-Responsible-Charge

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January 11, 2024
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1 INTRODUCTION

WSP E&I Canada Limited are pleased to provide this Water System Servicing Study completed for the Town of Torbay. The intent of this study is to look at long term servicing options for the Town including both the existing North Pond system and addition of a future second water supply at Great Pond. This study also includes preliminary phasing for servicing and preliminary costing.

1.1 BACKGROUND

Located on the east coast of the Avalon Peninsula in the St. John's Urban Region, the Town of Torbay has experienced rapid growth within the last several decades. The population has grown from 4,700 residents in 1991 to 7,900 residents in 2021. The existing water supply, North Pond, is at capacity and cannot support further development. The Town of Torbay has been notified by the St. John's Regional Water Authority that it cannot provide any water from its existing supplies. Any regional water provided to the Town of Torbay would be after the next new regional system development project. There are no timelines established for such a development. Other water supply sources have been investigated and Great Pond has been identified as the best option for development of additional capacity.

The Town of Torbay has undertaken the completion of this Water System Servicing Study to identify water system servicing requirements for the future development of the Town, taking into consideration the development of a new water supply source at Great Pond. This plan considers the required future core water system infrastructure and takes into consideration both high priorities developed in un-serviced areas of the Town and proposed future development (as provided by the Town of Torbay) that cannot be developed until a new water supply is brought online.

1.2 STUDY OBJECTIVES

The study objectives are summarized as follows:

- Identify Town priority planned service areas for Great Pond and North Pond.
- Prepare preliminary demand projections and allocations for each water supply.
- Prepare a phased servicing strategy taking into account the Great Pond supply.
- Develop preliminary capital, O&M cost projections and revenue projections based on the phased development.
- Prepare a final report.
- Presentation to Council.

The Water System Servicing Study has been prepared to provide guidance to the Town of Torbay for determination of budget requirements for future water system upgrading and expansion.

The Town of Torbay will be undertaking public consultation required under the Municipal Plan review process. Recommendations for development included in this report will be included within that public consultation process. Future water system development will be incorporated into the Municipal Plan.

1.3 REFERENCE INFORMATION

The following documents were used as reference in the development of this report:

- Great Pond Registration Document
- North Pond Water Supply Evaluation TF1869407
- GIS information provided by Town of Torbay
- Town of Torbay Development Regulations
- Guidelines for the Design, Construction and Operation of Water and Sewerage Systems, Government of Newfoundland and Labrador

1.4 STUDY AREA

The study area is within the Town boundaries for the Town of Torbay as identified on Figure 1. The study assesses the locations of existing water servicing, locations of the North Pond and Great Pond supplies, potential future development as provided by the Town of Torbay and makes recommendations for future upgrading to support proposed development and connection of existing un-serviced areas to the additional municipal water supply made available through the addition of Great Pond as a new water supply.

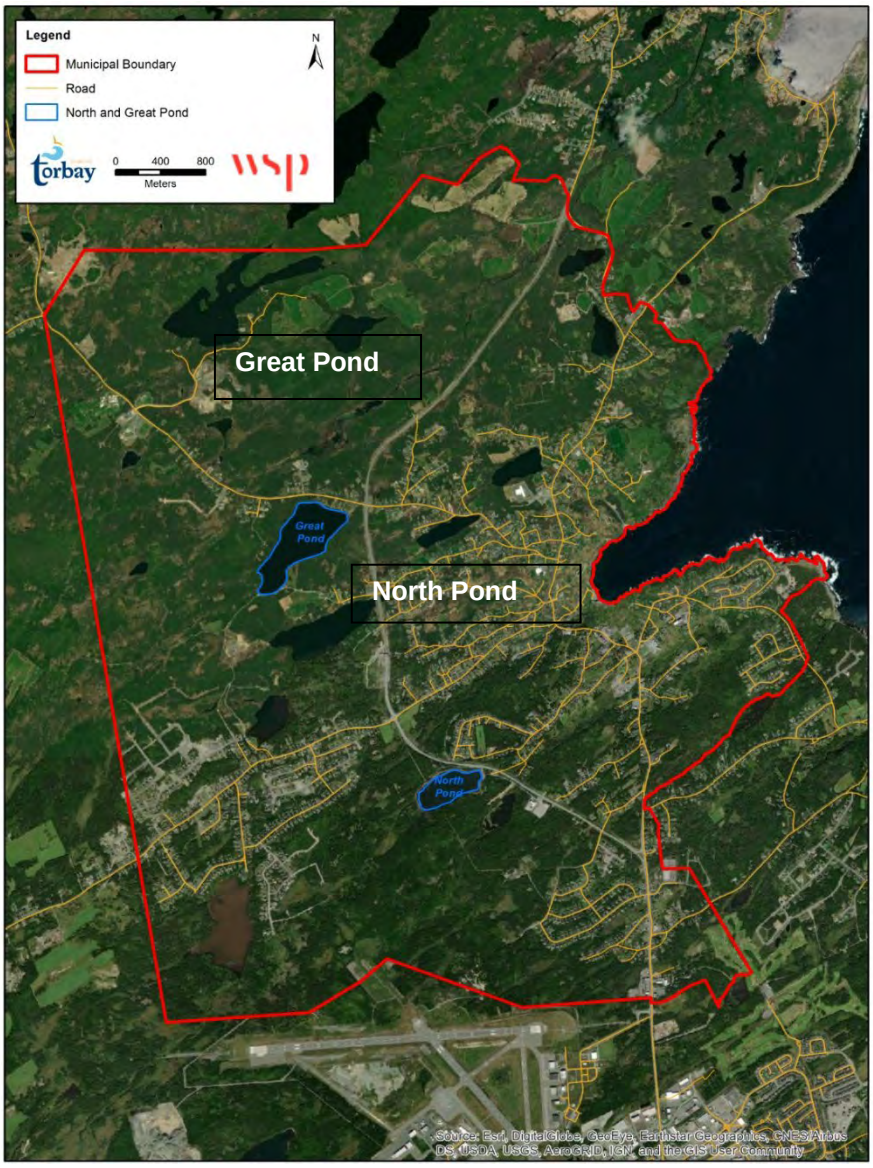

Figure 1: Town of Torbay North Pond and Great Pond Water Supply Locations

2 EXISTING WATER SYSTEM

The Town of Torbay municipal water supply source is North Pond, which is located on the South side of the community. The North Pond supply currently services approximately 40% of Torbay's residents. The area currently serviced by North Pond is shown in Figure 2. Serviced areas are shown in pink (for area's that have only water servicing) and green (for area's that have both water and sanitary sewer servicing). The areas shown in grey are unserviced areas.

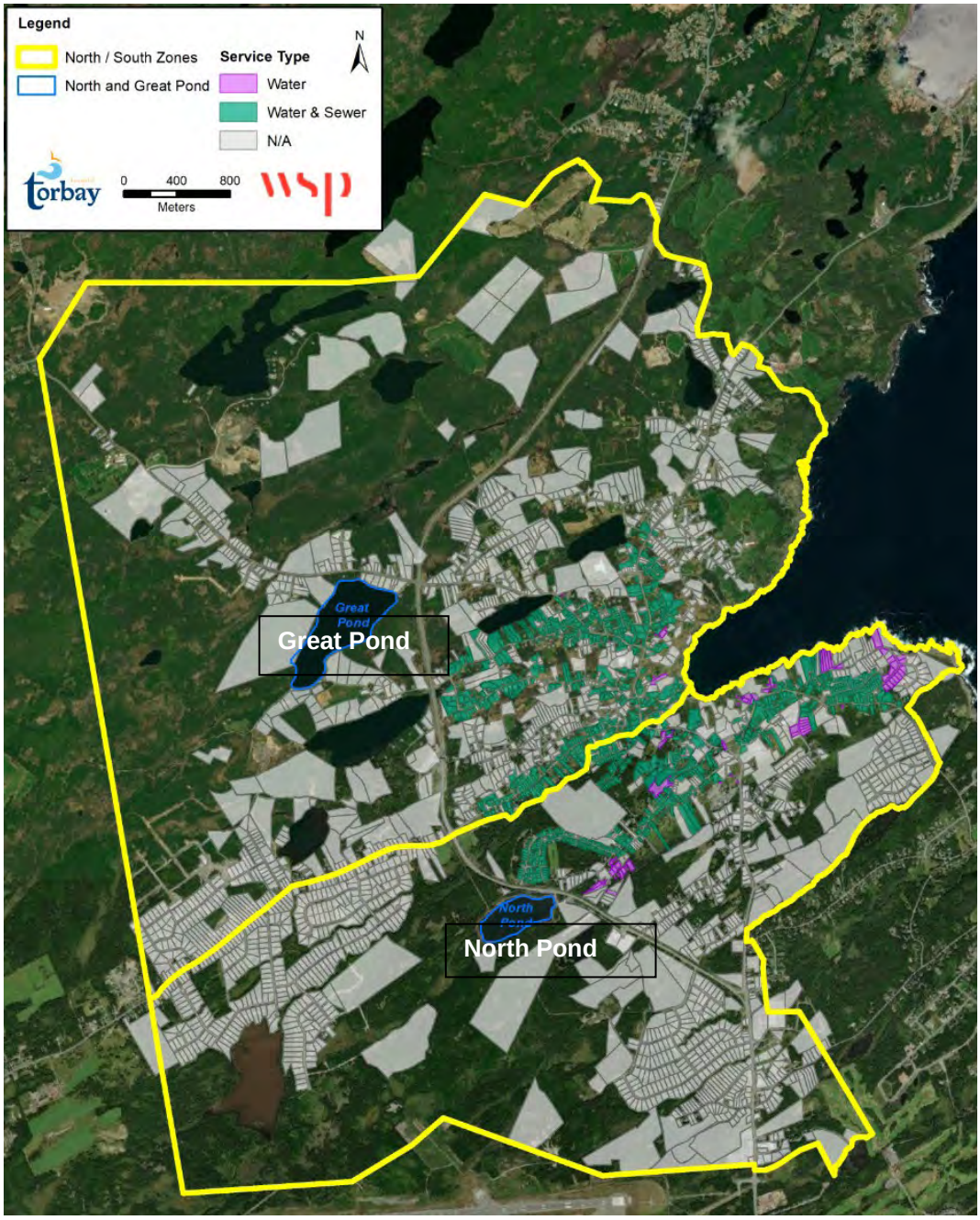

Figure 2: Existing North Pond Serviced Area

2.1 NORTH POND

Municipal water is supplied by North Pond via gravity. A weir was installed over 10 years ago to increase the water level in North Pond. Water is supplied to the system via a 400 mm diameter ductile iron intake line. Existing treatment includes liquid chlorination and soda ash treatment for pH adjustment. Disinfection byproducts outside of acceptable parameters occur regularly. The Town is planning the construction of a water treatment facility for North Pond in a phased approach to upgrade to a full-scale water treatment plant that will treat the North Pond water to meet guideline requirements.

