



Fort Erie Elevated Tank Class EA and Enhanced Conceptual Design – Project File Report

Final

October 27, 2020

Prepared for:



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October 27, 2020

RVA 184301

The Regional Municipality of Niagara
1815 Sir Isaac Brock Way
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**Attention: Derek Falardeau-Mercier, P.Eng.
Project Manager**

Dear Mr. Falardeau-Mercier:

Re: Project File Report
Fort Erie Elevated Tank Class EA and Enhanced Conceptual Design

Please find enclosed Project File Report for the above referenced project for your review.
The report outlines the EA process followed, details of alternatives and their evaluation as
well as the consultation process.

Please do not hesitate to contact the undersigned if you have any questions.

Yours very truly,

R.V. ANDERSON ASSOCIATES LIMITED



Rika Law, P.Eng., PMP
Project Manager

Fort Erie Elevated Tank Class EA and Enhanced Conceptual Design

Project File Report

Final

Niagara Region

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EXECUTIVE SUMMARY

Following the Niagara Region Master Servicing Plan Update undertaken in 2016, a Municipal Class Environmental Assessment (Class EA) for a new Fort Erie Elevated Water Storage Tank and associated distribution and transmission system upgrades commenced in February 2019.

The objective of this Project File Report (PFR) was to document the results of the Class EA process. This included identification and evaluation of alternatives, identification of affected stakeholders, relevant government agencies and First Nation communities, findings from investigations, recommendation of the preferred alternative, and design concepts for the elevated tank, in addition to the public and agency consultation completed during the Class EA process.

A total of five location alternatives for the Elevated Tank (ET) were identified and evaluated. After communication with potentially impacted and interested stakeholders (public, government agencies and First Nations), the preferred location alternative was determined to be at the Northeastern corner of Bridge Street and Pettit Road, next to the existing Waste Transfer Station.

The preferred alternative is on Region owned land, located on a relatively high elevation and close to the existing Fort Erie transmission watermain. A sizeable portion of this property and immediate area lies within the boundary of the Miller's Creek Provincially Significant Wetland Complex. The Ministry of Natural Resources and Forestry (MNRF) also classified a portion of the site as Environmental Conservation Area (ECA) associated with Significant Woodlands. Therefore, for environmental mitigation purposes and to avoid siting the tank within the Niagara Peninsula Conservation Authority (NPCA) regulated area, the ET is proposed to be sited at the north eastern corner of the property.

The Public Information Center (PIC) was held on November 13, 2019 to provide an opportunity for stakeholders to comment on the identified preferred location. No adverse comments were received during and after the PIC.

The Municipal Class EA was completed under a Schedule B Process. After the preferred alternative was selected as part of Phase 2 of the Class EA, a conceptual design of the ET at the preferred location alternative was undertaken. Results from various preliminary investigations, such as the topographical survey, geotechnical investigation, environmental investigation as well as archaeological and cultural heritage investigations were considered as part of the conceptual design.

1.0 INTRODUCTION

1.1 Purpose of Study

In 2016, the Regional Municipality of Niagara (Region) updated its Master Servicing Plan (MSP) to identify, evaluate and select its preferred water and wastewater servicing strategies to meet the current and future servicing demands, up to 2041.

The MSP recommended the construction of a new elevated water storage tank that would consolidate the system storage of Fort Erie. This was intended to simplify the water system, provide additional balancing storage and optimize the system pumping. The MSP also recommended the provision of a larger watermain on Gilmore Street.

According to the MSP, consolidation of Fort Erie's water storage facilities would involve the decommissioning of the existing Central Avenue ET and the Stevensville Reservoir and Pumping Station, maintaining the Rosehill WTP reservoir and provision of a new elevated tank to increase storage capacity as well as the floating storage.

The objective of this Project File Report (PFR) is to document the results of the Class EA process pertaining to the identification, evaluation and recommendation of the preferred location and design concepts for the new elevated water storage tank. In addition, communication and consultation efforts with the public, government agencies, First Nation communities and other interested stakeholders are documented in the report.

1.2 Study Area

Fort Erie is situated beside Lake Erie and the Niagara River. Figure 1.1 shows the approved Urban Area Boundary, as per the official plan, and the currently serviced areas within the boundary. It is currently serviced with municipal water supply via the Rosehill Water Treatment Plant (WTP), through a network of distribution mains and storage facilities. The total service equivalent population (combination of service population and service employment) in the year 2014 for this area was approximately 41,258 persons.

Ridgeway and surrounding neighbourhoods are experiencing growth and the growth is expected to remain strong for the next 5-10 years due to the areas' high marketability. Areas south of the Queen Elizabeth Way (QEW) are expected to see growth as opportunities around Ridgeway are exhausted. Areas north of the QEW and Douglastown as well as Stevensville are anticipated to experience growth in within a longer-term horizon.

As a result, the goal of this Class EA was to select a location for the new ET which would allow for an improved and increased storage capacity to meet the projected water demand of the area up to 2041.

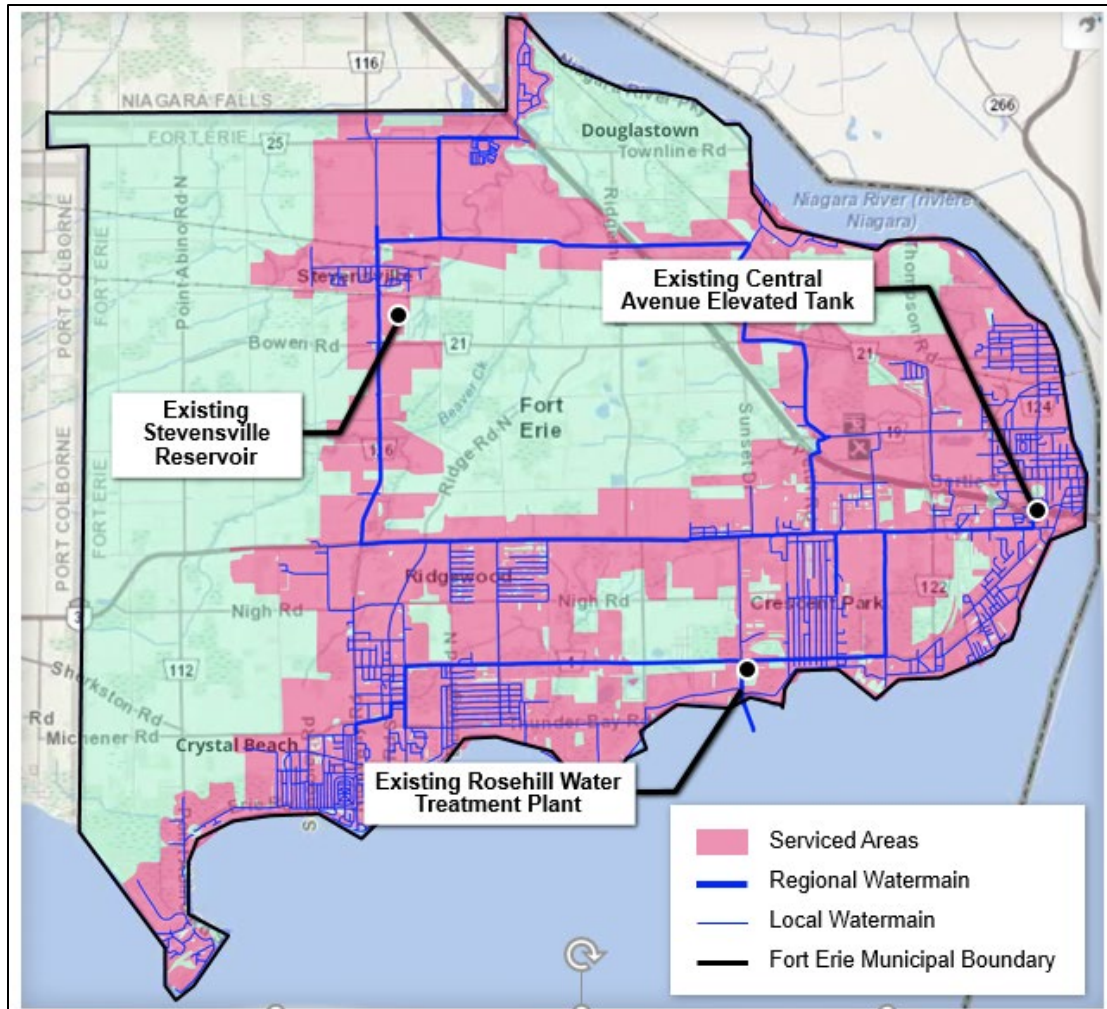


Figure 1.1: Existing Water Supply and Storage Infrastructure Servicing the Fort Erie Area

1.3 Project Team

The Regional Municipality of Niagara (Region) retained R.V. Anderson Associates Limited to undertake the Class EA. The following companies also assisted with the Class EA in their specialized fields:

- Parslow Heritage Consultancy Ltd. – Stage 1 and 2 Archaeological Assessment and Cultural Heritage Evaluation
- LGL Limited – Natural Heritage Investigation
- Palmer Environmental Consulting Group – Geotechnical and Hydrogeological Investigation
- Callon Dietz Incorporated – Topographical Survey

1.4 Background

In 2016, the Region completed a Water and Wastewater Master Servicing Plan (MSP) update which reviewed and developed water and wastewater servicing strategies for urban areas within the Region. The MSP was updated based on population and employment growth forecasts using a 2041 planning horizon.

The MSP recommended construction of a new water elevated water storage tank and decommissioning of both the existing Central Avenue Elevated Tank and the Stevensville reservoir and pumping station. The objectives of this recommendation were to consolidate Fort Erie's water system storage, improve pumping operations and reduce long term lifecycle costs while also providing additional storage to meet the projected growth and water demands.

A Schedule 'B' Class EA for the new elevated tank was satisfied through the MSP. Three location alternatives were evaluated during the process:

1. Bowen Road west of Queen Elizabeth Way
2. Bowen Road and Sunset Drive intersection
3. Bowen Road and Pettit Road intersection

Option 1 was selected due to its proximity to new growth areas, relatively higher elevation and proximity to the existing transmission watermain loop. However, due to some changes in the intended land use in that area since the 2016 MSP, the Region decided to consider other locations for the new elevated tank. As a result of this decision, it was necessary to undertake a new Schedule 'B' Class EA for the elevated tank.

1.5 Existing Water Supply System

The Fort Erie water supply system currently consists of the following components:

- Water Treatment Plant: The Rosehill Water Treatment Plant (WTP) with a maximum rated capacity of 50 MLD. It is located at 300 Rosehill Road, Fort Erie. The key processes in the plant include coagulation, flocculation, sedimentation, filtration and disinfection.
- Pumping Stations: There are two pumping stations as described below:
 - Rosehill WTP Pumping Station: Equipped with five pumps with a total firm capacity of 50 MLD. The Total Dynamic Head (TDH) of the pumping station is 73.2 m. This pumping station draws water from the Rosehill WTP reservoir.

- Stevensville Pumping Station: Equipped with four pumps, with a total firm capacity of 10 MLD and TDH of 43 m. This pumping station draws water from the Stevensville Reservoir.
- System Storage: There are three storage facilities in the Fort Erie water system:
 - Rosehill WTP reservoir: an in-ground reservoir with a storage capacity of 11.7 ML. It is located at the Rosehill Water Treatment Plant
 - Central Avenue Elevated Tank: Located at 115 Central Avenue with a capacity of 1.5 ML
 - Stevensville Reservoir: an in-ground reservoir, located at 2650 Stevensville Road, with a capacity of 1.9 ML.

1.6 Forecast Population, Water Demands and Water Storage Needs

Based on population data obtained from the Master Servicing Plan (MSP), the serviced population of Fort Erie is forecasted to increase from 30,419 in 2014 to 43,134 in 2041. Similarly, the employment population is forecasted to increase from 10,839 in 2014 to 14,698 in 2041. The total service equivalent population (serviced population and employment population) is 41,258 people for 2014, and 57,832 people in 2041.

However, the Region's current population forecast is approximately 60,000 equivalent population post 2041.

Using the current forecasted population, the average day demand and maximum day demand is expected to be 17.9 MLD and 27.6 MLD respectively by 2041.

Comparing the system capacity and the forecasted maximum day demand, the following can be concluded:

1. The Rosehill WTP will have sufficient capacity to meet demand to 2041 and beyond
2. Based on the Ministry of the Environment, Conservation and Parks (MECP) Drinking Water Design Guidelines, the recommended storage volume will increase from the current 16.2 ML to 18.8 ML by 2041¹. The system also has an existing storage deficit of 1.1 ML which is expected to increase to 3.7 ML

¹ The recommended storage volume to suit the updated forecasted population to 2041 is 18.8 ML, as compared to 18.6 ML from the Niagara Region 2016 Master Servicing Plan Update (Volume 3)

by 2041. This deficit is without decommissioning of the Stevensville Reservoir and Central Avenue Elevated Tank.

As previously mentioned, the MSP Update recommended that the Fort Erie water system storage be consolidated in order to optimize the system pumping and increase the available balancing storage. This was proposed to be done by providing a new Elevated Tank (ET) and decommissioning of both the Central Avenue Elevated Tank and the Stevensville Reservoir. The combined capacity of both reservoirs is 3.4 ML.

The capacity of the new elevated tank was obtained by adding the estimated 2041 storage deficit to the capacities of the Central Avenue Elevated Tank and the Stevensville Reservoir. Table 1.1 below shows the details of calculation of the new elevated tank.

Table 1.1: Calculation of Capacity of New Elevated Tank

Description	Value
Rosehill WTP Reservoir (ML)	11.7
Central Avenue ET (ML)	1.5 (A)
Stevensville Reservoir (ML)	1.9 (B)
Total existing storage (ML)	15.1 (C)
Average Daily Demand (2041) (MLD)	17.9
Maximum Daily Demand (2041) (MLD)	27.6
Total required storage (2041) (ML)	18.8 (D)
Deficit (ML) (D-C)	3.7 (E)
Total capacity to be decommissioned (ML) (A+B)	3.4 (F)
Size of new ET (ML) (E+F)	7.1

The minimum required size of the new ET was calculated as 7.1 ML. However, the 2016 MSP recommended a capacity of 8 ML. Operational requirements for both tank volumes are comparable and the additional size would provide more operational flexibility in the system. The MSP recommended capacity of 8 ML was therefore adopted.

The population and flow data, and the storage capacity calculations are available in Appendix A.

2.0 OVERVIEW OF MUNICIPAL CLASS EA PLANNING PROCESS

A Municipal Class Environmental Assessment (Class EA) is an approved planning process that proponents can follow, which meets the requirements of the Ontario Environmental Assessment Act. The Class EA approach provides for the evaluation of alternative solutions to a problem or opportunity. The Class EA process is illustrated in Figure 2-1 at the end of this section.

The Class EA approach includes mandatory requirements for public and regulatory agency input and efficiently presents the process of the EA. The Class EA identifies three different categories or “schedules” of projects as follows:

Schedule A projects are limited in scale and have minimal adverse effects. These projects are approved and may proceed directly to implementation without any further steps in the Class EA process.

Schedule B projects have the potential for some adverse environmental effects and must be subjected to a screening process, involving consultation with the directly affected public and relevant government agencies to ensure that any concerns are addressed. If there are no outstanding concerns, then the proponent may proceed to implementation.

Schedule C projects have the potential for significant environmental effects and must proceed under the full planning and documentation procedures specified in the Class EA document. Schedule C projects require evaluation of alternative solutions and alternative design concepts of the preferred solution. The public and agencies are provided several opportunities throughout the process to provide input and comments.

2.1 Confirmation of Municipal Class EA Schedule

The Municipal Class EA² identifies a project that “generally included improvement and minor expansions to existing facilities”, or “establish new or expand/replace existing water storage facilities to be a “Schedule B” project.

The procedure for a Schedule ‘B’ undertaking is indicated below:

- | | |
|----------------|---|
| Phase 1 | Identify the problem or opportunity. |
| Phase 2 | Identify and evaluate alternative solutions to the problem by considering the existing environment and establishing |

² Municipal Engineers Association. “Municipal Class Environmental Assessment”. October 2000, amended 2011 and 2015

the preferred solution, taking into account public and agency review input. Document the decisions in a Project File/Class EA Report, also known as the Project File Report (PFR) – i.e. this document.

Notice of Completion

Upon completion of the EA Report, a Notice of Completion is advertised and issued to the public and agencies expressing interest in the project, for a minimum of 30-day review period. Questions and concerns that are unrelated to Aboriginal and treaty rights are encouraged to be resolved through discussions with the proponent. Only issues that may prevent, mitigate, remedy adverse impacts on constitutionally protected Aboriginal and treaty rights may write to the Minister of the Environment, Conservation and Parks (MECP) and request a Part II Order (i.e. a “bump-up request”). In this case, the MECP will review the information and prepare a recommendation for the Minister’s consideration. The Minister will then make a decision whether the Part II Order will be denied or upheld or if the matter will be referred to a mediator.

Implementation

Provided that no Part II Order requests are made to the Minister of the Environment within the minimum 30-day review period, the project is approved and may proceed to detailed design, construction, operation and monitoring, if specified, for adherence to environmental provisions and commitments

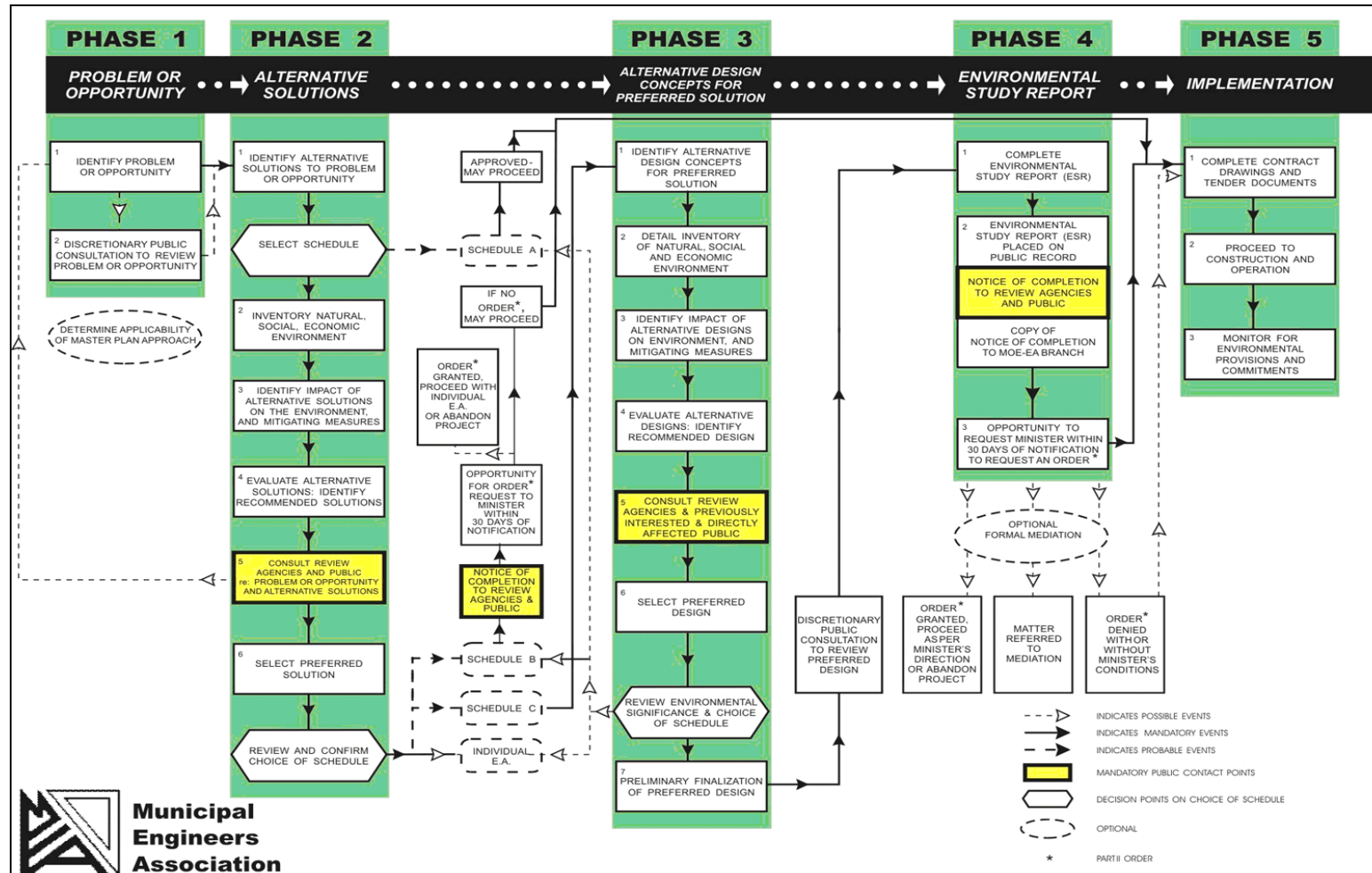


Figure 2.1: Municipal Class Environmental Assessment Process

(Reference: Municipal Engineers Association. "Municipal Class Environmental Assessment". October 2000, amended 2011 & 2015.)

2.2 Consultation Program Overview

A comprehensive consultation program was developed for this Class EA. The public consultation and communications carried out during this project provided a number of opportunities for the public and government agencies/authorities and First Nations to review information from the project team, to provide comments and feedback, and to receive clarifications in accordance with the Class EA process. A description of the stakeholders and First Nations contacted and opportunities for comment is provided below. Input into the Class EA process from the stakeholders is also summarized in the relevant sections noted below.

2.2.1 Public Consultation

Information, comments, and feedback were exchanged with the general public through one (1) Public Information Centre (PIC) as well as conversations and correspondence with the public.

The PIC, held in November 2019, explained why the Class EA was being undertaken, and presented the problem and opportunity statement, list of elevated tank location alternatives, evaluation criteria and evaluation results. Further information on this PIC and comments received can be found in Section 4.7 and Appendix B.

2.2.2 Consultation with Government Agencies/Authorities and Utilities

As part of the consultation process, various government agencies and regulatory authorities as well as Utilities were contacted for input during the Class EA. A few of the key agencies/authorities contacted included various government ministries (e.g. Ministry of the Environment, Conservation and Parks (MECP)), conservation authorities (e.g. Niagara Peninsula Conservation Authority), utility providers (e.g. Canadian Niagara Power Inc, Bell, Rogers, Hydro One), and other regulatory agencies (e.g. Nav Canada). For a full list of all agencies/authorities contacted and copies of correspondence, please refer to Appendix C.

A summary of the specific responses from the following agencies and regulatory authorities received during the Class EA can be found in Section 4.7.4 of this PFR:

- Ministry of the Environment and Conservation and Parks (MECP)
- Nav Canada
- Transport Canada
- Niagara Peninsula Conservation Authority
- Niagara Region Planning and Development Services
- Town of Fort Erie

The details of communications with Utilities can be found in Section 4.7.6

2.2.3 First Nation Communication

Various engagement initiatives were conducted throughout the Class EA with First Nations. Refer to Appendix B for a full list of organizations contacted.

Although notices and invitations were sent out to a number of local First Nation communities, only one First Nation community – the Mississauga of the Credit First Nation, showed interested and corresponded with the team. A summary of the specific responses received during the Class EA can be found in the following sections of this PFR:

- Mississaugas of the Credit First Nation (MCFN) – Section 4.7.5

3.0 PHASE 1: NOTICE OF COMMENCEMENT AND PROBLEM & OPPORTUNITY STATEMENT

3.1 Notice of Commencement

The Notice of Commencement was published on May 2, 2019 in the Fort Erie Observer and The Fort Erie Post and mailed to the interested public, agencies, and First Nations. The notice was also published on the Niagara Region's website.

The notice advised that the Region was undertaking a study for a new Fort Erie Elevated Water Storage Tank and associated distribution and transmission system upgrades. The notice advised that the project was a Schedule 'B' Class EA, and a PIC would be held as part of the process and that comments on this project should be submitted to Niagara Region or R.V. Anderson Associates Limited.

Samples of the notice, letters, additional information, and the stakeholders list are provided in Appendix B.

3.2 Problem and Opportunity Statement

As part of Phase 1 in the Class EA process, the problem and/or opportunity situation must be identified. Given the existing storage deficit in the Fort Erie water system and the forecasted growth for the Fort Erie Area, additional water storage will be required. As such, the Problem and Opportunity Statement has been identified as:

“The Regional Municipality of Niagara, through its integrated process aimed at identifying and planning for area growth within the next 25-year period, has updated its Water and Wastewater Master Service Plans. The plan identified a number of improvements required for the Fort Erie water distribution system to accommodate the

projected growth in the area. One of the improvements is the construction of a new Fort Erie Elevated Water Storage Tank and associated distribution and transmission system upgrades. This will provide the recommended storage volume, improve contingency and optimize pumping operations for the Fort Erie water system.

As part of the Class EA, a number of suitable sites for the new elevated tank will be investigated and evaluated. Furthermore, the existing water distribution and transmission system of Fort Erie will be analyzed to identify necessary improvements for the system, possible impacts and mitigation measures for the construction of the elevated tank at the preferred site.

The preferred site will be selected after due consideration of various factors which includes social, environmental, economic as well as operation and maintenance factors with minimal interruption to the existing water supply system.”

4.0 PHASE 2: ELEVATED TANK LOCATION ALTERNATIVES

4.1 Description of Location Alternatives

The 2016 MSP Update identified and evaluated three location alternatives. Two additional locations were further identified during the current Class EA.

The following is a summary of all the alternatives, including the Do Nothing Alternative, the alternatives listed in the MSP, and the additional alternatives added as part of the current Class EA process.

1. Alternative ‘0’: Do Nothing
2. Alternative ‘1’: Bridge Street and Pettit Road
3. Alternative ‘2A’: Bowen Road and Sunset Drive
4. Alternative ‘2B’: Bowen Road and Pettit Road
5. Alternative ‘3’: Bowen Road and Laur Road
6. Alternative ‘4’: Garrison Road and Stonemill Road

Figure 4.1 shows the location of the elevated tank alternative sites considered.

4.1.1 Alternative 0 – “Do Nothing” Alternative

The “Do Nothing” Alternative was required for evaluation under the Class EA process. It essentially identified the existing conditions to help define the extent of the problem and provides a “baseline” against which the other alternatives can be compared. This

scenario would involve maintaining the water system, including the existing storage facilities.

This alternative would lead to an increased storage deficit and increasingly inefficient system pumping. It would also result in higher operation costs due to additional pumping from the Rosehill WTP to distribution system to account for the storage deficit.

Furthermore, there would be a need to carry out more frequent maintenance works due to an infrastructure that was approaching the end of their design life.

Although there would be no new construction associated with this alternative, there would still be operation and maintenance costs, for example, repainting of the existing Central Ave Elevated Tank, and replacement pumps at the Stevensville pumping station and reservoir. Once the Central Avenue Elevated Tank reached the end of its useful life (it was originally built in 1966) there would be a replacement cost associated with building a similar tank on the same site.

However, since it does not address the problem and opportunity statement, namely, address storage volume issues, improve contingency and optimize pumping operations for the Fort Erie water system, it would not be a preferred alternative.

4.1.2 Alternative 1 – Bridge Street and Pettit Road

Alternative ‘1’ is located on the Northeast corner of Bridge Street and Pettit Road, next to the existing Waste Transfer Station. The site is approximately 6 acres in size. It is zoned for industrial use and owned by the Niagara Region. No rezoning would be required based on Section 27.2 of the Town of Fort Erie’s Comprehensive Zoning By-Law 129-90, which listed “Public Uses and Operations” as one of the zone’s Permitted Uses.