Town staff have advised that there are some zones within the existing serviced area that are known to have low operating pressure.

A summary of the existing North Pond System characteristics is included in Table 2.1 below.

Table 2-1 Existing North Pond System Characteristics

PARAMETER	VALUE
Flow - Average	1,300 m^3/day
Intake	400 mm Diameter Ductile Iron
Treatment	Chlorination
Reliable Yield	1,500 m^3/day
Water Level (elevation)	92.05 m

2.2 DISTRIBUTION

The area currently serviced by North Pond is shown in Figure 2, above. Water mains run from North Pond, down Pumphouse Road, North Pond Road and Convent Lane to Torbay Road and along Torbay Road from the intersection of Convent Lane/Torbay Road/Marine Drive to just north of Whitty's Lane/Dunphy's Lane.

Water mains also service the following areas:

- A short section of Bauline Line.
- Mannings Hill from Torbay Road to east of Route 20.
- Patricks Path from Bauline Line to east of Route 20.
- Indian Meal Line from Torbay Road to east of Route 20.
- Marine Drive from the Intersection with Torbay Road east to just past Motion Drive intersection.

The serviced area does not extend to the west of the Torbay Bypass Road, Route 20.

Table 2.2 provides a summary of the existing water distribution system by size of water main. There are 22.7 km of water main ranging in size from 150 mm to greater than 300 mm.

There are two pumphouses at Tynedale Drive and Thorne's Lane. New zone water meters have been installed at the two pumphouses, and at the intersections of Torbay Road with Convent Lane, Marine Drive and Indian Meal Line. They are operational and have been collecting flow information since late 2023.

There is an existing system chlorine booster station at the Thorne's Lane pumphouse. There are no water storage reservoirs. There are 186 streets in the Town of Torbay with a total length of approximately 65 km, not including roads that fall under Provincial jurisdiction.

Torbay Road, Marine Drive, Indian Meal Line, Bauline Line, Middle Cove Road, Pine Line and Route 20 are all roads under Provincial jurisdiction, as listed in the Building Near Highway's Regulations, 1997, under the Works, Services and Transportation Act. Sections of the distribution system that service these roadways are included in the totals provided for length of street and length of existing services.

2.3 SANITARY SEWER SYSTEM

There is an existing municipal sanitary sewer system in the Town of Torbay, however this report does not include any information related to the sanitary sewer infrastructure. Consideration should be given to required future sanitary sewer infrastructure as well as there could be locations where proposed future water system infrastructure is proposed that may also benefit from sanitary sewer infrastructure being constructed at the same time the water system infrastructure is put in place.

Table 2-2 Existing Water Distribution System Pipe Sizes and Material Types

PIPE SIZE	LENGTH (M)	PERCENTAGE OF SYSTEM
150 mm Diameter or Less	7,617.55	33.6%
200 mm Diameter	7,961.29	35.1%
300 mm Diameter	2,384.56	10.5%
Greater than 300 mm Diameter	534.85	2.4%
Unknown Diameter	4,159.53	18.4%
Total	22,657.78	100.0%

3 PLANNED SERVICE AREAS

3.1 DETERMINATION OF NORTH AND SOUTH SERVICE ZONES

To begin the study, the area currently serviced, the location of the North Pond supply, the Great Pond proposed treatment plant location and future development areas were discussed with the Town, updated in the GIS and reviewed. As the North Pond supply is currently at capacity and the majority of the proposed future development discussed is in the same geographical area and would require servicing from North Pond, a divider line was assumed that delineates a zone where existing services could be transferred from the North Pond system to a new Great Pond system, once that supply is available for use. This division line is shown on Figure 2 and runs west to east along Indian Meal Line from the Town Boundary to Route 20 and east of Route 20 to the South of the serviced properties on Indian Meal Line.

The zone identified as North Zone is the area of proposed existing services that can be transferred to the Great Pond Supply once it is operational. This is the area from Indian Meal Line to the North that is currently serviced with existing water infrastructure. The Zone identified as South Zone is the area of existing water services that would remain on North Pond. This includes the area from Indian Meal Line south, excluding properties fronting onto Indian Meal Line.

4 WATER DEMANDS

4.1 HISTORICAL WATER USE

Records provided by the Town and information compiled for previous reports assessed historical water use. Those calculations have been checked based on current GIS data related to existing services and is summarized in the sections below.

4.1.1 RESIDENTIAL DEMAND

Data provided indicates the following residential users of the water system:

- Number of serviced homes (2023 GIS Data) = 1,186
- Number of units in multi-residential buildings = 48 units
- Number of residents per household = 2.7 (2016 Canadian census statistics)
- Assumed water demand per person = 340 L/person/day (WRMD 2005)
- 1 serviced senior citizens home with 72 beds
- Assumed water demand per bed in the senior citizens home = 375 L/bed/day

The theoretical Average Daily Water Demand from Residential Units & Senior Citizens Home is:

1234 Services

= (1,186 homes + 48 units in multi residential bldgs) × (2.7 residents/home) × (340 L/c/d) + (72 beds) × (375 L/bed/d)

=1,159,812 L/day=**1,159 m^3/day**

4.1.2 NON-RESIDENTIAL DEMAND

The number of non-residential users of the water system is also assessed using Town provided information and data compiled for previous reports

The Average Daily Water Demand from Non-Residential users is:

- Number of municipal buildings = 4.
  - Estimated demand = 6 L/day per square metre (WRMD 2005).
  - Assuming each building is 150 square meters, total demand = 3,600 L/day = 4 m^3/day
- Number of schools = 3 (total number of students = 1,859).
  - Estimated demand assuming cafeteria is operational = 70 L/day per student (WRMD 2005).
  - Assuming 1,859 students, total demand = 130,130 L/day = 130 m^3/day
- Number of church buildings = 3.

- Estimated demand = 15 L/day per seat (WRMD 2005).
- Assuming 250 seats in each church, total demand = 11,250 L/day = 11 m^3/day

- Commercial units = 25.
  - Estimated demand = 6 L/day per square metre (WRMD 2005).
  - Assuming each building is 150 square meters, total demand = 22,500 L/day = 23 m^3/day

=3.6 m^3/day + 130 m^3/day + 11 m^3/day + 23 m^3/day = **168 m^3/day**

4.1.3 THEORETICAL AVERAGE DAILY WATER DEMAND

The theoretical average daily water demand is 1,159 m^3/day (residential and seniors home) + 168 m^3/day (non-residential) = **1,327 m^3/day.** This theoretical demand will need to be confirmed once the zone flow meters that have been installed by the Town of Torbay and commissioned in late 2023 have collected sufficient flow data.

4.2 NORTH POND RELIABLE YIELD

The North Pond reliable yield was assessed in a 2018 Wood report and determined to be 1,500 m^3/day.

The current demand on the system was assessed as part of the 2018 Wood report and determined to be 1,327 m^3/day.

Subsequent to the 2018 report, further assessment was completed, and recommendation was made that an addition of approximately 60 services could be supported based on the available capacity of North Pond. The Town subsequently approved 64 additional properties for new water service connections. These 64 properties include approximately 20 properties that have continuously been paying for the water connection fee, but may not be actively using the water service at this time.

The breakdown of these additional approved water services is as follows:

Table 4-1 Additional Committed Water Services

Location	Committed		Billed		Total	
	Number	Demand (m^3/day)	Number	Demand (m^3/day)	Number	Demand (m^3/day)
South (North Pond)	19	17.44	8	7.34	27	24.78
North (Great Pond)	25	22.95	12	11.02	37	33.97
Total	44	40.39	20	18.36	64	58.75

Those services identified as billed are already included in the existing demand of 1,327 calculated in Section 4.1.3. Adding the additional committed demands to the current demand, gives:

1,327 m^3/day + 40.39 m^3/day = **1,367.39 m^3/day (EXISTING NORTH POND DEMAND)**

For the purposes of the following calculations, this is the number carried forward as the existing demand.

4.3 GREAT POND RELIABLE YIELD

Great Pond is located off Bauline Line, to the west of the Torbay Bypass Road. It has a watershed of 3.05 km and sits at an elevation of approximately 117.5 m.

In order to prepare the servicing plan, the existing system and existing Town of Torbay development was reviewed, and a division line was applied to identify where the future division would be best located to identify areas that will remain within the North Pond service zone and those that could be economically serviced in the future by the Great Pond supply.

The reliable yield for the proposed Great Pond water supply has been assessed as part of the Great Pond WTP Option Study to be 2,000 m^3/day.

4.3.1 DEMAND TRANSFERRED TO GREAT POND SUPPLY

The location of the line providing division between the North and South service zones was determined to balance the number of existing services that can be transferred to Great Pond in order to open up existing development capacity in the North Pond area.

Information from the GIS was used to determine the numbers and types of existing services.

Proposed to Relocate from North Pond to Great Pond		
Residential Water Only	8	Services
Residential W&S	547	Services
Commercial	9	Services
Number of Residents / Household - 2.7		
Residential Total Current	555	Services
Residential Demand	509490	L/day
	509.49	m^3/day
Previous assumptions for commercial demand used 150 m^2 footprint at 6 L/ m^2 / per commercial lot		
Commercial Total Current		
	9	Services
Commercial Demand	5400	L/day
	5.4	m^3/day
Committed Demand from Table 4.1	22.95	M^3/day
Total Demand Transferred to Great Pond	**537.84**	**m^3/day**

Using the division line shown in Figure 2, the existing demands assigned to each zone have been determined and are presented in Table 4-2.

Table 4-2 Available Capacity North Pond and Great Pond

Item	North Pond	Great Pond
Reliable Yield (m^3/day)	1,500.00	2,000.00
Existing Demand (m^3/day)	1,367.39	0.00
Demand after transfer of services to Great Pond supply (m^3/day)	829.55	537.84
Available Capacity after Great Pond is brought online (m^3/day)	670.45	1,462.16

This available capacity can be used for future development and to connect existing un-serviced areas to the public water supply system. Section 5 reviews future development and associated demands and assesses infrastructure required to facilitate servicing of future development.

5 SERVICING STRATEGY

5.1 BASIS

The intent of the servicing strategy is to determine layout for moving forward with future infrastructure priorities to support development throughout the Town.