The location has a relatively high elevation and it is close to the existing Fort Erie transmission watermain loop. This would result in a lower construction costs than some other alternatives due to a smaller pedestal height and shorter connection to the regional watermain.

However, the northwest and southeast parts of the location is part of the Millers Creek Provincially Significant Wetland (PSW) Complex. No development or alteration would be permitted within a PSW designated area. Furthermore, all areas within the 30 m radius of the PSW were Niagara Peninsula Conservation Authority (NPCA) regulated areas.

More than half of the location is also part of the Ministry of Natural Resources and Forestry (MNRF) designated “Significant Woodland”.

The alternative is also located within 1.5 km radius of an existing private airport runway. However, the owner of that property confirmed that it was no longer in use and it was also no longer registered as an aerodrome.

4.1.3 Alternative 2A – Bowen Road and Sunset Drive

Alternative '2A' is located on Bowen Road east of the Queen Elizabeth Way (QEW). It is zoned for agricultural use, but a rezoning would not be required because Clause 6.24.a of the Town of Fort Erie's Comprehensive Zoning By-Law 129-90 does not generally prevent use of any land for public services use. The site is approximately 6 acres in size and privately owned.

This alternative is located along the Fort Erie transmission watermain loop which would lead to a lower cost to connect to the regional watermain, when compared to other alternatives like Alternative '3'.

The northern half of the property is also part of the Millers Creek PSW Complex and the NPCA regulation limit. The northern end of the site was within a deer wintering area and there would be a general timing restriction for vegetation clearing to protect migratory birds.

4.1.4 Alternative 2B- Bowen Road and Pettit Road

This alternative is located just further east of Alternative '2A'. It is zoned for dry industrial use. However, no rezoning would be required based on Section 29.2 of the Town of Fort Erie's Comprehensive Zoning By-Law 129-90, which listed "Public Uses and Operations" as one of the zone's Permitted Uses.

The alternative is about 21 acres in size and privately owned. The eastern and western portions of the property are either wooded and/or regulated wetlands and part of the Miller Creek Wetland Complex. As such, only the center portion of the land would be useable for the elevated tank. The likelihood of the private property owner being willing to sell the middle portion of the land, or if the entire property will need to be acquired would have to be assessed further should this site be selected as the preferred location.

Its proximity to the Fort Erie transmission watermain loop is considered an advantage as it would result in a lower watermain cost, when compared to other alternatives like Alternative '3'.

4.1.5 Alternative 3 – Bowen Road and Laur Road

This alternative is located just west of the QEW and adjacent to the proposed area for the future Canadian Motor Speedway. It is zoned for agricultural use. The location is about 33 acres in size and privately owned. The property is currently being used for farming and crop storage and its value could not be estimated without an appraisal.

The location had the highest elevation which would result in a reduced pedestal height. However, its location west of the QEW would require crossing the highway in order to connect to the Fort Erie transmission loop.

The alternative is free of any environmentally sensitive areas.

4.1.6 Alternative 4 – Garrison Road and Stonemill Road

Alternative '4' is located about 3 km north of the Rosehill WTP in the Ridgeway area of Fort Erie. It also has a high ground elevation, comparable to the other alternative locations.

Ideally, the water distribution system would be in between the water storage and the water treatment plant. This allows for better turn over of water in the entire distribution system. It also helps with redundancy in that if there was a major watermain break, there would be less chance that the break would affect both the water storage and water supply. In addition, the watermain on Garrison Road is only a 300 mm compared to the 400-450 mm trunk watermain for the other alternatives. This resulted in high pressure loss in the system if the elevated tank was located here.

Lastly, the elevated tank in this location would be a far distance from Douglastown, compared to the other alternatives, which helped to move the elevated tank to a more 'central' location between Fort Erie, Stevensville, Douglastown and Crystal Beach.

Therefore, given the above noted rationale, this alternative was eliminated from the shortlist.

The location alternatives are shown in the figure below and also summarized in the evaluation table in Section 4.2.

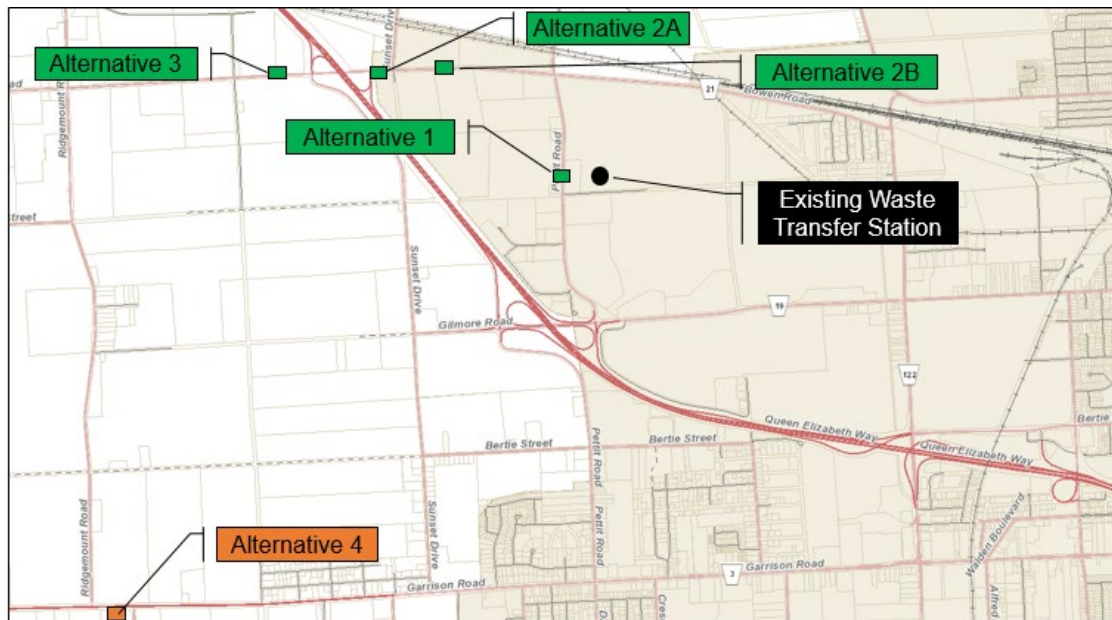


Figure 4.1: Location Alternatives

4.2 Evaluation of Location Alternatives

To determine the preferred alternative, the alternatives were evaluated using the following set of criteria and method.

4.2.1 Evaluation Criteria, Description and Methodology

The evaluation criteria consisted of five major evaluation categories, each with its own subset of specific criteria and considerations as described below:

Social

- Short and long term impacts on adjacent land uses, commercial or business operations during construction
- Public perception
- Zoning requirements
- Property ownership

Financial

- Capital cost factors included cost of land acquisition, site works, watermain works, tank costs

- Operational and maintenance cost factors included repainting and repairs to existing storage facilities, pump replacements, energy requirements from pumping etc.

Technical and Operational

- Elevations: natural ground elevation and hydraulic gradient
- Available pressure and fire flows in the distribution system (via hydraulic modelling)
- Availability of sufficient space for ET and associated site works
- Proximity and ease of connection to water transmission main
- Proximity to sanitary/storm sewer
- Availability of other utilities like gas and hydro
- Geotechnical and hydrogeological conditions

Archaeological

- Archaeological and cultural heritage

Environmental

- Environmental sensitivity and natural environmental conditions
- Approval requirements

A simple ranking scale was used to evaluate the alternatives to arrive at the preferred alternative. A scale of “Lowest Impact to Highest Impact” was used to simplify the evaluation process.

4.2.2 Evaluation of Alternatives

As per Section 4.1, Alternative ‘4’ (Garrison Road and Stonemill Road) was removed from the shortlist, and as such was not considered further.

The remaining location alternatives were evaluated based on the above criteria. Figure 4.2 later in this section provides a summary for the evaluation of all the alternatives during Phase 2 of the Class EA Process.

4.2.3 Alternative '0' – “Do Nothing” – Maintain existing facilities as is

Social Impacts

Alternative '0' was evaluated to have low moderate negative social impacts, based on the following:

Short Term Impacts on Adjacent Land Uses, Commercial, or Business Operations During Construction

- No large construction activities expected for the existing facilities, except for the maintenance and refurbishment of the Stevensville Reservoir & Pumping Station and the repainting/refurbishment of the Central Ave Elevated Tank. Minor construction impacts expected during this time.
- There would be some disruption to the area near Central Avenue ET when it reaches the end of its useful life and needs to be replaced. Noise, dust, and restricted road access would be likely during construction. The proximity of the construction work to nearby residents in downtown Fort Erie would have some negative impacts.
- No rezoning would be required
- No land acquisition or easement required as property is Region owned.

Long Term Impacts on Adjacent Land Uses, Commercial, or Business Operations

- The existing Central Avenue Elevated Tank is already located on Central Avenue and the local residents were used to the elevated tank as a landmark for the Town of Fort Erie.
- The existing Stevensville reservoir and pumping station was already located within the Stevensville community and no exterior changes, other than regular maintenance, would be required.
- No rezoning would be required.

Financial Impacts

- Alternative '0' Do Nothing was evaluated to have low negative financial impacts.
- Although there were no new construction works associated with this alternative for the immediate future, there would be upgrade costs associated with the upgrades and upkeeping of the existing facilities:

- The Stevensville Reservoir and Pumping Station refurbishment was estimated at \$1-2 Million.
 - The replacement cost for the Central Avenue ET was estimated at \$4.5-5 Million when it reaches the end of its useful life.
- Operation and maintenance costs were estimated at \$3-4 Million from now to 2041. The costs were calculated using the net present value of future operation and maintenance costs. The operation and maintenance costs included pump maintenance and replacement costs at Stevensville Pumping Station and Rosehill WTP, energy costs for the pumping stations, repainting of the Central Avenue ET every 15 years and inspection costs for the Stevensville reservoir and Central Avenue ET. It was assumed that the staffing complement would remain the same in all scenarios. As such labour costs were not included operation and maintenance cost comparison.
- The operational and maintenance costs for this alternative is expected to be higher compared to the other alternatives as result of upkeeping of aging facilities and having three reservoir facilities to maintain. It was also expected that there would be higher costs associated with the additional pumping from the Rosehill WTP to account for the current and future storage deficit.
- Overall, the life cycle cost (capital and operation and maintenance costs), over a span of approximately 20 years, would be approximately \$9.2 Million.
- The alternatives cost estimates were included in Table 4.1 and Appendix D.

Technical Impacts

- Alternative '0' was evaluated to have moderate high negative technical impact for the following reasons:
 - It did not satisfy the problem and opportunity statement, mainly on the premise of not being able to address the current and future storage deficit nor optimize the pumping operations
 - The storage deficit could result in inadequate storage for fire and emergency use as system demand increase.
 - When the Central Avenue ET reaches the end of its useful life and needs to be replaced, the existing ET would have to be taken offline and demolished prior to the construction of the replacement tank at the same site. This would result in greater storage deficit on a temporary basis and longer construction period within the existing small property

Archaeological Impacts

- Alternative '0' was evaluated to have low negative impacts as the sites involved are already built on and previously disturbed.

Environmental Impacts

- Alternative '0' was evaluated to have low negative environmental impacts as the sites involved are already built on and developed.

4.2.4 Alternative '1' – Bridge Street and Pettit Road

Social Impacts

Alternative '1' was evaluated to have low moderate negative social impacts, based on the following:

Short Term Impacts on Adjacent Land Uses, Commercial, or Business Operations During Construction

- Noise, dust, and restricted road access would occur during construction, particularly during installation of watermains and underground infrastructure between the elevated tank and the existing systems.
- The construction of this new elevated tank would have less negative social impact than the replacement of the existing Central Ave ET because it would be in a remote location, with less residents in the area
- No land acquisition or easement would be required as property is Region owned.
- No rezoning would be required

Long Term Impacts on Adjacent Land Uses, Commercial, or Business Operations

- The new location would be less visible from downtown Fort Erie and the Peace Bridge
- The new elevated tank will be visible from the Queen Elizabeth Way (QEW).

Financial Impacts

- Alternative '1' was evaluated to have moderate financial impacts.
- For Alternative '1', it was estimated that the cost would be approximately \$10 to \$11 Million to construct a new elevated tank, associated watermains, access road, site drainage and overflow infrastructure. It excludes land acquisition cost since the site is Region owned.

- Operation and maintenance costs were estimated at \$3-3.5 Million from now to 2041. The costs were calculated using the net present value of future operation and maintenance costs. The operation and maintenance costs included pump maintenance at Rosehill WTP, energy costs for the pumping station, repainting of the new ET every 15 years and inspection costs for the new ET. It was assumed that the staffing complement would remain the same in all scenarios. As such labour costs were not included operation and maintenance cost comparison.
- The alternatives cost estimates were included in Table 4.1 and Appendix D.

Technical Impacts

Alternative '1' was evaluated to have low negative technical impacts for the following reasons:

Technical/Constructability Challenges

- The high elevation of the terrain would be a suitable location for the new elevated tank. The elevation would be slightly lower than Alternatives '0' and '3', but higher than Alternatives '2A' and '2B'. A higher ground elevation and would minimize the height and cost of the tank pedestal, while allowing for a similar hydraulic grade line as the existing Central Avenue ET.
- Hydraulic modeling revealed the following pressure conditions in the distribution system under various growth scenario timelines of 2021, 2031 and 2041. To be conservative and practical, the modeling was completed using the same low operational water level as the Central Avenue Elevated Tank (i.e. 234.5 m). The high water level is 240.9m at Central Avenue Elevated Tank³.
- During the peak hour demand scenario analysis, both the ET and one (1) Rosehill WTP high lift pump (#3) were operational in order to meet the high flow demand. In conjunction with the new elevated tank locations, a larger 450 mm trunk watermain on Gilmore Road from Pettit Road to central Fort Erie would help with available fire flows and redundancy of supply to Town of Fort Erie
 - For 2021 under peak hour demands, the Alternative '1' ET location improved the distribution pressure when compared with the existing system (Central Ave ET at 234.5 m water level and Stevensville Reservoir in operation) for the 2021 peak hour demand system. For the Alternative '1' scenario only one node showed pressure that was less

³ Obtained from 2016 Master Servicing Plan Update by GM Blue Plan

- than 28 m (40 psi), which was the result of being at a small local, dead-ended watermain.
- Under the 2031 peak hour demand scenario, two additional areas in Crystal Beach showed pressures below 40 psi when compared with the new ET 2021 peak hour demand scenario. This was also drastically better than the existing system's 2031 peak hour demand scenario, which had about half of the Crystal Beach area and one third of Central Fort Erie area at less than 28 m (40 psi). As such, having the new ET at Alternative '1' and 1 HLP on at Rosehill during the peak hour demand will significantly improve pressure in the system, albeit a few isolated areas would still have pressure less than 40psi. Turning on a second HLP at Rosehill would help to alleviate this problem.
 - For 2041 peak hour demand scenario, when compared with new ET 2031 scenario, the previous area near Crystal Beach that had pressure below 28 m (40 psi) grew a bit larger. A small area around Miller's Creek Marina would also have a pressure below 28 m (40 psi), but likely due to it being a dead-ended watermain in that area. All other areas would have pressures between 28 m (40 psi) and 56 m (80 psi). Having the ET at Alternative '1' also significantly improves the distribution pressure compared to existing system's 2041 peak hour demand scenario.
 - This was a common pattern for all shortlisted elevated tank alternative sites (Alternatives 1, 2A, 2B, 3) when compared to the existing system's peak hour demand scenario.
- For the available fire flows during max day demand, the following observations were found, and were quite consistent for Alternatives 1, 2A, 2B and 3 given the close proximity of these locations.
 - Fire Flow: In 2021, regional watermains would be within acceptable fire flow ranges while some private and local watermains would have less than 50 L/s flow due to dead-ended watermains and/or smaller watermain size. When compared with the existing system, the new ET location would improve the fire flow in the system, particularly with the addition of larger trunk water main along Gilmore Road.
 - In 2031, there would be no significant difference in available fire flow when compared to Alternative '1' under 2021 max day plus fire flow demands, but there would be improvement in available fire flow when

compared with Alternative '0' – Do Nothing under the 2031 max day plus fire flow demands.

- In 2041, a few areas would have fire flow less than 50 L/s around the Crystal Beach area when compared with Alternative 1's 2031 max day plus fire flow demands, but there would be improvement in the available fire flow when compared with Alternative '0' – Do Nothing 2041 max day plus fire flow demands.
- There would be sufficient space for a new ET and other associated works on this site. However, an NPCA Work Permit would be required if works were carried out within the NPCA regulated area.
- The site would be located along the transmission watermain, making connections to the transmission watermain shorter and more economical.
- This alternative would be located close to a creek, which could receive overflows from the tank, after dechlorination.
- Geotechnical investigations revealed Dolostone bedrock approximately 3.4 m below grade, which would be suitable for ET's foundation.
- Lab sampling of the soil revealed acceptable concentrations of metals, inorganics and Volatile Organic Compounds (VOCs), thereby making it non-hazardous

Scheduling/Deadline Issues

- It is anticipated that the construction of the elevated tank would take six to twelve (12) months to complete, once design and approvals have been received. This is comparable to the construction timeframe for Alternatives 2A and 2B, and likely shorter than the replacement tank at Central Ave or new ET at Alternative 3 (for the watermain connection under the QEW).

Operational and Maintenance Complexity

- The required operation and maintenance for the elevated tank would be similar for Alternatives 1, 2A, 2B and 3. Elevated tanks supply the distribution system via gravity flow. Maintenance activities for elevated tanks may include the following:
 - Regular safety inspections and condition assessments
 - Depending on chosen tank material, recoating of tank interior and/or exterior would be required every 15 to 20 years.

Approval Challenges

- Ministry of Transportation (MTO) consultation would be required since the location is within 800 m radius of the QEW
- Work Permit would be required for construction works within the Niagara Peninsula Conservation Authority (NPCA) regulated area.
- Consultation with Town of Fort Erie's Environmental Advisory Committee would be required for all construction works in Environmental Conservation Areas (ECAs).
- The construction of the new water tower would require Site Plan Approval and Building Permits, which is typical for all alternatives.

Archaeological Impacts

According to the completed Stage 1 & 2 archaeological assessment, Alternative '1' was evaluated to have low negative impact as the site was considered free of archaeological concern.

There were no previously identified, listed and/or designated cultural heritage resources within or adjacent to the site.

Environmental Impacts

Alternative '1' was evaluated to have low moderate negative environmental impact. Parts of the new elevated tank and the buried infrastructure would be located within NPCA regulated area. Tree clearing would also be required. Short term impacts can be mitigated through design and/or construction methods and timing.

Further consultation with NPCA and MNRF would be required during detailed design.

4.2.5 Alternative '2A' – Bowen Road and Sunset Drive

Social Impacts

Alternative '2A' was evaluated to have low moderate negative social impact, based on the following:

Short Term Impacts on Adjacent Land Uses, Commercial, or Business Operations During Construction

- Noise, dust, and restricted road access would occur during construction, particularly during installation of watermains and underground infrastructure between the elevated tank and the existing systems.

- The construction of this new elevated tank would have less negative social impact than the replacement of the existing Central Ave ET because it would be in a remote location, with less residents in the area
- Land acquisition would be required from a private landowner.
- No rezoning would be required

Long Term Impacts on Adjacent Land Uses, Commercial, or Business Operations

- The elevated tank would not have significant impact to local residents as it was located furthest away from existing residents compared to other alternatives
- The elevated tank will be visible on Queen Elizabeth Way (QEW).

Financial Impacts

- For Alternative '2A', it was estimated that the cost would be approximately \$11 to \$12 Million to acquire land, construct a new elevated tank, required watermains and overflow infrastructure
- Operation and maintenance costs were estimated at \$3-3.5 Million from now to 2041. The costs were calculated using the net present value of future operation and maintenance costs. The operation and maintenance costs included pump maintenance at Rosehill WTP, energy costs for the pumping station, repainting of the new ET every 15 years and inspection costs for the new ET. It was assumed that the staffing complement would remain the same in all scenarios. As such labour costs were not included operation and maintenance cost comparison.
- The alternatives cost estimates were included in Table 4.1 and Appendix D.

Technical Impacts

Alternative '2A' was evaluated to have low moderate negative technical impact for the following reasons:

Technical/Constructability Challenges

- The comparatively lower elevation (vs Alternatives 0, 1, and 3) would require a higher tank pedestal in order to match the hydraulic grade line of the existing Central Avenue ET.
- Hydraulic modeling revealed the following pressure conditions in the distribution system under various growth scenario timelines of 2021, 2031 and 2041. To be conservative and practical, the modeling was completed using the same low

operational water level as the Central Avenue Elevated Tank (i.e. 234.5 m). The high water level is 240.9 m at Central Avenue Elevated Tank⁴.

- During the peak hour demand scenario, both the ET and one (1) Rosehill WTP high lift pump (#3) were operational in order to meet the high flow demand. In conjunction with the new elevated tank locations, a larger 450 mm trunk watermain on Gilmore Road from Pettit Road to central Fort Erie would help with available fire flows and redundancy of supply to Town of Fort Erie
 - For 2021 under peak hour demands, the Alternative '2A' ET location improved the distribution pressure when compared with the existing system (Central Ave ET at 234.5 m water level and Stevensville Reservoir in operation) for the 2021 peak hour demand system. For the Alternative '2A' scenario only one node showed pressure that was less than 28 m (40 psi), which was the result of being at a small local, dead-ended watermain.
 - Under the 2031 peak hour demand scenario, two additional areas in Crystal Beach showed pressures below 28 m (40 psi) when compared with the new ET 2021 peak hour demand scenario. This was also drastically better than the existing system's 2031 peak hour demand scenario, which had about half of the Crystal Beach area and one third of Central Fort Erie area at less than 28 m (40 psi). As such, having the new ET at Alternative '2A' and 1 HLP on at Rosehill during the peak hour demand will significantly improve pressure in the system, albeit a few isolated areas would still have pressure less than 28 m (40 psi). Turning on a second HLP at Rosehill would help to alleviate this problem.
 - For 2041 peak hour demand scenario, when compared with new ET 2031 scenario, the previous area near Crystal Beach that had pressure below 28 m (40 psi) grew a bit larger. A small area around Miller's Creek Marina would also have a pressure below 28 m (40 psi), but likely due to it being a dead-ended watermain in that area. All other areas would have pressures between 28 m (40 psi) and 56 m (80 psi). Having the ET at Alternative '2A' also significantly improves the distribution pressure compared to existing system's 2041 peak hour demand scenario.
 - This was a common pattern for all shortlisted elevated tank alternative sites (Alternative 1, 2A, 2B, 3) when compared to the existing system's peak hour demand scenario.

⁴ Obtained from 2016 Master Servicing Plan Update by GM Blue Plan

- For the available fire flows during max day demand, the following observations were found, and were quite consistent for Alternatives 1, 2A, 2B and 3 given the close proximity of these locations.
 - Fire Flow: In 2021, regional watermains would be within acceptable fire flow ranges while some private and local watermains would have less than 50 L/s flow due to dead-ended watermains and/or smaller watermain size. When compared with the existing system, the new ET location would improve the fire flow in the system, particularly with the addition of larger trunk water main along Gilmore Road.
 - In 2031, there would be no significant difference in available fire flow when compared to Alternative '2A' under 2021 max day plus fire flow demands, but there would be improvement in available fire flow when compared with Alternative '0' – Do Nothing under the 2031 max day plus fire flow demands.
 - In 2041, a few areas would have fire flow less than 50 L/s around the Crystal Beach area when compared with Alternative 2A's 2031 max day plus fire flow demands, but there would be improvement in the available fire flow when compared with Alternative '0' – Do Nothing 2041 max day plus fire flow demands.
- There would be sufficient space for a new ET at the southern portion of the site, which would be outside of PSW and NPCA regulated areas
- The site would be located along the transmission watermain, making connections to the transmission watermain shorter and more economical.
- There was no existing storm or sanitary sewers nearby. An overflow pond would be required if the location was selected as the preferred alternative.
- No bedrock found within drilled depths, but there may be cobbles at 2.6 m below ground level⁵. Further geotechnical and hydrogeological investigation would be required if location is identified as preferred site.

Scheduling/Deadline Issues

- It is anticipated that the construction of the elevated tank would take six to twelve (12) months to complete, once design and approvals have been received. This is comparable to the construction timeframe for Alternatives '1' and '2B', and likely

⁵ Based on information obtained from 400 mm Watermain Geotechnical Investigation Borehole Logs, Geo-Canada, July 2007.

shorter than the replacement tank at Central Ave or new ET at Alternative '3' (for the watermain connection under the QEW).

Operational and Maintenance Complexity

- The required operation and maintenance for the elevated tank would be similar for Alternatives 1, 2A, 2B and 3. Elevated tanks supply the distribution system via gravity flow. Maintenance activities for elevated tanks may include the following:
 - Regular safety inspections and condition assessments.
 - Depending on chosen tank material, recoating of tank interior and/or exterior would be required every 15 to 20 years.

Approval Challenges

- Ministry of Transportation (MTO) consultation would be required since the location is within 800 m radius of the QEW.
- Work Permit would be required for construction works within the Niagara Peninsula Conservation Authority (NPCA) regulated area.
- Consultation with Town of Fort Erie's Environmental Advisory Committee would be required for all construction works in Environmental Conservation Areas (ECAs).
- The construction of the new water tower would require Site Plan Approval and Building Permits, which is typical for all alternatives.

Archaeological Impacts

Alternative '2A' was evaluated to have moderate negative impact. There might be potential for archaeological interests as there were thirty-one known archaeological sites within 300 m radius of the site and potential historical transport road within 100 m radius of the site.

If this site is selected as the preferred alternative, a Stage 2 archaeological assessment and cultural heritage impact investigation would be required.

Environmental Impacts

Alternative '2A' was evaluated to have low moderate negative environmental impact as the northern half of the property was part of a PSW Complex and NPCA regulated area and the north end of the site is within a deer wintering area, which was a Significant Wildlife Habitat.

Further consultation with NPCA and MNRF would be required.

4.2.6 Alternative '2B' – Bowen Road and Pettit Road

Social Impacts

Alternative '2B' was evaluated to have low moderate negative social impact, based on the following:

Short Term Impacts on Adjacent Land Uses, Commercial, or Business Operations During Construction

- Noise, dust, and restricted road access would occur during construction, particularly during installation of watermains and underground infrastructure between the elevated tank and the existing systems.
- The construction of this new elevated tank would have less negative social impact than the replacement of the existing Central Ave ET because it would be in a remote location, with less residents in the area
- Land acquisition would be required from a private landowner.
- No rezoning will be required.

Long Term Impacts on Adjacent Land Uses, Commercial, or Business Operations

- The elevated tank would not have significant impact to local residents as it was located furthest away from existing residents compared to other alternatives
- The elevated tank would be visible from the Queen Elizabeth Way (QEW).

Financial Impacts

- For Alternative '2B', it was estimated that the cost would be approximately \$13 to \$14 Million to acquire land, construct a new elevated tank, associated watermains, access road, site drainage and overflow infrastructure. This would be considered as high moderate negative economical impact.
- Operation and maintenance costs were estimated at \$3-3.5 Million from now to 2041. The costs were calculated using the net present value of future operation and maintenance costs. The operation and maintenance costs included pump maintenance at Rosehill WTP, energy costs for the pumping station, repainting of the new ET every 15 years and inspection costs for the new ET. It was assumed that the staffing complement would remain the same in all scenarios. As such labour costs were not included operation and maintenance cost comparison.
- The alternatives cost estimates were included in Table 4.1 and Appendix D.