Additional water supply capacity is necessary to support future development. To bring Great Pond online will require the construction of a new water treatment plant and associated infrastructure. An assessment of these requirements has been completed and the following infrastructure is anticipated to be required:

- Water Treatment Plant
- Water Storage Reservoir
- Water Intake
- Water Control Structure
- Pumping
- Fishway

Figure 2 shows the potential future North and South servicing zones with the North area being serviced by Great Pond and the South area being serviced by North Pond. This division line is assumed to divide the community just to the south of Indian Meal Line. All existing serviced areas to the North of that line would be transferred to the Great Pond Service area with the areas to the south of that line being serviced by North Pond.

Using the data from the provided GIS information determined the following.

Of the existing service demand of 1,367.39 m^3/day, by transferring the existing services in the identified North Zone to Great Pond would transfer a total of 537.84 m^3/day from the North Pond Supply to the Great Pond System, thereby freeing up 537.84 m^3/day of available capacity to support future development in the South side of the community.

With a total reliable yield of 2,000 m^3/day from Great Pond, this transfer of existing services would mean that immediately upon bringing Great Pond into service, the supply would have 25% of its capacity in use, with a substantial tax base already in place to support repayment of the investment necessary to support that infrastructure.

5.2 PLANNED FUTURE DEVELOPMENT

Information provided by the Town of Torbay regarding six potential future developments is summarized in the following sections. These developments include:

- 128 North Pond Road Subdivision - 180 Residential Lots (Section 5.2.1)
- Town Centre Infill Development – assumed 60% commercial / 40% residential (Section 5.2.2)
- South Pond Commercial Development (Section 5.2.3)
- Jones Pond Residential Development (Section 5.2.4)
- Bauline Line – 72 Residential Lots (Section 5.2.5)

- CECON Development Area (Section 5.2.6)

5.2.1 128 NORTH POND ROAD SUBDIVISION

This proposed development is located between North Pond Road and Island Pond Brook to the north of Indian Meal Line. The preliminary development plan was submitted to Town of Torbay by MAE design on behalf of YBC Development. The project is for a proposed 180 lot residential subdivision and the development area is 18.2 ha. The project is shown to be developed over 7 phases with an average of 25 lots / phase. A sanitary sewer lift station is also required to support the development. The proposed layout is provided in Figure 3

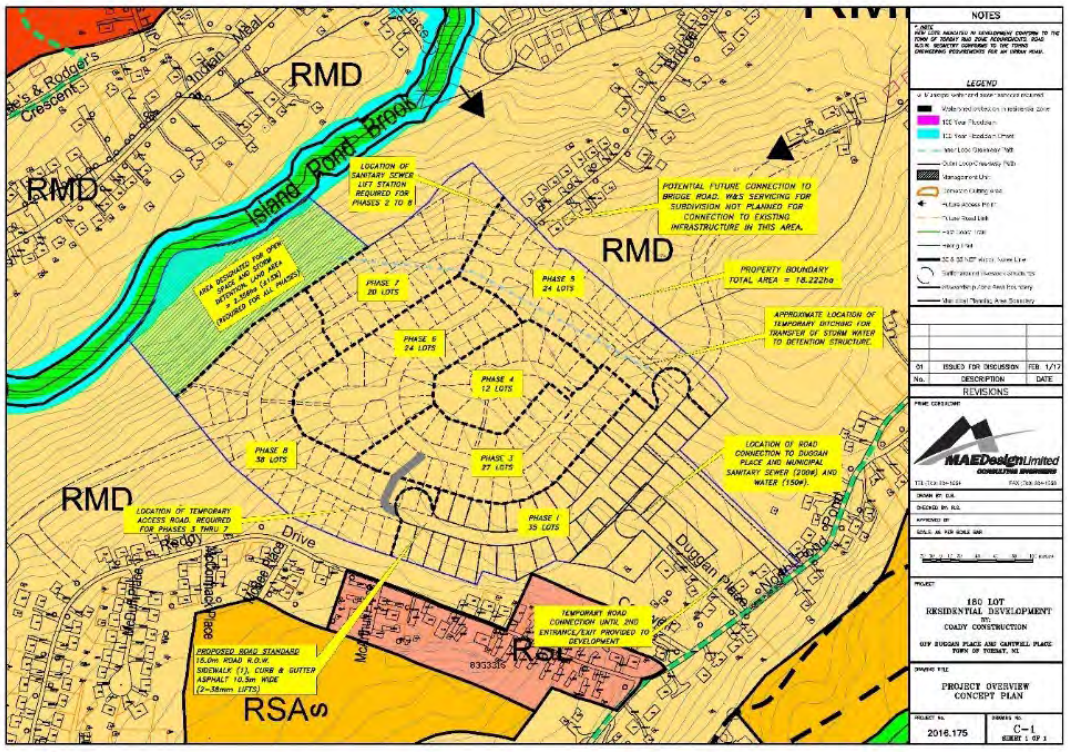

Figure 3: Proposed YBC 180 Lot Residential Subdivision Development

Servicing for this subdivision will be from the South Zone (North Pond Supply). It cannot be serviced until Great Pond is brought online and additional servicing capacity is made available within the North Pond system.

While this development will require the extension of public water/sewer infrastructure to service the development itself, an existing water main is located in the area for the development to be able to connect to. When the Great Pond supply is brought online and the proposed existing services are moved over to that system, there would be capacity freed up for this development to proceed.

The estimated demand for the full 180 lot development is:

180 lots x 2.7 people/lot * 340 l/p/day = 165240 L/day = 165.24 m^3/day

Taking into account the proposed phasing of development, once this subdivision begins construction, and assuming that one phase of development can be anticipated per year, it will take up to 7 years to complete with an approximate annual demand of 23 m^3/day of additional water demand.

5.2.2 TOWN CENTRE INFILL DEVELOPMENT

The Town Centre Infill Development is in the area of the existing Town centre, where some servicing already exists but there is no current capacity for further development. The development in the Town Centre area is planned to include a mixture of residential and commercial. This development is located on Torbay Road and runs from the intersection of Torbay Road and Indian Meal line to the North, along Torbay Road to just south of the intersection of Torbay Road and Marine Drive.

The description of this area to define the goal of the future development scheme states that the area will include a mixture of residential and commercial uses with open space near the shoreline. The assumption made for the purposes of determining future demand is that the area still available for development will be broken by 60% commercial and 40% residential.

The total area of this development, shown within the orange footprint in Figure 4 is 26.1 ha. The area that is undeveloped is 16.48 ha. Demand estimates for the developed and serviced areas and the developed and un-serviced areas are included in Section 5.4, below. The estimate of demand for this future infill development is based on the 16.48 ha currently undeveloped footprint.

For the determination of future demand, estimates of 80 people/ha for residential development and 40 m^3/ha for commercial were used.

Residential Demand:

16.48 ha * 40% = 6.60 ha residential

6.60 ha * 80 people/ha *340 L/person/day = 179,520 L/day = 179.52 m^3/day

Commercial Demand:

16.48 ha * 60% = 9.89 ha commercial

40 m^3/day/ha (from GDOWSS) * 9.89 ha = 395.60 m^3/day

Total Demand:

179.52 m^3/day + 395.60 m^3/day = 575.12 m^3/day

Figure 4: Town Centre Infill Development Area

No new infrastructure would be required to be able to provide service to this area as there are existing water mains along Torbay Road throughout the proposed development area. To determine a detailed servicing plan for the development, the development scheme would be required.

It may be possible to service some of this area from Great Pond if the two water supplies are approved to be interconnected by the regulatory authority and water modeling of the entire town water system confirms that Great Pond could be used to supplement North Pond should the Town develop this area. This would require future water system modeling be completed by the Town.

The total estimated demand for this development 575.12 m^3/day which would require almost all of the additional capacity that will be made available in North Pond.

5.2.3 SOUTH POND DEVELOPMENT

The Town is considering the preparation of a development scheme for the area south of both North and South Ponds. The Town is in receipt of an amendment application for this area. This is a large expanse potentially connecting the Bypass Road at William Manning Drive south towards Torbay Road, potentially to RCAF Access Road or the Kelly's Lane area. There is potential for a combined industrial / commercial development. Residential development is not likely in this area due to the proximity to the St. John's International Airport. There is a large provincial domestic cutting area designated within this area that is removed from potential amendment and development, that reduces the developable footprint. The proposed development area is shown in Figure 5, below.

Figure 5: Proposed South Pond Development Area

The Town has been advised by Provincial Department of Forestry about the extension south of Edgewater Place, and Forestry advised that 108 households in Torbay currently rely on this area for fuel wood. That is a substantial number, and for this reason the domestic cutting area has been excluded from the developable area.

Due to existing contamination of South Pond, this area can only be developed if it is serviced by municipal water.

The South Pond development area as provided is 188.8 ha in size. This would be an industrial / commercial development so using the estimated loading of 40 m^3/ha for commercial zones the full demand assuming full build-out of this area is:

188.8 ha * 40 m^3/day/ha = 7,552.0 m^3/day

This total demand is more than the available supply that could be made available by North Pond and Great Pond combined.

To service this area, a new water main would need to be constructed along Pumphouse Road from the proposed new North Pond Water Treatment Building Site to the east toward the existing Torbay Municipal Depot. This new water main would be brought across the front of this property and capped for connection by future development. Approximate length 700 m.

5.2.4 JONES POND DEVELOPMENT

The proposed Jones Pond development plan is a concept development scheme for the area between Marine Drive and Torbay Road, which is currently un-serviced. An amendment process will proceed imminently for this development area. The developer has not requested that this area be serviced by municipal water and

sewer infrastructure. The area is being explored by the Town in the context of overall Town development potential. The development could proceed with private well and septic services. The proposed Jones Pond development area is 54.57 ha and is shown in Figure 6, below.

Assuming 80 people / ha for residential development

Demand = 54.57 ha * 80 p/ha * 340 l/p/day = 1,484,304 L/day = 1,484.3 m3/day

Figure 6: Proposed Jones Pond Development Area

There is currently no capacity in the South Zone (North Pond supply) to service this area. To service this area, extending the water transmission main that has been proposed to service the South Pond development down Quigley's Lane would be the most efficient route to service this area. This would require approximately 1 km of transmission main. It would also provide access to public water to residents along the transmission main route.

5.2.5 LARGE LOT DEVELOPMENT BAULINE LINE

The Bauline Line large lot development proposes construction of 72 un-serviced lots. Crown Land Acquisitions are currently in process for this development area. Council is wondering if this potentially could become semi-serviced lots on municipal water. The developer has not been asked about this at this point, however, this could potentially render some tax return for Council. This area is close to Great Pond.

This development is located approximately 1 km west of the proposed Great Pond WTP along off Bauline Line and is shown in Figure 7, below.

The estimated demand is:

72 lots * 2.7 people / lot * 340 L/p/day = 66,096 l/day = 66.1 m^3/day.

Figure 7: Proposed Bauline Line Large Lot Development

To service this area, approximately 1 km of new water main would be required to be installed along Bauline Line from the new Great Pond WTP west toward the new development.

5.2.6 CECON DEVELOPMENT AREA

The Cecon Development Area is located to the North of the Torbay Bypass Road, opposite the Torbay Municipal Depot. This development proposes construction of 12 large lot residential lots and one commercial lot, adjacent to the Route 20. The proposed development area is shown in Figure 8, below.

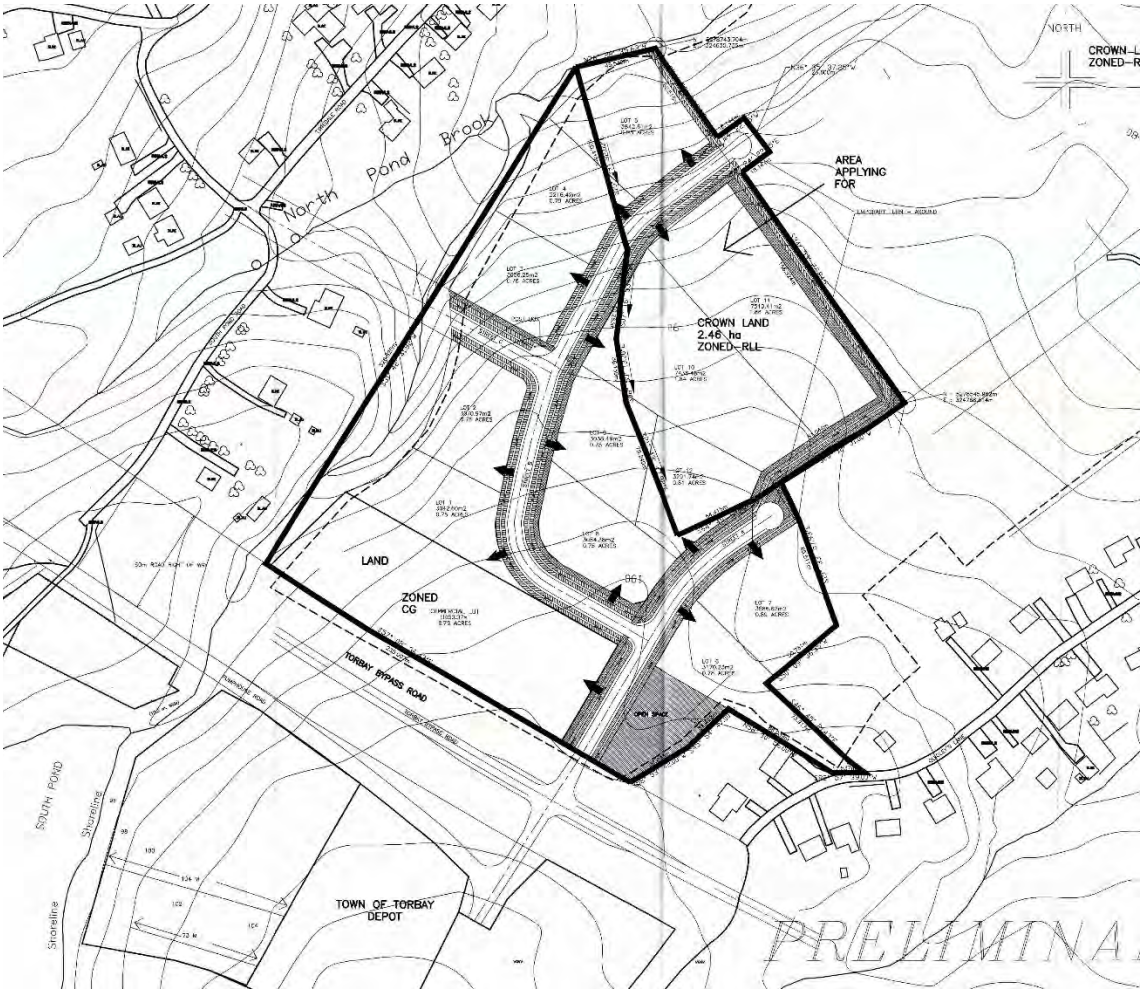

Figure 8: Proposed CECON Development Area

The estimated demand is:

Residential

12 lots * 2.7 people / lot * 340 L/p/day = 11,016 l/day = 11.0 m^3/day.

Commercial

1.105 ha * 40 m^3/day/ha = 44.2 m^3/day

Total

11.0m3/day +44.2 m3/day = 55.2 m3/day

The same proposed infrastructure described in 5.2.3 to service the South Pond Development could also be used to provide service to the Cecon Lands.

5.2.7 SUMMARY OF DEMAND FROM PLANNED FUTURE DEVELOPMENT

Table 5.1 provides a summary of the potential future demand for the proposed developments described in the sections above.

Table 5-1 Future Proposed Large-Scale Developments

Location	Servicing Zone	Development Mix	Development Area (ha)	Potential Services	Estimated Demand (m^3/day)
YBC Subdivision Indian Meal Line	South Zone (North Pond)	Residential	18.2	180 lots using 2.7 people/lot and 340 l/p/day	165.24
Town Centre Infill Development	South Zone (North Pond)	Residential / Commercial with Open Space near shoreline	16.48	No development plan available. Assumed 60% commercial and 40% residential	579.12
South Pond Development	South Zone (North Pond)	Commercial / Industrial	188.8	No development plan available. Assumed to be 100% commercial.	7,552.00
Jones Pond Large Lot Development	South Zone (North Pond)	Residential	54.57	Demand based on provided layout using 80 people/ha	1,484.30
Large Lot Development Bauline Line	North Zone (Great Pond)	Residential	TBD	72 Lots	66.10
CECON Development	South Zone (North Pond)	Commercial / Residential	5.836	1 Commercial Lot and 12 Large Lot Residential Lots	55.20

5.3 OTHER DEVELOPMENT INCLUDING INFILL LOTS

In addition to the proposed future developments discussed above, additional information was provided by the Town of Torbay Planning Department for smaller development proposals. Additional future demand from these developments is summarized in Table 5.2 below.

See Appendix A and B for the breakdowns by street of existing serviced and un-serviced lots. Appendix A includes streets in the serviced areas. Appendix B is a list of all un-serviced streets.

Table 5-2 Additional Servicing Allowances

LOCATION	# SERVICES	ZONE	DEMAND (M3/DAY)	NOTES
1545 Torbay Road Development	6	North Zone / Great Pond	5.51	Approved for 6 units on non-domestic well but developer is interested in providing serviced units.
Proposed Development off 39 Marine Drive	3	South Zone / North Pond	2.75	This is an existing back lot off 39 Marine Drive that owners are hoping to subdivide into three lots.
St. Nicholas Lane Proposed Development	3	North Zone / Great Pond	2.75	2011 approval for 3 residential lots off St. Nicholas Lane.
McArthur Place Extension Development	5	South Zone / North Pond	4.59	A rezoning would be required. Area is zoned Residential Subdivision Area (RSA) and would require preparation of development scheme. More than 5 lots could fit.
Country Drive Proposed Development	30	North Zone / Great Pond	27.54	There is a river in the area with risk of flooding that could affect development.
Riverdale Drive Extension off Bridge Road	30	South Zone / North Pond	27.54	In proximity, northwest of 180 lot YBC Subdivision.

Additional development demand based on the lots identified in Table 5.2 is 35.8 m^3/day in the North Zone / Great Pond supply and an additional 34.88 m^3/day in the South Zone / North Pond supply.

5.3.1 INFILL AREAS

Existing development in the Town of Torbay was assessed to determine potential future demand should the currently un-serviced areas be connected to municipal water. Partially serviced streets are those locations that currently have water mains installed but where not all properties are connected. A summary is provided in Table 5-3. Table 5-4 provides a summary of streets for which no servicing currently exists, grouped into general subdivision or development areas.

As an example, see the first row in Table 5.3. Within the North Zone / Great Pond supply there are 35 streets with existing services. The total number of existing un-serviced properties in this zone (excluding those directly off Torbay Road) is 255. Assuming these are residential properties provides the following:

255 Lots * 2.7 people/lot * 340 l/person/day = 234,090 l/day = 234.09 m^3/day

Table 5-3 Summary of Serviced and Partially Serviced Streets

Zone	Number Streets	Number Residential (W&S)	Number Residential (W)	Number Commercial Services	Number Unserviced (From GIS)	Potential Future Demand (m^3/day)
North (Great Pond Supply)	35	335	5	1	255	234.09
South (North Pond Supply)	46	723	58	3	359	329.56
Torbay Road North Zone	0.5	35	1	3	78	71.60
Torbay Road South Zone	0.5	27	1	5	93	85.37
Totals	**82**	**1120**	**65**	**12**	**783**	**720.62**

For those streets that are completely un-serviced, a summary of the number of un-serviced lots by area has been prepared. Where the is a development area (example, Forest Landing subdivision) that area is listed separately with potential future demand calculated. Demand assumes residential development. The information is presented in Table 5.4.

Table 5-4 Summary of Unserviced Streets by Area

Area	Zone	# Streets	Type of Service	# Unserviced Lots	Theoretical Demand (m^3/day)
Bauline Line East of Bypass	North (Great Pond Supply)	12	Residential	125	114.75
Bauline Line West of Bypass	North (Great Pond Supply)	6	Residential	46	42.23
Forest Landing Area	South (North Pond Supply)	15	Residential	287	434.90
Indian Meal Line East of Bypass	South (North Pond Supply)	10	Residential	96	88.13
Indian Meal Line West of Bypass	South (North Pond Supply)	8	Residential	111	101.89

Area	Zone	# Streets	Type of Service	# Unserviced Lots	Theoretical Demand (m^3/day)
Jones Pond Area	South (North Pond Supply)	7	Residential	75	68.85
Karon Drive Area	South (North Pond Supply)	6	Residential	138	126.68
Near North Pond and West of Bypass	South (North Pond Supply)	2	Commercial and access to future South Pond Development?	5	4.50
Torbay Road North of Serviced Area	North (Great Pond Supply)	13	Assumed Residential	117	107.41
Torbay Road South of Serviced Area	South (North Pond Supply)	22	Assumed Residential	278	255.20
Streets off Torbay Road Within Serviced Area	North (Great Pond Supply)	7	Assumed Residential	38	34.88
Streets off Torbay Road Within Serviced Area	South (North Pond Supply)	4	Assumed Residential	35	32.13
Totals		**112**		**1351**	**1,411.55**

These developed and un-serviced streets result in an additional potential demand of 1,411.55 m^3/day broken by 401.16 m^3/day in the North (Great Pond) zone and 1010.39 m^3/day in the South (North Pond) zone.