Technical Criteria

Alternative '2B' was evaluated to have low moderate negative technical impact for the following reasons:

Technical/Constructability Challenges

- The comparatively lower elevation (vs Alternative 0, 1, and 3) would require a higher tank pedestal in order to match the hydraulic grade line of the existing Central Avenue ET.
- Hydraulic modeling revealed the following pressure conditions in the distribution system under various growth scenario timelines of 2021, 2031 and 2041. To be conservative and practical, the modeling was completed using the same low operational water level as the Central Avenue Elevated Tank (i.e. 234.5 m). The high water level is 240.9 m at Central Avenue Elevated Tank⁶.
- During the peak hour demand scenario, both the ET and one (1) Rosehill WTP high lift pump (#3) were operational in order to meet the high flow demand. In conjunction with the new elevated tank locations, a larger 450 mm trunk watermain on Gilmore Road from Pettit Road to central Fort Erie would help with available fire flows and redundancy of supply to Town of Fort Erie
 - For 2021 under peak hour demands, the Alternative '2B' ET location improved the distribution pressure when compared with the existing system (Central Ave ET at 234.5 m water level and Stevensville Reservoir in operation) for the 2021 peak hour demand system. For the Alternative '2B' scenario only one node showed pressure that was less than 28 m (40 psi), which was the result of being at a small local, dead-ended watermain.
 - Under the 2031 peak hour demand scenario, two additional areas in Crystal Beach showed pressures below 28 m (40 psi) when compared with the new ET 2021 peak hour demand scenario. This was also drastically better than the existing system's 2031 peak hour demand scenario, which had about half of the Crystal Beach area and one third of Central Fort Erie area at less than 28 m (40 psi). As such, having the new ET at Alternative '2B' and 1 HLP on at Rosehill during the peak hour demand will significantly improve pressure in the system, albeit a few

⁶ Obtained from 2016 Master Servicing Plan Update by GM Blue Plan

isolated areas would still have pressure less than 28 m (40 psi). Turning on a second HLP at Rosehill would help to alleviate this problem.

- For 2041 peak hour demand scenario, when compared with new ET 2031 scenario, the previous area near Crystal Beach that had pressure below 28 m (40 psi) grew a bit larger. A small area around Miller's Creek Marina would also have a pressure below 28 m (40 psi), but likely due to it being a dead-ended watermain in that area. All other areas would have pressures between 28 m (40 psi) and 56 m (80 psi). Having the ET at Alternative '2B' also significantly improves the distribution pressure compared to existing system's 2041 peak hour demand scenario.
- This was a common pattern for all shortlisted elevated tank alternative sites (Alternatives 1, 2A, 2B, 3) when compared to the existing system's peak hour demand scenario.
- For the available fire flows during max day demand, the following observations were found, and were quite consistent for Alternatives 1, 2A, 2B and 3 given the close proximity of these locations.
 - Fire Flow: In 2021, regional watermains would be within acceptable fire flow ranges while some private and local watermains would have less than 50 L/s flow due to dead-ended watermains and/or smaller watermain size. When compared with the existing system, the new ET location would improve the fire flow in the system, particularly with the addition of larger trunk water main along Gilmore Road.
 - In 2031, there would be no significant difference in available fire flow when compared to Alternative '2B' under 2021 max day plus fire flow demands, but there would be improvement in available fire flow when compared with Alternative '0' – Do Nothing under the 2031 max day plus fire flow demands.
 - In 2041, a few areas would have fire flow less than 50 L/s around the Crystal Beach area when compared with Alternative 2B's 2031 max day plus fire flow demands, but there would be improvement in the available fire flow when compared with Alternative '0' – Do Nothing 2041 max day plus fire flow demands.
- There would be enough space for a new ET outside of PSW and NPCA regulated areas
- The site would be located along the transmission watermain, making connections to the transmission watermain shorter and more economical.

- There was no existing storm or sanitary sewers nearby. An overflow pond would be required if the location was selected as the preferred alternative.
- Possible boulder previously reported at 4.1 m below ground level and possible groundwater level at about 4.5 m below grade⁷. Further geotechnical and hydrogeological investigation would be required if location is identified as preferred site.

Scheduling/Deadline Issues

- It is anticipated that the construction of the elevated tank would take six to twelve (12) months to complete, once design and approvals have been received. This is comparable to the construction timeframe for Alternatives '1' and '2A', and likely shorter than the replacement tank at Central Ave or new ET at Alternative '3' (for the watermain connection under the QEW).

Operational and Maintenance Complexity

- The required operation and maintenance for the elevated tank would be similar for Alternatives 1, 2A, 2B and 3. Elevated tanks supply the distribution system via gravity flow. Maintenance activities for elevated tanks may include the following:
 - Regular safety inspections and condition assessments
 - Depending on chosen tank material, recoating of tank interior and/or exterior would be required every 15 to 20 years.

Approval Challenges

- The property identified as the potential location of the elevated tank would need to be acquired from a private owner.
- Ministry of Transportation (MTO) consultation would be required since the location is within 800 m radius from QEW
- The construction of the new water tower would require Site Plan Approval and Building Permits, which is typical for all alternatives.

⁷ Based on information obtained from 400 mm Watermain Geotechnical Investigation Borehole Logs, Geo-Canada, July 2007.

Archaeological Impacts

- Alternative '2B' was evaluated to have moderate negative impact. There might be potential for archaeological interests as there were thirty-one known archaeological sites within 300 m radius of the site and potential historical transport road within 100 m radius of the site.
- If this site was selected as the preferred alternative, a Stage 2 archaeological assessment and cultural heritage impact investigation would be required.

Environmental Impacts

Alternative '2B' was evaluated to have low negative environmental impact as no environmental sensitivities were noted for the immediate ET construction area, although the property does have PSW and NPCA regulated area on the West and East sides.

4.2.7 Alternative '3' – Bowen Road and Laur Road

Social Impacts

Alternative '3' was evaluated to have low moderate negative social impact, based on the following:

Short Term Impacts on Adjacent Land Uses, Commercial, or Business Operations During Construction

- Noise, dust, and restricted road access would occur during construction, particularly during installation of watermains and underground infrastructure between the elevated tank and the existing systems.
- The construction of this new elevated tank would have less negative social impact than the replacement of the existing Central Ave ET because it would be in a remote location, with less residents in the area.
- Land acquisition would be required from a private landowner.
- No rezoning would be required.

Long Term Impacts on Adjacent Land Uses, Commercial, or Business Operations

- The elevated tank would have significant impact on a local resident, as the property is currently being used for agricultural purposes. If this was chosen as the preferred alternative, a real property value appraisal would be required for the land acquisition, as it was a functional farm.
- The elevated tank would be visible on Queen Elizabeth Way (QEW).

Financial Impacts

- For Alternative '3', it was estimated that the cost would be approximately \$11 to \$12 Million to construct a new elevated tank, access road, site drainage, required watermain crossing of the QEW and overflow infrastructure. The estimate excludes land acquisition cost as it could not be determined without an appraisal.
- Operation and maintenance costs were estimated at \$3-3.5 Million from now to 2041. The costs were calculated using the net present value of future operation and maintenance costs. The operation and maintenance costs included pump maintenance at Rosehill WTP, energy costs for the pumping station, repainting of the new ET every 15 years and inspection costs for the new ET. It was assumed that the staffing complement would remain the same in all scenarios. As such labour costs were not included operation and maintenance cost comparison.
- This would be considered as high moderate negative economical impact
- The alternatives cost estimates were included in Table 4.1 and Appendix D.

Technical Criteria

Alternative '3' was evaluated to have moderate negative technical impact for the following reasons:

Technical/Constructability Challenges

- The relatively high elevation of the terrain is an ideal location for the new elevated tank because it would minimize the height and cost of the tank pedestal, while allowing for comparable hydraulic grade line to the existing Central Avenue ET
- Hydraulic modeling revealed the following pressure conditions in the distribution system under various growth scenario timelines of 2021, 2031 and 2041. To be conservative and practical, the modeling was completed using the same low operational water level as the Central Avenue Elevated Tank (i.e. 234.5 m). The high water level is 240.9 m at Central Avenue Elevated Tank⁸.
- During the peak hour demand scenario, both the ET and one (1) Rosehill WTP high lift pump (#3) were operational in order to meet the high flow demand. In conjunction with the new elevated tank locations, a larger 450 mm trunk

⁸ Obtained from 2016 Master Servicing Plan Update by GM Blue Plan

watermain on Gilmore Road from Pettit Road to central Fort Erie would help with available fire flows and redundancy of supply to Town of Fort Erie

- For 2021 under peak hour demands, the Alternative '3' ET location improved the distribution pressure when compared with the existing system (Central Ave ET at 234.5 m water level and Stevensville Reservoir in operation) for the 2021 peak hour demand system. For the Alternative '3' scenario only one node showed pressure that was less than 28 m (40 psi), which was the result of being at a small local, dead-ended watermain.
- Under the 2031 peak hour demand scenario, two additional areas in Crystal Beach showed pressures below 28 m (40 psi) when compared with the new ET 2021 peak hour demand scenario. This was also drastically better than the existing system's 2031 peak hour demand scenario, which had about half of the Crystal Beach area and one third of Central Fort Erie area at less than 28 m (40 psi). As such, having the new ET at Alternative '3' and 1 HLP on at Rosehill during the peak hour demand will significantly improve pressure in the system, albeit a few isolated areas would still have pressure less than 28 m (40 psi). Turning on a second HLP at Rosehill would help to alleviate this problem.
- For 2041 peak hour demand scenario, when compared with new ET 2031 scenario, the previous area near Crystal Beach that had pressure below 28 m (40 psi) grew a bit larger. A small area around Miller's Creek Marina would also have a pressure below 28 m (40 psi), but likely due to it being a dead-ended watermain in that area. All other areas would have pressures between 28 m (40 psi) and 56 m (80 psi). Having the ET at Alternative '1' also significantly improves the distribution pressure compared to existing system's 2041 peak hour demand scenario.
- This was a common pattern for all shortlisted elevated tank alternative sites (Alternatives 1, 2A, 2B, 3) when compared to the existing system's peak hour demand scenario.
- For the available fire flows during max day demand, the following observations were found, and were quite consistent for Alternatives 1, 2A, 2B and 3 given the close proximity of these locations.
 - Fire Flow: In 2021, regional watermains would be within acceptable fire flow ranges while some private and local watermains would have less than 50 L/s flow due to dead-ended watermains and/or smaller watermain

size. When compared with the existing system, the new ET location would improve the fire flow in the system, particularly with the addition of larger trunk water main along Gilmore Road.

- In 2031, there would be no significant difference in available fire flow when compared to Alternative '3' under 2021 max day plus fire flow demands, but there would be improvement in available fire flow when compared with Alternative '0' – Do Nothing under the 2031 max day plus fire flow demands.
- In 2041, a few areas would have fire flow less than 50 L/s around the Crystal Beach area when compared with Alternative 3's 2031 max day plus fire flow demands, but there would be improvement in the available fire flow when compared with Alternative '0' – Do Nothing 2041 max day plus fire flow demands.
- There would be sufficient space for ET as the property did not have any PSW, NPCA regulated areas or environmentally sensitive areas
- The site is not located along the transmission watermain and separated by the QEW, which would make connection of the new watermain to the existing transmission watermain more difficult and more costly. Trenchless technologies should be considered for this work
- There is no existing storm or sanitary sewers nearby. An overflow pond would be required if the location was selected as the preferred alternative.
- Further geotechnical and hydrogeological investigation would be required if this location is identified as the preferred site, particularly along the watermain routing

Scheduling/Deadline Issues

- MTO approval for the watermain connection under the QEW may significantly impact the project schedule.
- Although the construction of the elevated tank would be comparable to Alternatives 1, 2A and 2B, the watermain connection could take longer

Operational and Maintenance Complexity

- The required operation and maintenance for the elevated tank would be similar for Alternatives 1, 2A, 2B and 3. Elevated tanks supply the distribution system via gravity flow. Maintenance activities for elevated tanks may include the following:
 - Regular safety inspections and condition assessments

- Depending on chosen tank material, recoating of tank interior and/or exterior would be required every 15 to 20 years.
- Maintenance of the watermain under the QEW would be very difficult, and as such will have to be designed for minimal maintenance and long lasting.

Approval Challenges

- The property identified as the potential location of the elevated tank will need to be acquired from a private owner.
- MTO approval will be required for the QEW-watermain crossing
- Ministry of Transportation (MTO) consultation would be required since the location is within 800 m radius from QEW
- The construction of the new water tower would require Site Plan Approval and Building Permits, which was typical for all alternatives.

Archaeological Impacts

- Alternative '3' was evaluated to have low moderate negative impact. There might be potential for archaeological interest as there were six known archaeological sites within 300 m radius of the site and potential historical transport road within 100 m radius of the site
- If this site is selected as the preferred alternative, a Stage 2 archaeological assessment and cultural heritage impact investigation would be required.

Environmental Impacts

Alternative '3' was evaluated to have low negative environmental impacts as no environmental sensitivity was noted.

Table shows the cost estimate for all the alternatives.

Table 4.1: Cost Estimates of Evaluated Alternatives

Description	Alternatives				
	0	1	2A	2B	3
Capital Cost	\$7,300,000	\$10,800,000	\$11,700,000	\$13,700,000	\$11,700,000 ⁹
Net Present Value of Operation and Maintenance	\$3,500,000	\$3,000,000	\$3,000,000	\$3,000,000	\$3,000,000
Total	\$10,800,000	\$13,800,000	\$14,700,000	\$16,700,000	\$14,700,000 ⁹
Population (2041)	41,258 ¹⁰	59,567 ¹¹	59,567	59,567	59,567
Cost Per Person	\$261.77	\$231.67	\$246.78	\$280.36	\$246.78 ⁹

Table 4.1 shows the summary of the evaluation of all the shortlisted alternatives.

Summary of Evaluation of Alternatives

Alternative '0' Do Nothing

Since this alternative did not address the problem and opportunity statement, it would not be a preferred alternative. However, it is helpful to use this as a basis of comparison for the other alternatives.

Alternative '1' – Bridge St & Pettit Road

Based on the above evaluation of having relatively low impacts on all criteria, this would be a preferred location for the new elevated tank.

Alternative '2A' – Bowen Road & Sunset Drive

Based on the above evaluation of having a mix of low and moderate negative impacts, this did not score as well as Alternative '1'. As such, it would not be recommended as the preferred location for the new elevated tank.

Alternative '2B' – Bowen Road & Pettit Road

Based on the above evaluation of having a mix of low and moderate negative impacts, this did not score as well as Alternative '1'. As such, it would not be recommended as the preferred location for the new elevated tank.

⁹ Excludes land acquisition costs. A cost appraisal would be required to determine the actual land cost. As such, Alternative 3's financial impact would be more negative than Alternative 2A, even though their totals were similar.

¹⁰ Current population: The alternative does not allow for population growth

¹¹ 2041 Population: New ET was sized to meet the storage requirements up to 2041

Alternative '3' – Bowen Road & Laur Road

Based on the above evaluation of having a mix of low and moderate negative impacts, this did not score as well as Alternative '1'. As such, it would not be recommended as the preferred location for the new elevated tank.

Evaluation Criteria	Alternative 0: Do Nothing	Alternative Site 1: Bridge Street & Pettit Road	Alternative Site 2A: Bowen Road & Sunset Drive	Alternative Site 2B: Bowen Road & Pettit Road	Alternative Site 3: Bowen Road & Laur Road
Social	- Zoned as Urban Residential; rezoning not required - Land is owned by Region; no land acquisition is required - Moderate aesthetic impacts to surrounding properties 	- Zoned as Industrial; rezoning not required - Land is owned by the Region, no land acquisition required - No aesthetic impacts to surrounding properties 	- Zoned as Agricultural; rezoning not required - Land privately owned; Owner has not been approached at this stage - No aesthetic impacts to surrounding properties 	- Zoned as Dry Industrial; rezoning not required - Land privately owned; Owner has not been approached at this time - No aesthetic impacts to surrounding properties 	- Zoned as Agricultural; rezoning not required - Land privately owned; Owner has not been approached at this time - No aesthetic impacts to surrounding properties 
Financial	- No capital costs for new ET and watermain - High operation cost due to need for additional pumping at the Rosehill WTP pumping station to compensate for insufficient storage - High maintenance cost due to increasingly frequent repair works - High capital cost for eventual replacement of existing Central Ave ET, refurbishment of Stevensville Reservoir & replacement of pumping station at end of useful life 	- Higher capital cost when compared with Alternative 0 - Compared to Alternatives 1, 2 and 3, lower capital costs anticipated related to land acquisition & overall ET height based on ground elevation - Compared to Alternative 3, lower capital cost for shorter watermain - Similar operation and maintenance lifecycle costs anticipated for all alternatives 	- Higher capital cost when compared with Alternative 0 - Compared to Alternative 1, higher capital costs anticipated related to land acquisition & overall ET height based on ground elevation - Compared to Alternative 3, lower capital cost for shorter watermain - Similar operation and maintenance lifecycle costs anticipated for all alternatives 	- Higher capital cost when compared with Alternative 0 - Compared to Alternative 1, higher capital costs anticipated related to land acquisition & overall ET height based on ground elevation - Compared to Alternative 3, lower capital cost for shorter watermain - Similar operation and maintenance lifecycle costs anticipated for all alternatives 	- Highest capital costs anticipated related to land acquisition & lowest overall ET height based on ground elevation - Highest capital cost for longer watermain - Similar operation and maintenance lifecycle costs anticipated for all alternatives 
Technical	- Will not satisfy the Problem & Opportunity Statement 4.8 Million Liters of storage deficit will have to be compensated by additional pumping from Rosehill WTP 	- Similar operations and maintenance effects - Similar improvements to water distribution system for pressure and fire flows - Close to an existing storm sewer for overflow and drainage of ET - Existing communications tower nearby – interruption of signals to be minimized - Bedrock likely, no groundwater, based on existing records of area. - Similar approvals anticipated to be required 	- Similar operations and maintenance effects - Similar improvements to water distribution system for pressure and fire flows - No nearby sanitary or storm sewer systems, stormwater pond required for overflow and drainage of ET - No bedrock or groundwater, cobble likely, based on existing records of area. - Similar approvals anticipated to be required 	- Similar operations and maintenance effects - Similar improvements to water distribution system for pressure and fire flows - No nearby sanitary or storm sewer systems, stormwater pond required for overflow and drainage of ET - Possible boulder and groundwater present, based on existing records of area. - Similar approvals anticipated to be required 	- Similar operations and maintenance effects - Slightly less improvements to water distribution system for pressure and fire flows - No nearby sanitary or storm sewer systems, stormwater pond required for overflow and drainage of ET - Crossing of the QEW is required for watermain connection; Approval from Ministry of Transportation will be required 
Archaeological	- Existing sites are already developed. - Likely no archeological interest - Like no cultural heritage impact 	- Stage 1 Assessment showed potential for archaeological interest – known water sources within 300m, potential historical transport road within 100m. - Stage 2 Assessment confirmed no archaeological sites of interest. - Cultural heritage evaluation report confirmed no cultural heritage resource 	- Stage 1 Assessment showed potential for archaeological interest – 31 known archaeological sites within 300m, potential historical transport road within 100m - Cultural heritage evaluation report confirmed no cultural heritage resource 	- Stage 1 Assessment showed potential for archaeological interest – 31 known archaeological sites within 300m, potential historical transport road within 100m - Cultural heritage evaluation report confirmed no cultural heritage resource 	- Stage 1 Assessment showed potential for archaeological interest – 6 known archaeological sites within 300m, potential historical transport road within 100m - Cultural heritage evaluation report confirmed no cultural heritage resource 
Environmental	No impact from natural environmental perspective 	- Moderate impact from natural environmental perspective, with mitigation measures required during design/construction - Northwest and south east parts of location lie within the boundary of the Provincially Significant Wetland Complex - Parts of location is an MNR Designated "wooded area" - A clearing within the interior of the site that could avoid regulated areas is planned to be used 	- Moderate impact from natural environmental perspective, with mitigation measures required during design/construction - Northern half of property is part of Millers Creek Provincially Significant Wetland Complex - Extreme north end of site is within a deer wintering area - General timing restrictions for vegetation clearing to protect migratory birds. 	No impact from natural environmental perspective 	No impact from natural environmental perspective 
Overall Conclusion	Alternative will not be carried forward. 	Alternative to be carried forward Recommended Alternative Site 	Alternative will not be carried forward. 	Alternative will not be carried forward. 	Alternative will not be carried forward. 

Table 4.2: Evaluation of Shortlisted Alternatives

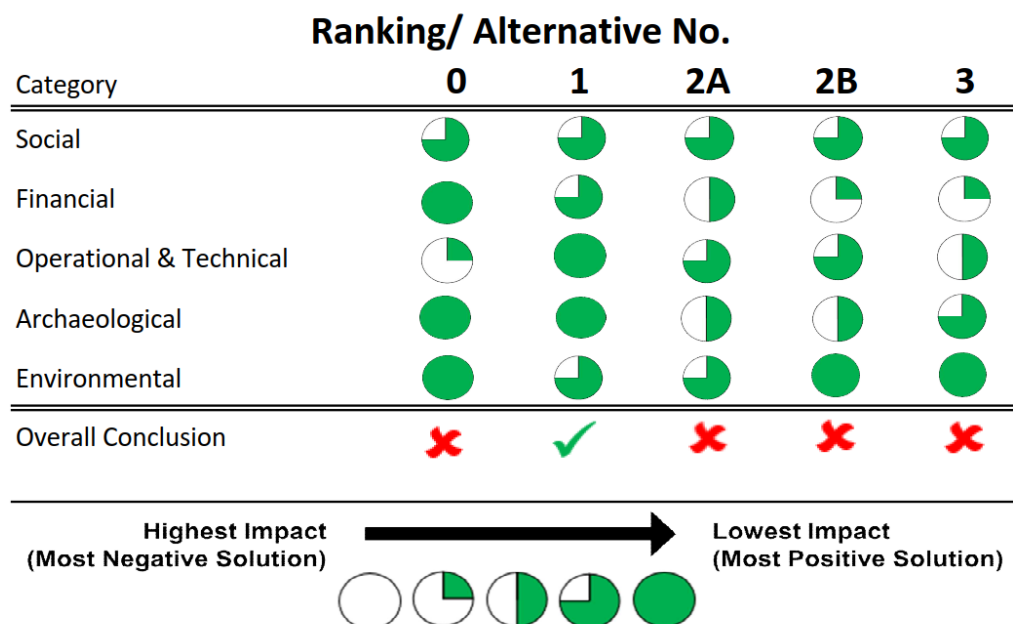


Figure 4.2: Summary of Alternatives Comparison

4.3 Preferred Alternative

Based on the evaluation of the location alternatives, Alternative 1 – Bridge Street and Pettit Road was selected as the preferred alternative for the new elevated tank. In addition, to the installation of a new 450 mm watermain along Gilmore Road from Pettit Road to central Fort Erie would help with available fire flows and redundancy of supply to the Fort Erie water distribution system. The reasons for this selection were as follows:

- Addresses the problem and opportunity statement regarding the ability to support the forecasted growth and optimization of the pumping strategy
- Improves both fire flow and pressure when compared to the existing Central Avenue ET
- Lowest capital cost compared to the feasible shortlisted alternatives
- Location already owned by the Region. No acquisition or easement would be required
- Environmental impacts would be low moderate and could be mitigated/compensated during design and construction
- No archaeological and cultural heritage impact
- Socio-economic impacts are low moderate, and have potential for mitigation

- Easier means of handling and discharging overflow from ET

The ET is proposed to be located at the north eastern portion of the property in order free up the southern part for other development and to avoid the PSW area.

Figure 4.3 shows the map of the preferred ET location alternative.

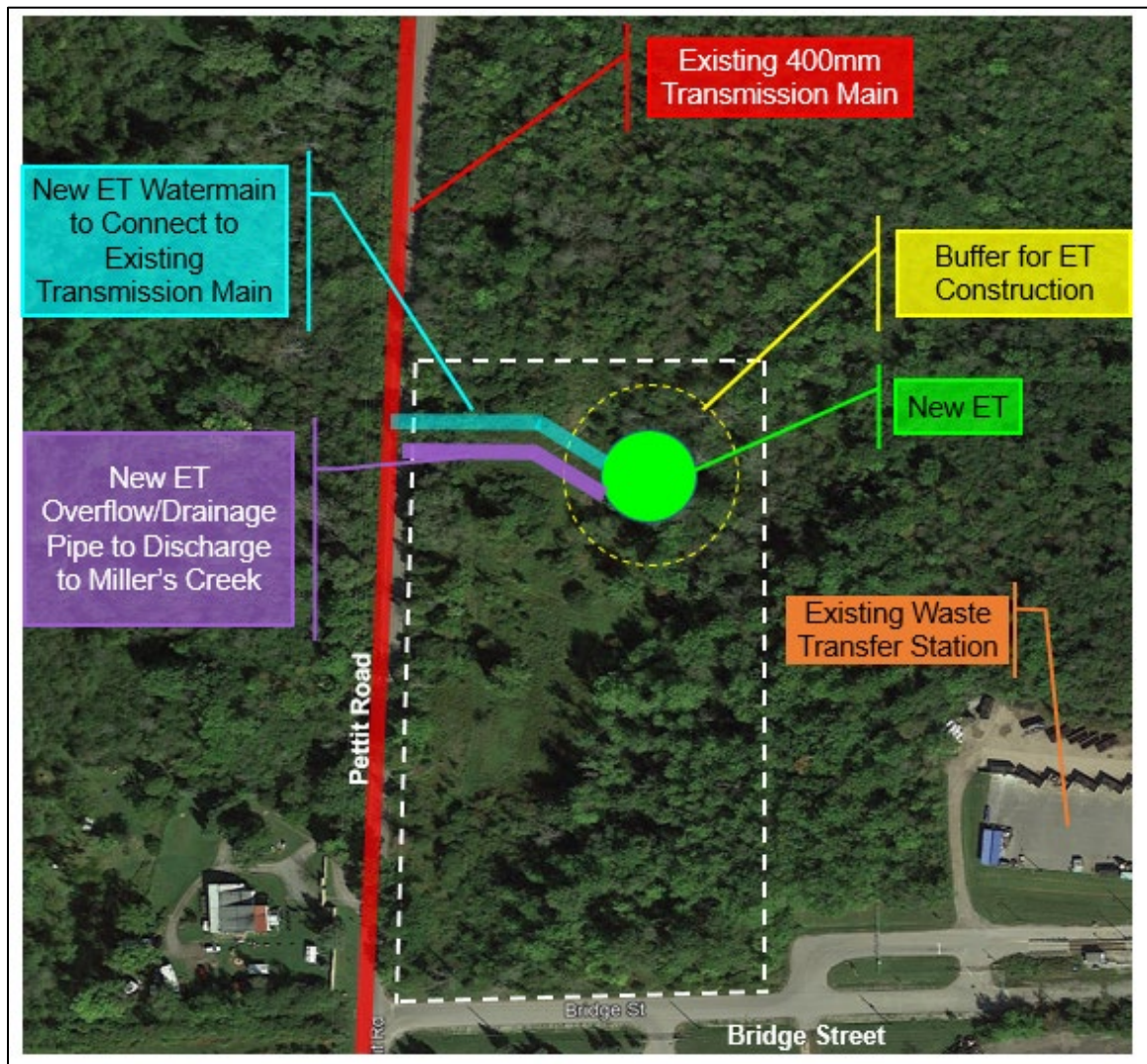


Figure 4.3: Map of Preferred ET Location Alternative

Figure 4.4 shows the artistic rendition of the new elevated tank in Alternative '1' when looking north on Pettit Street.



Figure 4.4: Artistic Rendition of ET in Alternative 1

With the selection of the preferred alternative of a new elevated tank and watermain upgrades on Gilmore Road, it is important to confirm the Class EA schedule for each project.