5.4 DEMAND SUMMARIES

The following sections provide demand summaries for the North Zone (Section 5.4.1) and South Zone (Section 5.4.2).

5.4.1 NORTH ZONE DEMAND SUMMARY

The North Zone will be serviced by Great Pond. Great Pond has a capacity of 2000 m^3/day. A summary of the demand estimates for the Great Pond supply is provided in Table 5.5.

Table 5-5 Demand Summary for Great Pond Supply

ITEM	DEMAND (M^3/DAY)
Available Capacity	**2,000.00**
Calculated Demand	
Transfer of Services from North Pond	537.84
Large Lot Development Bauline Line	66.10
Other Development (Smaller Applications)	35.8
Unconnected development in Partially Serviced Areas	234.09
Unconnected Development off Torbay Road in Partially Serviced area	71.60
Un-serviced Streets (developed) off Bauline Line East	114.75
Bauline Line West of Bypass	42.23
Indian Meal Line East of Bypass	88.13
Indian Meal Line West of Bypass	101.89
Torbay Road North of Serviced Area	107.41
Streets off Torbay Road Within Serviced Area	34.88
Total Demand	**1,434.72**
Remaining Capacity	**565.28**

5.4.2 SOUTH ZONE DEMAND SUMMARY

The South Zone will be serviced by North Pond. North Pond has a capacity of 1,500 m^3/day. A summary of the demand estimates for the North Pond supply is provided in Table 5.6.

Table 5-6 Demand Summary for North Pond Supply

ITEM	DEMAND (M^3/DAY)
Available Capacity	**1,500.00**
Existing Demand on North Pond after transfer of services (537.84 m3/day) to Great Pond	**829.55**
Free Capacity after Transfer of Services to Great Pond	**670.45**

ITEM	DEMAND (M^3/DAY)
Additional Calculated Demand	
YBC Subdivision	165.24
Town Centre Infill	579.12
South Pond Development	7,552.00
Jones Pond Development	1,484.30
Cecon Land	55.2
Other Development (Smaller Applications)	34.88
Unconnected Development in Partially Serviced Areas	329.56
Unconnected Development Off Torbay Road I Partially Serviced Areas	85.37
Forest Landing	434.90
Jones Pond	68.85
Karon Drive Subdivision	126.68
Near North Pond West of Bypass	4.50
Torbay Road South of Serviced Area	255.20
Streets off Torbay Road within Serviced Area	32.13
Total Potential Demand	**11,207.93**

6 COST ESTIMATES

6.1 CAPITAL COSTS

From the information presented above, we can summarize the following:

- Adding Great Pond as an additional water supply will provide an additional 2,000 m3/day of available capacity.
- Servicing all existing un-serviced developed areas plus the future potential development areas would require more capacity than can be provided by Great Pond.
- An order of priority needs to be created that takes into consideration servicing of existing properties as well as supporting future development.
- Proposed commercial developments are desired by the Town to diversify the mixture of development in the community. Estimated demand from the proposed commercial development at Town Centre and South Pond would be well more than the capacity Great Pond can supply.

Table 6.1 presents high-level cost estimates for the development priorities in the South Zone (North Pond Supply) and Table 6.2 presents high-level cost estimates for the development priorities in the North Zone (South Pond Supply. Estimate backup is included in Appendix C.

Table 6-1 Development Priorities North Pond (South Zone)

Project	Scope	Status	Estimate
North Pond Water Treatment Plant	Full WTP to address existing water quality issues. To be completed using Design-Build contracting strategy. Project start 2023.	Active Project	$7,450,000.00
Other Projects in North Pond (South) Zone can not start until the Great Pond water supply is brought online and existing services are transferred from North Pond to Great Pond, freeing up capacity in North Pond for additional development in the North Pond area.			
180 Lot YBC Development	Residential Development. No additional infrastructure required to ROW of the proposed development for tie-in of new infrastructure to be provided by developer to service the proposed subdivision.	Future Development	$0.00
Town Centre / Infilling	Mixed 40% residential 60% commercial. No additional infrastructure required to ROW of the proposed development for tie-in of new infrastructure to be provided by	Future Development	$0.00

Project	Scope	Status	Estimate
	developer to service the proposed subdivision.		
South Pond Development / CECON Development Area	Future industrial / commercial development to the east of South Pond. Municipal services required to supply water due to environmental concerns in the area. This infrastructure would also support development of the CECON Development Area. Requires a 700 m transmission main along Pumphouse Road to provide stub for future service connection.	Future Development	$1,479,043.75
Jones Pond Development	Residential Development. Requires approximately 1000 m transmission main to provide stub for future service connection.	Future Development	$2,301,221.88

Table 6-2 Development Priorities Great Pond (North Zone)

Project	Scope	Status	Estimate
Great Pond Water Treatment Plant including water reservoir	Infrastructure requirements to develop Great Pond Water Treatment Plant	Preparation of background information for cost shared funding submissions	$12,390,560.00
Transmission Main from WTP to Intersection of Bauline Line and Torbay Road	Linear infrastructure required to connect Great Pond Water Treatment Plant to existing water system.	Preparation of background information for cost shared funding submissions	$5,571,031.25
Bauline Line Large Lot Development	Linear infrastructure required to provide connection to water system.	Preliminary concept only.	$1,884,706.25

6.2 INFRASTRUCTURE FINANCING

A high-level assessment is presented below to assess the existing tax structure in the Town of Torbay for water and sewer services vs impact of bringing a new water supply online. To begin connecting any additional development, the minimum infrastructure upgrading required would be the completion of the North Pond Water Treatment Plant, the Great Pond Water Treatment Plant and sufficient underground infrastructure to connect the Great Pond system to the existing Town of Torbay water distribution network.

The current (2023) Town of Torbay tax structure for water is as follows:

- Annual Tax Rate - Water Only $225/year/unit
- Annual Tax Rate - Water &Sewer $375/year/unit
- Annual Tax Rate – Commercial Water Only $275/year/unit
- Annual Tax Rate – Commercial Water and Sewer $475/year/unit

The Department of Transportation and Infrastructure Application Guide Fiscal Year 2024/2025 for Water projects provides information on the funding breakdowns for different types of infrastructure projects based on population. The Town of Torbay's population (Census 2021) is 7852. From the guideline for populations of greater than 7000, a 30% / 70% municipal/ provincial cost share is available for water infrastructure projects that are approved for funding. Current Town of Torbay ICIP funded GI (green infrastructure) projects are funded at 30% municipal 30% provincial 40% federal. For the calculations presented below, it is assumed that going forward, the same cost sharing can be anticipated.

Table 6.3, below, includes an estimate of the annual payments that would be required assuming a 20-year loan, at 5%, for each upgrading scope of work. Estimates of annual operation and maintenance costs are included.

The current number of services (taxpayers) serviced by North Pond 1186. This assessment is completed based on residential taxes, not taking commercial property taxes into account.

Annual expenditures for Water System from the last three annual Town of Torbay budget submissions average approximately $360,000.00/year. The estimated O&M Costs for the Great Pond Water Treatment Plant are $352,000/year and are assumed to be similar for the North Pond Water Treatment Plant. A summary of Financing costs is presented in Table 6-3.

Table 6-3 Annual Financing Costs for Required Infrastructure Upgrading

Scope of Work	Capital Cost Estimate	30% of Capital Cost	Approx. Monthly Mortgage Cost	Approx. Annual Financing Cost	Annual O&M Costs	Annual Water System Costs	Annual Cost (1186)	Annual Cost (2272)	Annual Cost (3359)
North Pond WTP	$7,450,000.00	$2,235,000.00	$14,750.00	$177,000.00	$352,000.00	$529,000.00	$446.04	$232.83	$157.49
Great Pond WTP	$12,390,560.00	$3,717,168.00	$24,531.66	$294,379.92	$352,000.00	$646,379.92	$545.01	$284.50	$192.43
Transmission Main Bauline Line	$5,571,031.25	$1,671,309.38	$11,029.90	$132,358.80	$360,000.00	$492,358.80	$415.14	$216.71	$146.58
South Pond Connection	$1,479,043.75	$443,713.13	$2,928.00	$35,136.00		$35,136.00	$29.63	$15.46	$10.46
Totals	**$26,890,635.00**	**$8,067,190.51**	**$53,239.56**	**$638,874.72**	**$1,064.000.00**	**$1,702,874.72**	**$1,435.82**	**$749.50**	**$506.96**

Land acquisition will be required and is not taken into consideration in the costing provided in Table 6-3, above. Land acquisition must be undertaken for the development of the Great Pond water treatment plant, water supply intake and control structure as well as for the water reservoir.

Therefore, to construct the minimum required infrastructure necessary to have both North Pond and Great Pond water supplies developed, and treatment plants constructed, commissioned and operating and the transmission main required to connect Great Pond to the existing water distribution system and to provide infrastructure connection for potential development in the South Pond Development Area requires an infrastructure investment of $26,890,635.00, of which $8,067,190.51 of the cost will be Municipal contribution. To finance these projects assuming the costs will be recovered through taxes from system users, the current water tax rates will not be sufficient. As new users are connected to the system, these rates can decrease, but up to the point where the system is connected and new users can be added, the burden on current users would be a minimum of $1,435.82 / year, including operation and maintenance of the system. This does not include any additional costs for capital upgrading or operation and maintenance of the municipal sanitary sewer collection system or costs associated with sanitary sewer treatment.

It would be approximately 4-5 year after funding for the Great Pond water treatment plant and the required transmission main are approved before design and construction would be advanced to the point that new facility is commissioned, connection to the existing system is completed and at that point, new development could proceed.

7 SUMMARY

In summary we have found the following:

1. With the water supply capacity of both North Pond and Great Pond, there will not be sufficient capacity available to service all current and future development currently proposed in the Town of Torbay.
2. No additional development can proceed without an investment of more than $26 M to construct the basic infrastructure required to bring additional capacity online, allowing for the connection of additional water services to the municipal water system.
3. Providing water system infrastructure along Pumphouse Road to provide a stub for future development is needed in order to facilitate future development of an Industrial / Commercial development in the South Pond area.
4. The Town should apply for funding to construct the Great Pond Water Treatment Plant as early as fall 2023 and it will take 4 to 5 years to bring this system online following the approval of funding. It is anticipated that this project would be undertaken using a design-build approach, similar to the approach being used for the North Pond Water Treatment Plant project.
5. The Town should consider undertaking a water system modelling project to assess the existing system flows and pressures and for use in looking at impacts of potentially connecting the North Pond and Great Pond systems in the future.
6. The areas for which development of new water transmission / distribution piping is proposed to support future development do not currently have sanitary sewer infrastructure in place and consideration can be given to constructing sanitary sewer infrastructure at the same time water infrastructure is constructed. A sanitary sewer system plan may be required to determine where such opportunities exist.