Based on the Municipal Class EA document, the preferred alternatives have been identified as follows:

Table 4.3: Confirming Class EA Schedule of Preferred Alternative

Project	Class EA Schedule	Description of Permitted Activity
New Elevated Tank	Schedule B	Establish new or expand/replace existing water storage facility
Gilmore Road watermain upsizing	Schedule A+	Establish, extend or enlarge a water distribution system and all works necessary to connect the system to an existing system or water source, provided that all such facilities are in either an existing road allowance or an existing utility corridor, including the use of Trenchless Technology for water crossings

4.4 Environmental Considerations

As part of the Class Environmental Assessment, environmental sensitivities were considered as part of the work, including but not limited to the following:

- Portions of the preferred location are part of the Miller's Creek PSW Complex. PSW are also referred to as Environmental Protection Areas (EPA). The Regional Official Plan (ROP) does not permit any development or site alteration within the PSW.
- Parts of the property is also designated as Environmental Conservation Area (ECA) associated with Significant Woodlands. The ROP permit development or site alteration within or adjacent to Significant Woodlands provided no negative impact can be demonstrated. According to the Region, its Woodland By-Law permitting requirements currently exempts tree removals for municipal purposes for permitting purposes.
- Parts of the property falls in the Niagara Peninsula Conservation Authority (NPCA) regulated areas as they are within 30m of the PSW boundaries. In terms of Ontario Regulation 155/06, an NPCA Work Permit is required for any construction works within the regulated area.

A summary of the Natural Environment Assessment report is found in Section 5.3 of this report. The full Natural Environment Assessment report is in Appendix G.

4.5 Mitigation Measures

4.5.1 Environmental Protection and Conservation Areas

The Environmental Protection Areas (EPA) are areas where development or site alterations are not permitted by the Niagara Peninsula Conservation Authority (NPCA). The EPA are located at the northwestern and southeastern parts of the preferred alternative location. Therefore, the ET is proposed to be located at the northeastern corner to completely avoid the Environmental Protection Areas.

However, the access road, watermain and storm sewer construction will unavoidably encroach on the designated Environmental Conservation Area (ECA) and the NPCA regulated area. This is due to the following reasons:

- Avoiding the PSW areas result in encroachment into the Woodland
- The Region would like to keep the southern portion of the property undisturbed as there was significant woodland and PSW there, as well as possibility for future development

The following mitigation measures were taken:

- The proposed elevated tank location within the preferred Alternative '1' site, was chosen to avoid PSW
- The proposed elevated tank location within the preferred Alternative 1 site, was chosen to minimize the amount of tree removal that would need to occur. However, some tree removal within the property will be required.
- The environmental impact assessment completed on the property confirmed that there were no butternut trees or other species of concern within the property
- Coordination with the Region and Town of Fort Erie should be undertaken during detailed design for tree removal

The final site plan should consider minimizing tree removal. A Tree Saving/Replanting Plan should also be developed during detailed design.

4.5.2 Traffic Control

The construction of the watermain and overflow/drainage pipe will take place within the existing right-of-way. Work within the road and right-of-way will require traffic control measures to ensure access for vehicles and pedestrians during the disruption. Limited pedestrian traffic is anticipated on this rural road.

4.5.3 Dust, Noise and Vibration

The operation of construction equipment could create temporary, undesirable noise and vibration impacts to adjacent properties. Although bedrock was reported within 3.4 m below grade, the watermain and storm sewers should be located above this depth, which would minimize the amount of excavation in rock. In addition, the bedrock would be suitable foundation for the elevated tank, and as such, a large amount of rock excavation is not expected.

Construction work hours should abide by the Region/Town's noise by-laws to minimize disturbance to property owners between evening and early morning hours.

Erosion and sedimentation control plans would be required from the Contractor, with silt fence around the perimeter of the work area to minimize impacts to the nearby waterways and wetlands. Mud mats and washdown of construction vehicles prior to leaving the site would help to minimize mud and dust leaving the construction site.

4.5.4 Monitoring Objectives

It would be recommended that the Niagara Region and its representatives develop a monitoring program to ensure all mitigating measures are being implemented as required. Input from review agencies, including the Niagara Peninsula Conservation Authority, Ministry of the Environment, Conservation and Parks, Town of Fort Erie Environmental Advisory Committee and Ministry of Natural Resources and Forestry may be beneficial to program.

The objectives of the monitoring program should include, but not be limited to, the following:

- Abiding by the terms of the Work Permit for works within the regulated area and the Tree Saving/Replanting Plan
- Reviewing proposed construction methods and temporary facilities with respect to their ability to implement the stated mitigation measures.
- Liaising with area property owners to ensure compliance with noise restrictions, working hours, and accommodation of vehicular and pedestrian traffic

The Contractor performing these works would be ultimately responsible for implementing all required mitigating measures. However, the objective of the Niagara Region and its representatives should be to monitor these efforts.

4.6 Considerations for Climate Change

As per the new regulations set out by the Ministry of the Environment, Conservation and Parks (MECP) in December 2017, climate change shall be considered during the Class EA process.

The preferred alternative of the new elevated tank would provide improvement to greenhouse gas emissions by consolidation of the existing two storage facilities into one larger storage facility, and therefore eliminate the Stevensville PS, which would reduce energy and maintenance requirements.

For the water storage preferred alternatives mitigation/adaptation was considered during the selection of the preferred solutions as follows:

- Best practices for climate change would be considered during the design to mitigate the impact of the new elevated tank, and associated infrastructure. For example, water and energy reducing features would be incorporated into the design (e.g. energy efficient lighting systems).

- Best practices for structural building requirements to accommodate extreme weather would be incorporated to the elevated tank design (e.g. wind and snow load on elevated tank).
- The construction timing windows would be scheduled to mitigate the negative impacts on local vegetation, and native species.
- Tree clearing would be minimized as much as possible, and trees would be replanted in the same or nearby locations to reduce impacts on the local vegetation and hydrogeology, as well as carbon sequestration/storage.
- The location alternative minimizes the overall impact to the environment in terms of the infrastructure required to connect the systems – minimal extension length for new watermain required and elevated tank can use existing watermain.
- Climate change is not anticipated to have a large effect on the operation, decommissioning, or post-closure of the tank. The preferred location of the elevated tank is at a point of high elevation in Fort Erie, which would reduce the risk of flooding, etc. from local water bodies. As mentioned, a stormwater management plan would be developed during design and would account for changes in severity of storms.

4.7 Public Consultation for Location Alternatives

The focus of the public consultation and Public Information Centre was to present the problem and opportunity statement, list of location alternatives, key information, the evaluation criteria, and the evaluation results to the interested public for input.

4.7.1 Notice of Public Information Centre

The Notice of Public Information Centre was mailed to interested public and agencies on October 18, 2019. The notice was also published on the Niagara Region's website as well as various newspapers including the Fort Erie Observer of October 31, 2019 and The Fort Erie Post on October 31, 2019 and November 7, 2019.

The notice advised of the Class EA status and provided a list of the location alternatives being considered. The notice advised of the date, time, and location for the November 13, 2019 PIC, and that questions and comments on this project should be submitted to the Niagara Region or R.V. Anderson Associates Limited.

Samples of the notice and the stakeholders list are provided in Appendix B.

4.7.2 Public Information Centre

On Wednesday, November 13, 2019 a PIC was held at the Town Hall Atrium located at 1 Municipal Centre Drive in Fort Erie, Ontario. The PIC presented the problem and opportunity statement, list of location alternatives for the new ET, key information, the evaluation criteria, and the evaluation results. The PIC was held between 6 p.m. and 8 p.m. and the Region staff and members of the consulting team received and responded to questions and comments from the public.

A total of six (6) citizens attended the PIC and one (1) comment sheet was received from the public. Copies of the display materials, comment sheet and sign in sheet of the PIC are provided in Appendix B.

4.7.3 Public Comments and Input

A summary of the comments/responses received from the Public are summarized in the table below:

Table 4.4 – Public Comments Received & Responses

Comments Received	Resolution / Response / Action Taken
Please try to make a deal with the Town of Fort Erie to supply this area of Pettit Road with water service.	Although there is a trunk water main on Pettit Road, it is not usual Region/Town practice to allow for local connections to the trunk watermain. However, the request for connection was passed on to both the Region and Town of Fort Erie to be considered and addressed as a special case.
Provide the artistic renderings of the ET when viewed from Pettit Road	PIC panel already included the artistic rendering of the ET viewed from Pettit Road. A copy of the PIC panels was sent to the member of the public through both email and regular mail.

4.7.4 Agency Comments and Input

Ministry of the Environment, Conservation and Parks (MECP)

The MECP provided input on the following items which were considered during the Class EA process. Correspondence with the MECP dated June 6, 2019 can be found in Appendix C:

- First Nations Consultation
 - MECP provided a list of First Nations who could potentially be affected by the project and must be consulted during the Class EA process

- Direct notification should be sent to the Aboriginal peoples who may be affected by the project and an opportunity to participate in any planned public consultation should be provided.
- Description of steps that need to be taken in relation to Aboriginal consultation and further steps to be taken if serious issues are encountered after consultations with the communities

The MECP provided list was checked and cross referenced with the project stakeholders list to ensure that all the listed First Nations were contacted. The following table shows the list of First Nations that were on the project's stakeholders list and who were contacted at the project commencement stage.

Table 4.5: Follow Up Action from MECP Input

First Nation	On Original Project Stakeholder List	On MECP Provided List	Comments/Follow Up Action
Six nations of the Grand River Territory	Yes	Yes	Two of the three contacts provided by MECP were on project stakeholders list. MECP also provided previously unknown email addresses of all the contacts. List was updated to add the third contact and email addresses of all three contacts. Notice of Commencement was also emailed to the contacts on June 7, 2019.
Assembly of First Nations	Yes	No	None
Haudenosaunee Confederacy	Yes	Yes	A new contact with an address was provided by the MECP and the stakeholders list was updated accordingly. Notice of Commencement was mailed to the new contact on June 7, 2019. Subsequent project notices were also sent to them.
Ontario Native Affairs Secretariat	Yes	No	None
Association of Iroquois and Allied Indians	Yes	No	None

First Nation	On Original Project Stakeholder List	On MECP Provided List	Comments/Follow Up Action
Mississaugas of the Credit First Nation	Yes	No	None
Niagara Region Metis Council	Yes	No	None
Metis nation of Ontario	Yes	No	None

Canadian Environmental Assessment Agency (CEAA)

The CEAA provided information on determining whether the project is subject to a federal environmental assessment, requiring the involvement of federal authorities. The CEAA further advised that they should be removed from the project's distribution list if the project will not be a subject of federal environmental assessment.

After a review of the Canadian Environmental Assessment Act, 2012 and its Regulations, it was concluded that the project was not subject to federal environmental assessment. The CEAA was subsequently removed from the project's stakeholders list.

Nav Canada

Nav Canada advised that it has no objection to the project. It also requested to be notified of the completion of construction in order to maintain up-to-date aeronautical publications.

Nav Canada further advised that it received confirmation that the nearby airport runway has fallen into disrepair and no longer in use from Magellan Canada who owns the property where the runway is located.

The land use evaluation carried out by Nav Canada is only valid for 12 months. A new evaluation may be required during the detailed design.

Transport Canada

An aeronautical assessment for obstacle evaluation was carried out by Transport Canada.

Transport Canada advised that no marking and lighting would be required on the new ET.

Niagara Peninsula Conservation Authority

MECP was contacted for their input on possible discharge of dechlorinated overflow from the ET into the nearby Miller's Creek.

Niagara Region Planning and Development Services

The Environmental Planning Department of Niagara Region provided input on the following:

- Environmental concerns in all location alternatives
- Restrictions and permitting requirements for works in EPA and ECA
- Suggested further consultations with MECP and NPCA

The input from the Niagara Region Planning and Development Services was considered during the evaluation of location alternatives and location of the ET within the preferred location.

Town of Fort Erie

The Town of Fort Erie provided the following inputs:

- Need to consult Town's Environmental Advisory Committee if woodland will be disturbed and developments in ECA

4.7.5 First Nations Communication

On May 1, 2019, a letter was sent to First Nations notifying them of the commencement of the EA process. The Notice of Commencement, as described in the earlier sections of this report, was sent with the letter.

A letter was also sent on October 31, 2019 to the First Nations inviting them to the Public Information Centre (PIC) that held on November 13, 2019. The Notice of the PIC was sent with the letter.

Samples of the letters, stakeholders lists and display materials are provided in Appendix B.

Additionally, specific input from Mississaugas of the Credit First Nation was received. Detailed correspondences with them are provided in Appendix B.

Mississaugas of the Credit First Nation

The Mississaugas of the Credit First Nation (MCFN) advised that it does not have a high level of concern on the project. It further requested that a Field Liaison Representative (FLR) employed by the MCFN must be on site whenever any environmental and archaeological fieldwork are being carried out.

The project team advised that the fieldworks had already been completed before the receipt of the letter. However, the team made the final reports of the studies available to the MCFN.

4.7.6 Utilities

Several utilities were contacted through Ontario 1 Call to determine the presence of any assets at the preferred alternative.

The following table shows the contacted utilities and the confirmed assets on both the Pettit Road and Bridge Street.

Table 4.6: Details of Existing Utilities on Pettit Road and Bridge Street

Utility	Description
Enbridge Gas	No response was received
Niagara Region	400 diameter watermain on Pettit Road
Town of Fort Erie	None
Niagara Regional Broadband Network	No response was received
Bell Canada	Cables, conduits and pedestals
Canadian Niagara Power Inc.	Fibre optic cable, overhead power lines on Pettit Road

Furthermore, the Region provided a list of utilities that had infrastructure mounted on the existing Central Avenue Tank, which would be decommissioned after the new ET is completed. The utilities were contacted to obtain their comments on how the change of ET location may impact their business operations. They were also invited to the PIC to provide them an opportunity to provide input and seek any clarification.