APPENDIX A

LIST OF SERVICED AND PARTIALLY SERVICED STREETS

Item	Street	Zone	Service Type	Number of Serviced Lots	Number of Unserviced Lots
1	Anstey's Cove Lane	North	Residential (W&S)	11	1
2	Barron's Lane	North	Residential (W&S)	5	2
3	Bauline Line	North	Residential (W&S)	31	116
			Residential (W)	1	
4	Beamerview Place	South	Residential (W&S)	3	0
5	Bridge Road	South	Residential (W&S)	42	2
6	Brown's Lane	North	Residential (W&S)	18	3
7	Byrne's Place	South	Residential (W&S)	14	4
8	Cannon Marsh Road	North	Residential (W&S)	8	1
9	Cantwell Place	South	Residential (W&S)	1	1
10	Clement's Lane	South	Residential (W&S)	2	5
11	Coady's Lane	South	Residential (W&S)	1	2
			Residential (W)	2	
12	Convent Lane	South	Residential (W&S)	42	11
13	Coppertop Place	South	Residential (W&S)	7	1
14	Country Drive	North	Residential (W&S)	66	17
15	Dan's Loop	North	Residential (W&S)	3	1
16	Davalan Place	North	Residential (W&S)	11	0
17	Dodd's Lane	North	Residential (W&S)	2	0
18	Donovan's Hill	South	Residential (W&S)	1	3
19	Doyle's and Quigley's Lane	South	Residential (W&S)	15	6
			Commercial (W&S)	1	
20	Duggan Place	South	Residential (W&S)	9	3
21	Dunphy's Lane	North	Residential (W&S)	2	23
22	Easterbrook Drive	South	Residential (W&S)	35	2
23	Ellard's Lane	North	Residential (W&S)	1	4
24	Eustace Lane	South	Residential (W&S)	7	1
25	Evening's Path	South	Residential (W&S)	6	31
			Commercial (W&S)	1	
26	Falkirk Place	South	Residential (W&S)	18	0
27	Fleming's Hill	South	Residential (W&S)	20	2
28	Fooster Place	South	Residential (W&S)	4	0
29	Franella Place	North	Residential (W&S)	7	1
30	Gosse's Lane	North	Residential (W&S)	8	11
31	Gosse's & Rodger's Crescent	South	Residential (W&S)	12	10
32	Hickey's Place	North	Residential (W&S)	6	1
33	Hiscock's Lane	North	Residential (W&S)	1	3
34	Hearn Place	South	Residential (W)	4	0
35	Indian Meal Line	South	Residential (W&S)	106	158
36	Liney's Place	North	Residential (W&S)	7	0
37	Lower Street	South	Residential (W&S)	21	4
38	Lynch's Lane	South	Residential (W&S)	4	4
			Residential (W)	8	
39	Manning's Hill	North	Residential (W&S)	3	1
40	Marine Drive	South	Residential (W&S)	75	29
			Residential (W)	2	
41	Martin's and Doyle's Lane	North	Residential (W&S)	21	0
42	Martin's Lane	North	Residential (W&S)	4	2
			Residential (W)	2	
43	Matthew Drive	North	Residential (W&S)	7	0
44	McArthur Place	South	Residential (W&S)	6	0
45	McBee Place	South	Residential (W&S)	5	1
46	McCormick Place	South	Residential (W&S)	5	1
47	McDuff Place	South	Residential (W&S)	16	1
48	McEvoy Street	South	Residential (W&S)	8	0
49	McFayden Street	South	Residential (W&S)	10	0
50	McGory Place	South	Residential (W&S)	7	0
51	Mill Lane	South	Residential (W&S)	1	2
			Residential (W)	1	
52	Mockin's Place	North	Residential (W&S)	1	0
53	Moore's Valley Road	North	Residential (W&S)	2	5
			Residential (W)	2	
54	Motion Drive	South	Residential (W&S)	14	25
			Residential (W)	15	
55	Motion Lane	South	Residential (W&S)	15	11
			Residential (W)	6	
56	Ned's Place	South	Residential (W&S)	7	0
57	Nolan's Lane	North	Residential (W&S)	2	1
58	North Pond Road	South	Residential (W&S)	56	17
			Residential (W)	5	
			Commercial	1	
59	Patrick's Path	North	Residential (W&S)	54	12
60	Reardon's Lane	North	Residential (W&S)	9	3
61	Reddy Drive	South	Residential (W&S)	68	4
62	Riverbank Place	South	Residential (W&S)	6	0
63	Riverbend Place	South	Residential (W&S)	5	1
64	Riverdale Drive	South	Residential (W&S)	20	3
65	Riverview Place	South	Residential (W&S)	5	1
66	Robin's Pond Hill Road	North	Residential (W&S)	2	7
67	Santa Maria Drive	North	Residential (W&S)	9	0
68	Seaview Avenue	South	Residential (W&S)	16	0
69	Shea's Lane	North	Residential (W&S)	9	1
70	South Pond Road	South	Residential (W)	3	6
71	Spray Lane	South	Residential (W)	6	3
72	St. Nicholas Lane	South	Residential (W&S)	2	1
		North		1	1
73	Texas Place	South	Residential (W&S)	3	0
74	Thomas Gardens	North	Residential (W&S)	11	1
75	Thorne's Lane	North	Residential (W&S)	3	2
76	Tina Place	North	Residential (W&S)	4	0
77	Torbay Road	South	Residential (W&S)	27	93
			Residential (W)	1	
			Commercial (W&S)	4	
			Commercial (W)	1	
			Res/Com (W&S)	1	
		North	Residential (W&S)	35	78
			Residential (W)	1	
			Commercial (W&S)	3	
78	Tynedale Drive	South	Residential (W)	11	3
79	Watts Pond Road	North	Residential (W&S)	1	2
			Commercial (W&S)	1	
80	Whitten's Lane	North	Residential (W&S)	1	9
81	Whitty's Lane	North	Residential (W&S)	2	23
82	Yeo's Lane	South	Residential (W&S)	1	1
			Residential (W)	3	

APPENDIX B

LIST OF UNSERVICED STREETS

Number	Street	Zone	Subdivision or Area	Number of Unserviced Lots
1	Albert Place	South	Torbay Road South of Serviced Area	3
2	Anastasia's Place	North	Bauline Line West of Bypass	5
3	Barkwood Place (or Lane)	South	Indian Meal Line West of Bypass	4
4	Barn Marsh Place	North	Bauline Line East of Bypass	4
5	Bellaventure Place	South	Torbay Road South of Serviced Area	5
6	Bernice Drive	North	Bauline Line East of Bypass	14
7	Birchy Nap Hill Road	North	Indian Meal Line East of Bypass	15
8	Blackberry Crescent	South	Torbay Road South of Serviced Area	7
9	Bourne's Close	South	Karon Drive Area	11
10	Bradbury's Lane	North	Torbay Road North of Serviced Area	4
11	Brixham Crescent	South	Jones Pond Area	16
12	Buckley's Hill	North	Bauline Line East of Bypass	3
13	Bullocks Town Road	South	Torbay Road within existing serviced area	13
14	Byrne's Lane	North	Torbay Road North of Serviced Area	14
15	Camp Carey Road	North	Bauline Line East of Bypass	22
16	Cedarwood Lane	South	Forest Landing Area	8
17	Charles Lane	North	Torbay Road North of Serviced Area	7
18	Cherrywood Drive	South	Forest Landing Area	17
19	Clara's Place	South	Karon Drive Area	5
20	Clement's Place	South	Indian Meal Line East of Bypass	5
21	Codner's Place	South	Indian Meal Line East of Bypass	9
22	Concepta's Place	South	Forest Landing Area	6
23	Cordelia Crescent	South	Karon Drive Area	23
24	Cox Marsh Road	South	Torbay Road South of Serviced Area	14
25	Cpt Matthew Davis Drive	South	Forest Landing Area	11
26	Crowe's Lane	North	Bauline Line East of Bypass	22
27	Crowley Place	North	Torbay Road within existing serviced area	7
28	Cullen's Lane	South	Torbay Road within existing serviced area	3
29	Curran Place	South	Torbay Road South of Serviced Area	2
30	Darryl Pye Drive	North	Torbay Road within existing serviced area	4
31	Doody's Lane	North	Torbay Road North of Serviced Area	11
32	Eagle Ridge Drive	North	Indian Meal Line West of Bypass	10
33	Edgewater Lane	South	Forest Landing Area	26
34	Ellacombe Street	South	Jones Pond Area	6
35	Ellard Place	South	Torbay Road South of Serviced Area	7
36	Farmers Road	North	Torbay Road South of Serviced Area	1
37	Field's Lane	South	Indian Meal Line East of Bypass	11
38	Flora Drive	North	Indian Meal Line West of Bypass	46
39	Forest River Road	South	Forest Landing Area	52
40	Gallows Cove Road	North	Torbay Road North of Serviced Area	17
41	Galway Place	South	Indian Meal Line East of Bypass	3
42	Garden Road	North	Bauline Line East of Bypass	15
43	Great Pond Road	North	Bauline Line West of Bypass	17
44	Gulley Road	North	Torbay Road North of Serviced Area	1
45	Herring Cove Road	North		1
46	Holy Trinity Lane	South	Torbay Road within existing serviced area	5
47	Howlett's Avenue	North	Torbay Road North of Serviced Area	9
48	Humpity Marsh Road	North		4
49	Hunter Place	North	Bauline Line East of Bypass	2
50	Island Pond Place	South	Forest Landing Area	4
51	Jakie's Place	North	Torbay Road North of Serviced Area	2
52	Jen's Place	North	Indian Meal Line East of Bypass	6
53	Jones Pond Road	South	Torbay Road South of Serviced Area	4
54	Karon Drive	South	Karon Drive Area	53
55	Katrina Place	North	Indian Meal Line East of Bypass	7
56	Keatings Place	North	Bauline Line East of Bypass	5
57	Keating's Pound Road	North	Bauline Line East of Bypass	5
58	Kelly's Lane	South	Torbay Road South of Serviced Area	8
59	Kennedy's Brook Drive	South	Torbay Road South of Serviced Area	1
60	Kinsmen Place	North	Torbay Road within existing serviced area	2
61	Lacey's Hill	South	Indian Meal Line East of Bypass	3
62	Mahon's Lane	South	Torbay Road South of Serviced Area	28
63	Manning Place	North	Indian Meal Line East of Bypass	1
64	Mary Manning's Place	North	Bauline Line West of Bypass	9
65	Mascarin Place	South	Torbay Road South of Serviced Area	3
66	Mayflower Drive	North	Bauline Line West of Bypass	3
67	McGrath's Lane	North	Bauline Line East of Bypass	3
68	Mid Three Island Pond Road	North		1
69	Morey's Lane	South	Torbay Road South of Serviced Area	4
70	Morris Avenue	North	Torbay Road North of Serviced Area	26
71	Motion View Close	South	Torbay Road within existing serviced area	14
72	Nathaniel Drive	North	Indian Meal Line West of Bypass	12
73	Oceanview Hill	North	Torbay Road within existing serviced area	9
74	Paul's Place	South	Jones Pond Area	5
75	Peter's Place	North	Indian Meal Line West of Bypass	23
76	Pinch Creek Place	North	Bauline Line West of Bypass	7
77	Pine Line	South	Torbay Road South of Serviced Area	26
78	Pine Ridge Crescent	South	Karon Drive Area	37
79	Piperstock Place	South	Torbay Road South of Serviced Area	11
80	Pond Side Lane	North	Bauline Line West of Bypass	5
81	Pulpit Rock Road	South	Torbay Road South of Serviced Area	24
82	Pump House Road	South	Near North Pond and West of Bypass	4
83	Quarry Road	South	Torbay Road South of Serviced Area	17
84	Quarry Road Extension	South	Torbay Road South of Serviced Area	18
85	Quigley's Lane	South	Torbay Road South of Serviced Area	55
86	Rattling Brook Road	South	Forest Landing Area	10
87	Riverwood Place	South	Torbay Road South of Serviced Area	3
88	Roblin Place	South	Torbay Road South of Serviced Area	35
89	Rosebud Street	South	Karon Drive Area	9
90	Russworthy Place	North	Bauline Line East of Bypass	6
91	Ryan's Road	North	Torbay Road North of Serviced Area	8
92	Salerno Place	South	Jones Pond Area	18
93	Sallesnik Lane	South	Jones Pond Area	15
94	Scenic View Drive	North	Indian Meal Line West of Bypass	2
95	Scott Place	North	Torbay Road North of Serviced Area	2
96	Skipper's Landing	South	Forest Landing Area	20
97	Sprucewood Lane	South	Forest Landing Area	13
98	Streamside Lane	South	Forest Landing Area	13
99	Tantum View Place	North	Torbay Road North of Serviced Area	6
100	Tapper Place	North	Torbay Road within existing serviced area	2
101	Tapper's Farm Road	North		4
102	The Battery	North	Torbay Road within existing serviced area	1
103	Torquay Place	South	Jones Pond Area	10
104	Upper Evenings Path	North	Indian Meal Line East of Bypass	36
105	Upton Place	South	Jones Pond Area	5
106	Valley Loop Drive	North		2
107	Victor Place	North	Indian Meal Line West of Bypass	3
108	Victoria Place	South	Forest Landing Area	3
109	Weather Station Road	North	Bauline Line East of Bypass	24
110	Western Island Pond Drive	South	Forest Landing Area	54
111	Whiteway Pond Road	North	Torbay Road within existing serviced area	13
112	Wildberry Lane	South	Forest Landing Area	11
113	William Manning Drive	South	Near North Pond and West of Bypass	1
114	Wills Place	South	Torbay Road South of Serviced Area	2
115	Windgap Road	North	Torbay Road North of Serviced Area	10
116	Woodbridge Lane	South	Forest Landing Area	39
117	Woodfine's Lane	North	Indian Meal Line West of Bypass	11

APPENDIX C
COST ESTIMATES

Cost Estimate
North Pond Water Treatment Plant - Phased
Torbay, NL

DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
PHASE ONE - Engineering, Pilot Testing, Geotechnical and Regulatory				
Project Design	L.S.	Unit	$ 521,739.13	$ 521,739.13
Pilot Testing of Two Technologies	L.S.	Unit	$ 217,391.31	$ 217,391.31
Geotechnical	L.S.	Unit	$ 43,478.26	$ 43,478.26
Regulatory Interaction	L.S.	Unit	$ 43,478.26	$ 43,478.26
a. Subtotal Phase One				**$ 826,086.96**
b. H.S.T. 15% of Sub-Total				**$ 123,913.04**
c. Grand Total Phase One				**$ 950,000.00**

PHASE TWO - Building, Wastewater Lagoon and Intake				
Intake	L.S.	Unit	$ 120,000.00	$ 120,000.00
Building	L.S.	Unit	$ 1,190,000.00	$ 1,190,000.00
General Site Works	L.S.	Unit	$ 300,000.00	$ 300,000.00
Storage Lagoon	L.S.	Unit	$ 750,000.00	$ 750,000.00
a. Contingency (10%)				**$ 236,000.00**
b. Subtotal Phase Two				**$ 2,596,000.00**
c. H.S.T. 15% of Sub-Total				**$ 389,400.00**
d. Grand Total Phase Two				**$ 2,985,400.00**
e. Rounded Total Phase Two				**$ 3,000,000.00**

PHASE THREE - Treatment Equpment, Water Storage Tank				
Treatment System (incl. chemicals)	L.S.	Unit	$ 1,400,400.00	$ 1,400,400.00
Backwash Tank (filter/membrane)	L.S.	Unit	$ 90,000.00	$ 90,000.00
Solids/Surge Tank Systems (DAF)	L.S.	Unit	$ 90,000.00	$ 90,000.00
UV System	L.S.	Unit	$ 60,000.00	$ 60,000.00
Chlorine Systems	L.S.	Unit	$ 34,000.00	$ 34,000.00
Water Storage Tank	L.S.	Unit	$ 1,400,000.00	$ 1,400,000.00
a. Subtotal Phase Three				**$ 3,074,400.00**
b. H.S.T. 15% of Sub-Total				**$ 461,160.00**
c. Grand Total Phase Three				**$ 3,535,560.00**
d. Rounded Total Phase Three				**$ 3,500,000.00**

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SECTION	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
DIVISION #1					
01005	Maintain Existing Piped Services				
	1. Maintain Existing Water System (Part 14.2)	L.S.	Unit	$ 10,000.00	$ 10,000.00
01010	Mobilization & Demobilization				
	(not greater than 5% if on the Island, or 10% if in Labrador, or 15% north of Cartwright, of Sub-Total Before HST)	L.S.	Unit	$ 45,000.00	$ 45,000.00
01560	Environmental Requirements				
	1. Silt Fence	m	100	$20.00	$2,000.00
01570	Traffic Regulations				
	1. Flag persons Wages	Hour	800	$ 35.00	$ 28,000.00
01580	Project Signs & Signposts & Installation				
	1. Project Sign - Federal	L.S.	Unit	$ 1,500.00	$ 1,500.00
DIVISION 2					
02104	Landscaping, Seeding, Sodding & Tree Preservation				
	1. Supply & Placement of Hydroseeding	m^2	2000	$ 12.00	$ 24,000.00
02111	Clearing & Grubbing				
	1. Clearing & Grubbing	Ha	0.2	$ 10,000.00	$ 2,000.00
02223	Excavation, Trenching & Backfilling				
	1. Main Trench Excavation				
	1. Common	m^3	2520	$ 40.00	$ 100,800.00
	2. Rock	m^3	840	$ 100.00	$ 84,000.00
	2. Granular Pipe Bedding				
	1. Type 3	m^3	1000	$ 45.00	$ 45,000.00
	3. Supply & Placement of Marking Tape				
	1. Plastic Tape	m	700	$ 2.00	$ 1,400.00
	2. Metallic Tape	m	700	$ 2.00	$ 1,400.00
02233	Selected Granular Base & Sub Base Materials				
	1. Class "A" Granular Base	m^3	630	$ 45.00	$ 28,350.00
	2. Class "B" Granular Sub-Base	m^3	840	$ 45.00	$ 37,800.00
02713	Water Mains				
	1. Supply & Installation of Water Main				
	1. 300mm PVC DR18	m	700	$ 800.00	$ 560,000.00
	2. Supply & Installation of Fitting				
	1. Bends (45 deg., 300mm)	Each	2	$ 1,000.00	$ 2,000.00
	2. Bends (90 deg., 300mm)	Each	2	$ 1,000.00	$ 2,000.00
	3. Tees (300 x 300 x 300)	Each	2	$ 1,600.00	$ 3,200.00
	4. Sleeve-type Couplings (300 mm)	Each	2	$ 1,500.00	$ 3,000.00
	5. Air Release Valve and Chamber (300 mm)	Each	1	$ 6,500.00	$ 6,500.00
	3. Joint Restraints				
	1. Supply & Placement of Joint Restraints 300mm (1100 series Megalug or approved equal)	Each	20	$ 500.00	$ 10,000.00
	4. Supply & Install Valves including Valve Boxes				
	1. Gate Valve, 300mm	Each	2	$ 12,800.00	$ 25,600.00
	5. Swabbing of Water Lines				
	1. (300mm)	m	700	$ 3.00	$ 2,100.00
	6. Locating & Connecting to Existing System (Mains)	Each	1	$ 1,500.00	$ 1,500.00
DIVISION 3					
03300	Cast-In-Place Concrete				
	1. Concrete Thrust Blocks	m^3	5	$ 350.00	$ 1,750.00
			a. Sub-Total		**$ 1,028,900.00**
			b. Engineering (10%)		**$ 102,890.00**
			c. Contingency (15%)		**$ 154,335.00**
			d. Sub-Total		**$ 1,286,125.00**
			e. H.S.T. 15% of Sub-Total		**$ 192,918.75**
			f. Grand Total		**$ 1,479,043.75**