The following table shows the details of the communications.

Table 4.7: Details of Communication with Utilities with Leases for Existing ET

Utility	Comments
Rogers	Comments Received. Details is shown in Appendix C
Freedom Mobile	No response received for initial and follow up emails
Bell Mobility	Comments Received. Details is shown in Appendix C

5.0 RELATED STUDIES AND INVESTIGATIONS

Numerous supporting investigations and studies were carried out on the alternatives and have contributed to this Class EA. The section below summarized the related studies.

5.1 Archaeological Study

A Stage 1 archaeological assessment was carried out in all the evaluated alternatives. Stage 2 archaeological assessment was then carried out in Alternative '1' after its selection as the preferred alternative.

The Stage 1 archaeological assessment concluded that Alternatives '1' and '3' have archaeological potential for both historical and precontact sites. The following specific conclusions were reached for Alternative '1':

1. There were no registered or known archaeological sites within 300 metres of the site
2. There was a known water source within 300 metres of the site (Miller Creek).
3. There was a potential historic transportation road (Pettit Road) within 100 metres of the site
4. There were no identifiable features such as elevated topography, sandy pockets of soil, or resource areas within or near the site.

However, the Stage 2 assessment concluded that the site was free of any archaeological concern.

The Stage 1 and 2 archaeological assessment reports Report can be found in Appendix E.

5.2 Cultural Heritage Impact Study

A cultural heritage impact study was conducted in all the evaluated alternatives.

For Alternative '1', the Cultural Heritage Evaluation found that Pettit Road was an important historical transportation route but the significant industrial development around the area coupled with the improvements to the road itself have removed it from its historical context. The evaluation found that the stone farmhouse laneway pillar located at the southwest intersection of Pettit Road and Bridge Street was the only remnant of a heritage landscape around the location but concluded that it no longer retained significant cultural heritage value since the surrounding historical context had been removed.

The report concluded that there were no previously identified, listed and/or designated cultural heritage resources within or adjacent to the project area and as such, the site also did not hold any further cultural heritage value of interest.

5.3 Natural Environmental Investigation

A natural environment investigation was carried out in all the evaluated alternatives to evaluate the potential impacts of the project on natural heritage.

The following are the conclusions of the investigation:

1. No plant Species at Risk were found during the botanical investigations
2. There were 27 species of wildlife that could be verified as occurring in the project area (all location alternatives) based on field observations.
3. 25 bird species of birds were observed at all location alternatives. Some 'species at risk' wildlife species were recorded in the area but the project has a low likelihood of having a negative effect on them.
4. Portions of the preferred location are subject to Ontario Regulation 155/06 NPCA Regulation Development Interference with Wetlands and Alterations to Shorelines and Watercourses. A permit from the NPCA would be required during the detailed design.
5. Construction of the elevated tank, access road and other infrastructure in Alternative '1' will not affect any species regulated under the Endangered Species Act will be affected by the project although further detailed studies may be required to confirm whether additional species at risk are using the site.
6. Construction of the elevated tank, access road and other infrastructure in Alternative '1' will have no effect on the species listed under Schedule 1 of

Species at Risk Act. Further consultations with Department of Fisheries and Oceans (DFO) and Ministry of Natural Resources and Forestry (MNRF) may be required if any additional species at risk are encountered during the subsequent stages of the project.

7. There are no Areas of Natural and Scientific Interest (ANSI) within 120 m of the study area.
8. A fish and fish habitat survey was recommended to be conducted during the detailed design to determine if the construction of the elevated tank and other infrastructure would have any impacts on the watercourse.
9. The potential effects on aquatic features, vegetation and wildlife as well as mitigation measures are detailed the Natural Heritage Report in Appendix G.

5.4 Geotechnical and Hydrogeological Investigations

A geotechnical and hydrogeological investigation was undertaken at Alternative '1'.

Two (2) boreholes were drilled at the proposed elevated tank and watermain location sites. The following were the findings:

- Existing fill materials were found to be unsuitable for supporting foundations of the proposed elevated tank. The foundation of the tank can, however, be supported on the sound bedrock located about 3.4 m below existing grade. The bedrock that was encountered was characterized as medium strong to very strong dolostone and very strong in the rock's axial direction.
- All topsoil, fill materials and disturbed or other objectionable material must be removed from excavation base prior to placement of watermain pipe bedding. Soils excavated from the site should only be used for on-site backfill and should not be reused if transported off site because the soil Table 1 (background) sodium adsorption ratio (SAR) ration, but the soils did not exceed Table 3 (residential/park/institutional property use for coarse-grained soils).
- Native soils encountered at the site are capable of providing adequate support for the watermains using conventional Class "B" bedding. The recommended minimum thickness of granular bedding below the invert of the pipes is 150 mm where the subgrade consists of competent native soils.
- An allowable bearing resistance at SLS of 100 kPa and factored bearing resistance at ULS of 150 kPa can be used in the design of thrust blocks constructed at a depth of 1.2 m or deeper on undisturbed native soils.
- For seismic consideration, Site Class B may be used for the design

- Composite Samples analyzed for Toxicity Characteristic Leaching Procedure (TCLP) indicated that all parameters analyzed were within Ontario Regulation 347 as amended and thus non-hazardous.
- The evaluation of the sulphate (SO₄) resistance of the concrete in contact with the soil indicated that the sulphate concentration in the tested soil sample was less than 20mg/kg or 20ppm or 0.0020%. The category of severity of attack is “negligible” based on CSA Standard CAN/CSA-A23.1, Concrete Materials and Methods of Concrete Construction.
- The soil tested for corrosivity potential shows that the sample poses low potential for corrosion of ductile iron pipe. This would not be a concern as PVC watermain would likely be installed outside and stainless steel pipes would be installed inside the concrete pedestal and tank.
- The upper bedrock is very permeable and will require significant dewatering to control groundwater if excavations extend into this unit. The surficial clay till unit has a low permeability and will not require groundwater control. The elevated tank foundation will be founded on the bedrock at about 3.3 meter below ground surface (mBGS). The depth of the watermain is also expected to be a maximum of 2 mBGS. All excavation above 2.67 mBGS is expected to be above groundwater table.
- There are a significant number of contamination sources nearby that could be mobilized and drawn into the excavation if significant dewatering is needed.
- The site currently has low concentrations of VOC and phenols in the groundwater. The concentrations are generally low, but definitely above background. The source is not known at this time. This will need to be addressed through further Environmental Site Assessments (ESA) during detailed design.
- Treatment of groundwater may be required before it can be discharged to the environment.

6.0 ENHANCED CONCEPTUAL DESIGN

The sections below describe in detail the design concepts for the elevated tank to be located at the preferred alternative.

In Phase 2, of the Class EA, possible location alternatives of the new elevated tank were identified and evaluated in Section 4.2. The location “Alternative 1 – Bridge Street and Pettit Road was selected as the preferred location alternative for the reasons outlined in Section 4.3.

The enhanced conceptual design includes confirmation of the storage volume, preferred elevated tank type and possible site layout for the elevated tank, and associated watermain as well as the access road.

6.1 Design Criteria Assumptions

The following design criteria were used:

- Population growth projections obtained from the Niagara Municipal Comprehensive Review and the Planning Department
- Residential Average Day Demand: 300 L/c/d
- Employment Average Day Demand: 300 L/c/d
- Maximum Day Factor: 1.54¹²
- Maximum Pressure in Distribution System: 700 kPa (100 psi)¹³
- Minimum Pressure in Distribution System: 275 kPa (40 psi)¹³
- Minimum Pressure along regional trunk main: 345 kPa (50 psi)
- High Water Level (HWL): 241 m (similar to existing Central Ave ET)

6.2 Tank Sizing

According to Ministry of the Environment, Conservation and Parks (MECP) guidelines, it is recommended that water supply systems provide sufficient storage for equalization of

¹² GM BluePlan – 2016 Master Servicing Plan Update Volume 3

¹³ Ministry of the Environment and Climate Change, Design Guidelines for Drinking Water Systems, 2008

peak hours, firefighting, and emergency conditions. More specifically, the water storage volume for a community should be calculated using the following formula:

$$\text{Total Treated Water Storage Requirement} = A + B + C$$

Where: A = Fire Storage;

B = Equalization Storage (25% of maximum day demand); and

C = Emergency Storage (25% of A + B)

Fire Storage (A) is calculated based on theoretical fire flows over an estimated duration that the fire would require water. Charts and equations to calculate the fire flows and recommended duration are available in the MECP Design Guidelines for Drinking Water Systems. Based on the equivalent population of the area, the theoretical fire flow of 378 L/s for a duration of 6 hours was used to calculate the required fire storage volume. This resulted in a fire storage volume of 8,160 m³.

Equalization Storage (B) is calculated as 25% of the maximum day demand. This storage allows for the fluctuation in water demand throughout the day. The maximum day demand of 27.6 MLD was used in this calculation to obtain a volume of 6,890 m³.

Emergency Storage (C) is calculated as 25% of the sum of the Fire Storage (A) and Equalization Storage (B). This storage accounts for unexpected issues that may arise in the water system, such as a watermain break or equipment failure.

The following calculation show storage volume required based on MECP guidelines.

A	= 378 L/s x 6 hour	= 8,160 m ³
B	= 25% x 27,600 m ³	= 6,890 m ³
C	= 25% (8,160 m ³ + 6,890 m ³)	= 3,760 m ³
TOTAL		= 18,820 m ³

The calculated storage is applicable to the entire Fort Erie system. The following shows the details of the existing system storage:

- Rosehill Water Treatment Plant: 11,700 m³
- Central Avenue ET: 1500 m³
- Stevensville Reservoir: 1900 m³

However, Central Avenue ET and Stevensville Reservoir would be decommissioned and will not be considered as part of existing storage capacity. Therefore, the total required water storage requirement for the new ET is 7,120 m³. The Master Servicing Plan

prepared GM BluePlan recommended 8,000m³ storage volume. The operational requirements for both tank volumes are comparable, hence the size of the ET is proposed to be 8,000 m³.

Table 6.1 below shows the design parameters for the elevated tank.

Table 6.1: Design Parameters

Design Parameter	Value
Total Volume (usable) ¹⁴	8,000 m ³
Tank Bottom Elevation ¹⁴	226 m
High Water Level	241 m
Overflow Level	241.3 m
Tank Diameter (Approximate)	29 m
Pedestal Diameter (Approximate)	14 m
Pedestal Height (Approximate)	40 m
Tank Height, including roof (Approximate)	16 m
Total Tank Height (Approximate)	56 m
Incoming/Outgoing Watermain Diameter	400 mm/450 mm

6.3 Tank Material

There are currently two general styles for elevated tanks constructed in Ontario. They are Composite Welded Steel and Composite Bolted Glass-Lined Steel. Both are composite which means they use a concrete pedestal holding up a steel storage tank. Both types of tanks are typically delivered using design-build construction contracts. The Composite Welded Steel tanks have been used in numerous applications that required large tanks of 7,000 – 8,000 m³, and beyond. Meanwhile, the composite bolted glass-lined steel tanks are starting to get into the larger tank sizes as well.

The major consideration for composite welded steel tank construction is that the steel tank portion needs to be coated internally and externally, and the coatings need to be maintained and re-applied typically every 15 to 20 years. The costs to refurbish an elevated tank have risen significantly, mainly due to the need for environmental controls, to prevent dispersion of dust and overspray. The recoating process would take the facility out of service for 6-10 months. However, in Ontario, most of the current elevated tanks to date have been composite welded steel tanks as they have reasonable dimensions and appearance and are generally the least expensive to construct. Overall, they are a tried and proven type of elevated water storage facility.

¹⁴ Design intent for tank is to have a minimum of 40psi at the lowest point in the tank so that entire usable volume can be used for equalization, emergency and fire as required.

Currently, there is only one main manufacturers/installer for the Composite Welded Steel and one to two main manufacturer/installation of Composite Bolted Glass-Lined Steel Tanks in Canada.

Further evaluation of the tank type (Composite Welded Steel vs Composite Bolted Glass-Lined Steel) or the consideration of allowing either style, would have to be done during detailed design.

7.0 NEXT STEPS AND SCHEDULE

As per the Municipal Class EA Process, Phase 2 of the Schedule B Class EA includes the issuance of the Notice of Completion, the filing of this Project File Report and a minimum 30-day public review period. Given the COVID-19 pandemic situation, the Region has chosen to extend the public review period to 45 days to allow for a longer consultation period.

During the 45-day review period, the public and agencies can provide comments on the presented information. Questions and concerns are to be addressed to the Region, which will be addressed during the public review period.

Based on the COVID-19 Economic Recovery Act, that was passed by the Province of Ontario on July 21, 2020, a Part II Order request may be made to the Ministry of Environment, Conservation and Parks (MECP) for an order requiring a higher level of study (i.e. requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies). This is only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name for the ministry.

Part II Order requests regarding Aboriginal and treaty rights should specify what kind of order is being requested (request for additional conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy those potential adverse impacts, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request.

Provided that no Part II Order requests are made to the Minister within the public review period, the project is approved and may proceed to detailed design, construction, operation and monitoring, if specified, for adherence to environmental provisions and commitments.

Further geotechnical, environmental and archaeological investigations may have to be undertaken as part of the design process.

The design and construction of the various components may occur in phases, pending council approval, agency approval and available funding.

Table 7.1: Next Steps and Schedule

Activity	Planned Completion Date
Completion of Class EA	Fall 2020
Detailed Design	2021
Construction of ET	2022-2023
Decommissioning of existing Central Avenue Elevated Tank and Stevensville Reservoir	2023 onwards

8.0 REFERENCES

Town of Fort Erie - "Comprehensive Zoning By-law No. 129-90,"

Regional Municipality of Niagara, "Consolidated Regional Official Plan," 2014.

Municipal Engineers Association, "Municipal Class Environmental Assessment", October 2000, amended 2015.

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Geo-Canada Ltd. - 400mm Eagle Street Watermain – Borehole Logs