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SECTION	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
DIVISION #1					
01005	Maintain Existing Piped Services				
	1. Maintain Existing Water System (Part 14.2)	L.S.	Unit	$ 10,000.00	$ 10,000.00
01010	Mobilization & Demobilization				
	(not greater than 5% if on the Island, or 10% if in Labrador, or 15% north of Cartwright, of Sub-Total Before HST)	L.S.	Unit	$ 45,000.00	$ 45,000.00
01560	Environmental Requirements				
	1. Silt Fence	m	100	$20.00	$2,000.00
01570	Traffic Regulations				
	1. Flag persons Wages	Hour	800	$ 35.00	$ 28,000.00
01580	Project Signs & Signposts & Installation				
	1. Project Sign - Federal	L.S.	Unit	$ 1,500.00	$ 1,500.00
DIVISION 2					
02104	Landscaping, Seeding, Sodding & Tree Preservation				
	1. Supply & Placement of Hydroseeding	m^2	2000	$ 12.00	$ 24,000.00
02111	Clearing & Grubbing				
	1. Clearing & Grubbing	Ha	0.2	$ 10,000.00	$ 2,000.00
02223	Excavation, Trenching & Backfilling				
	1. Main Trench Excavation				
	1. Common	m^3	2825	$ 40.00	$ 113,000.00
	2. Rock	m^3	925	$ 100.00	$ 92,500.00
	2. Granular Pipe Bedding				
	1. Type 3	m^3	1000	$ 45.00	$ 45,000.00
	3. Supply & Placement of Marking Tape				
	1. Plastic Tape	m	700	$ 2.00	$ 1,400.00
	2. Metallic Tape	m	700	$ 2.00	$ 1,400.00
02233	Selected Granular Base & Sub Base Materials				
	1. Class "A" Granular Base	m^3	900	$ 45.00	$ 40,500.00
	2. Class "B" Granular Sub-Base	m^3	1200	$ 45.00	$ 54,000.00
02552	Hot Mix Asphalt Concrete Pavement				
	1. Surface Course	Ton	600	$ 235.00	$ 141,000.00
	2. Base Course	Ton	600	$ 235.00	$ 141,000.00
02713	Water Mains				
	1. Supply & Installation of Water Main				
	1. 300mm PVC DR18	m	1000	$ 800.00	$ 800,000.00
	2. Supply & Installation of Fitting				
	1. Bends (45 deg., 300mm)	Each	2	$ 1,000.00	$ 2,000.00
	2. Bends (90 deg., 300mm)	Each	2	$ 1,000.00	$ 2,000.00
	3. Tees (300 x 300 x 300)	Each	2	$ 1,600.00	$ 3,200.00
	4. Sleeve-type Couplings (300 mm)	Each	2	$ 1,500.00	$ 3,000.00
	5. Air Release Valve and Chamber (300 mm)	Each	1	$ 6,500.00	$ 6,500.00
	3. Joint Restraints				
	1. Supply & Placement of Joint Restraints 300mm (1100 series Megalug or approved equal)	Each	20	$ 500.00	$ 10,000.00
	4. Supply & Install Valves including Valve Boxes				
	1. Gate Valve, 300mm	Each	2	$ 12,800.00	$ 25,600.00
	5. Swabbing of Water Lines				
	1. (300mm)	m	1000	$ 3.00	$ 3,000.00
	6. Locating & Connecting to Existing System (Mains)	Each	1	$ 1,500.00	$ 1,500.00
DIVISION 3					
03300	Cast-In-Place Concrete				
	1. Concrete Thrust Blocks	m^3	5	$ 350.00	$ 1,750.00
			a. Sub-Total		**$ 1,600,850.00**
			b. Engineering (10%)		**$ 160,085.00**
			c. Contingency (15%)		**$ 240,127.50**
			d. Sub-Total		**$ 2,001,062.50**
			e. H.S.T. 15% of Sub-Total		**$ 300,159.38**
			f. Grand Total		**$ 2,301,221.88**

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SECTION	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
DIVISION #1					
01005	Maintain Existing Piped Services				
	1. Maintain Existing Water System (Part 14.2)	L.S.	Unit	$ 10,000.00	$ 10,000.00
01010	Mobilization & Demobilization				
	(not greater than 5% if on the Island, or 10% if in Labrador, or 15% north of Cartwright, of Sub-Total Before HST)	L.S.	Unit	$ 100,000.00	$ 100,000.00
01560	Environmental Requirements				
	1. Silt Fence	m	100	$20.00	$2,000.00
01570	Traffic Regulations				
	1. Flag persons Wages	Hour	2000	$ 35.00	$ 70,000.00
01580	Project Signs & Signposts & Installation				
	1. Project Sign - Federal	L.S.	Unit	$ 1,500.00	$ 1,500.00
DIVISION 2					
02104	Landscaping, Seeding, Sodding & Tree Preservation				
	1. Supply & Placement of Hydroseeding	m^2	2000	$ 12.00	$ 24,000.00
02223	Excavation, Trenching & Backfilling				
	1. Main Trench Excavation				
	1. Common	m^3	9600	$ 40.00	$ 384,000.00
	2. Rock	m^3	2400	$ 100.00	$ 240,000.00
	2. Granular Pipe Bedding				
	1. Type 3	m^3	3000	$ 45.00	$ 135,000.00
	3. Supply & Placement of Marking Tape				
	1. Plastic Tape	m	2500	$ 2.00	$ 5,000.00
	2. Metallic Tape	m	2500	$ 2.00	$ 5,000.00
02233	Selected Granular Base & Sub Base Materials				
	1. Class "A" Granular Base	m^3	950	$ 45.00	$ 42,750.00
	2. Class "B" Granular Sub-Base	m^3	1250	$ 45.00	$ 56,250.00
02552	Hot Mix Asphalt Concrete Paving				
	1. Base Course	Ton	800	$ 235.00	$ 188,000.00
	2. Surface Course	Ton	800	$ 235.00	$ 188,000.00
02574	Reshaping & Patching Asphalt Pavement				
	1. Removal of Asphalt Pavement	m^2	800	$ 235.00	$ 188,000.00
02713	Water Mains				
	1. Supply & Installation of Water Main				
	1. 300mm PVC DR18	m	2500	$ 800.00	$ 2,000,000.00
	2. Supply & Installation of Fitting				
	1. Bends (45 deg., 300mm)	Each	6	$ 1,000.00	$ 6,000.00
	2. Bends (90 deg., 300mm)	Each	2	$ 1,000.00	$ 2,000.00
	3. Tees (300 x 300 x 300)	Each	9	$ 1,600.00	$ 14,400.00
	4. Sleeve-type Couplings (300 mm)	Each	4	$ 1,500.00	$ 6,000.00
	5. Air Release Valve and Chamber (300 mm)	Each	1	$ 6,500.00	$ 6,500.00
	3. Joint Restraints				
	1. Supply & Placement of Joint Restraints 300mm (1100 series Megalug or approved equal)	Each	70	$ 500.00	$ 35,000.00
	4. Supply & Install Valves including Valve Boxes				
	1. Gate Valve, 300mm	Each	12	$ 12,800.00	$ 153,600.00
	5. Swabbing of Water Lines				
	1. (300mm)	m	2500	$ 3.00	$ 7,500.00
	6. Locating & Connecting to Existing System (Mains)	Each	1	$ 1,500.00	$ 1,500.00
DIVISION 3					
03300	Cast-In-Place Concrete				
	1. Concrete Thrust Blocks	m^3	10	$ 350.00	$ 3,500.00
			a. Sub-Total		**$ 3,875,500.00**
			b. Engineering (10%)		**$ 387,550.00**
			c. Contingency (15%)		**$ 581,325.00**
			d. Sub-Total		**$ 4,844,375.00**
			e. H.S.T. 15% of Sub-Total		**$ 726,656.25**
			f. Grand Total		**$ 5,571,031.25**

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SECTION	DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
DIVISION #1					
01005	Maintain Existing Piped Services				
	1. Maintain Existing Water System (Part 14.2)	L.S.	Unit	$ 10,000.00	$ 10,000.00
01010	Mobilization & Demobilization				
	(not greater than 5% if on the Island, or 10% if in Labrador, or 15% north of Cartwright, of Sub-Total Before HST)	L.S.	Unit	$ 50,000.00	$ 50,000.00
01560	Environmental Requirements				
	1. Silt Fence	m	100	$20.00	$2,000.00
01570	Traffic Regulations				
	1. Flag persons Wages	Hour	800	$ 35.00	$ 28,000.00
01580	Project Signs & Signposts & Installation				
	1. Project Sign - Federal	L.S.	Unit	$ 1,500.00	$ 1,500.00
DIVISION 2					
02104	Landscaping, Seeding, Sodding & Tree Preservation				
	1. Supply & Placement of Hydroseeding	m^2	2000	$ 12.00	$ 24,000.00
02111	Clearing & Grubbing				
	1. Clearing & Grubbing	Ha	0.2	$ 10,000.00	$ 2,000.00
02223	Excavation, Trenching & Backfilling				
	1. Main Trench Excavation				
	1. Common	m^3	2810	$ 40.00	$ 112,400.00
	2. Rock	m^3	940	$ 100.00	$ 94,000.00
	2. Granular Pipe Bedding				
	1. Type 3	m^3	1300	$ 45.00	$ 58,500.00
	3. Supply & Placement of Marking Tape				
	1. Plastic Tape	m	1000	$ 2.00	$ 2,000.00
	2. Metallic Tape	m	1000	$ 2.00	$ 2,000.00
02233	Selected Granular Base & Sub Base Materials				
	1. Class "A" Granular Base	m^3	630	$ 45.00	$ 28,350.00
	2. Class "B" Granular Sub-Base	m^3	840	$ 45.00	$ 37,800.00
02713	Water Mains				
	1. Supply & Installation of Water Main				
	1. 300mm PVC DR18	m	1000	$ 800.00	$ 800,000.00
	2. Supply & Installation of Fitting				
	1. Bends (45 deg., 300mm)	Each	2	$ 1,000.00	$ 2,000.00
	2. Bends (90 deg., 300mm)	Each	2	$ 1,000.00	$ 2,000.00
	3. Tees (300 x 300 x 300)	Each	2	$ 1,600.00	$ 3,200.00
	4. Sleeve-type Couplings (300 mm)	Each	2	$ 1,500.00	$ 3,000.00
	5. Air Release Valve and Chamber (300 mm)	Each	1	$ 6,500.00	$ 6,500.00
	3. Joint Restraints				
	1. Supply & Placement of Joint Restraints 300mm (1100 series Megalug or approved equal)	Each	20	$ 500.00	$ 10,000.00
	4. Supply & Install Valves including Valve Boxes				
	1. Gate Valve, 300mm	Each	2	$ 12,800.00	$ 25,600.00
	5. Swabbing of Water Lines				
	1. (300mm)	m	1000	$ 3.00	$ 3,000.00
	6. Locating & Connecting to Existing System (Mains)	Each	1	$ 1,500.00	$ 1,500.00
DIVISION 3					
03300	Cast-In-Place Concrete				
	1. Concrete Thrust Blocks	m^3	5	$ 350.00	$ 1,750.00
			a. Sub-Total		**$ 1,311,100.00**
			b. Engineering (10%)		**$ 131,110.00**
			c. Contingency (15%)		**$ 196,665.00**
			d. Sub-Total		**$ 1,638,875.00**
			e. H.S.T. 15% of Sub-Total		**$ 245,831.25**
			f. Grand Total		**$ 1,884,706.25**