Town of Erin
Urban Centre Water Servicing

Schedule B
Class Environmental Assessment

Project File Report

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Section 1: Introduction

1.1 Introduction

The Corporation of the Town of Erin (Town) initiated the Urban Water Servicing Municipal Class Environmental Assessment (Class EA)in May 2015 to evaluate potential solutions to address water supply and storage deficiencies for both existing development and future growth scenarios for the two urban centres of Hillsburgh and Erin Village (project), as identified in the Servicing and Settlement Master Plan (SSMP) that was completed by B.M. Ross and Associates in August 2014 for the Town. The Class EA process follows the procedures set out in the Municipal Class Environmental Assessment document, dated October 2000, and as amended in 2007, 2011 and 2015. Triton Engineering Services Limited (Triton) was retained to administer the Class EA on behalf of the Town. The purpose of this Project File Report (herein referred to as Project File or Report) is to document the Class EA planning and evaluation process followed for this project.

This Report includes the following major components:

- An overview of the general project/study area and environmental setting.
- A summary of the infrastructure deficiencies associated with the project.
- A description of the alternative solutions considered and evaluated.
- Documentation of the decision-making process used in selection of the preferred alternative.
- A description of the preferred alternative and next steps.

Section 2: Municipal Class EA

2.1 Planning Process

The Municipal Class EA planning process provides Municipalities with an approved framework to fulfil the requirements of the Environmental Assessment Act (EAA) for municipal sewage (sanitary and storm), potable water and transportation projects. To ensure that a degree of standardization in the planning process is followed across the Province, the EAA contemplates the use of Class EAs for municipal projects that are carried out routinely and have predictable environmental effects that can be mitigated. Projects that fall into these categories do not warrant an Individual Environmental Assessment (IEA). This project is being planned using the Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 and 2015) document.

In addition to providing Municipalities with an approved planning procedure, the Class EA serves as a public statement of the decision-making process under which municipal projects can be planned and implemented. The Municipal Class EA process reflects the following five key principles for successful environmental assessment planning under the EAA:

- consultation with affected parties early on and throughout the process such that the planning process is a cooperative venture.
- consideration of a reasonable range of alternatives, both the functionally different “alternatives to” and the “alternative methods” of implementing the solution.
- identification and consideration of the effects of each alternative on all aspects of the environment.
- systematic evaluation of alternatives in terms of their advantages and disadvantages to determine their net environmental effects.
- provision of clear and complete documentation of the planning process followed, to allow “traceability” of decision-making with respect to the project.

The Municipal Class EA categorizes projects according to their potential impact on the environment. This has resulted in the development of the following four Class EA project schedules:

Schedule "A" - Pre-Approved Project: This Schedule includes activities that are limited in scale, have minimal adverse environmental effects and include a number of maintenance and operation activities. As a pre-approved project, it may proceed to implementation without following the full Class EA planning process. Schedule A projects generally include normal or emergency operational and maintenance activities.

Schedule "A+" - Pre-Approved Project with Public Consultation Prior to Implementation: Activities under this Schedule require the Municipality to inform the public of what is to be undertaken in their local area prior to implementation. There is no appeal mechanism to the Ministry of Environment, Conservation and Parks (MECP) on these projects for a Part II Order under the EAA and the manner in which the public is advised is to be determined by the Municipality.

Schedule "B" - Projects Subject to Public Screening: Schedule B projects have the potential for some adverse environmental effects. The Municipality is required to undertake a screening process involving mandatory contact with directly affected public and relevant review agencies to ensure that they are aware of the project and that their concerns are addressed. A project file must be prepared and filed for review by the public and review agencies. Activities under this Schedule generally include improvements and minor expansions to existing facilities. There is an appeal mechanism for a Schedule B project called a Part II Order Request.

Schedule "C" - Project Subject to the Full Class EA Planning Process: Activities under this Schedule have the potential for significant environmental effects and must proceed under the full planning and documentation procedures specified in the Class EA document. An Environmental Study Report (ESR) must be prepared and filed for review by the public and review agencies. Schedule C projects generally include the construction of new facilities and major expansions to existing facilities. There is an appeal mechanism for a Schedule C project called a Part II Order Request.

The planning and design process for each Schedule varies. Figure 1 outlines the five phased planning process. A description of each phase is provided below.

Phase 1: The problem statement that is to be addressed by the project is developed. Notification of the project undertaking to the public, review agencies and interested parties is optional in this Phase.

Phase 2: Alternatives to address the problem are identified and evaluated in the context of potential natural, social and environmental impacts resulting in the selection of a preferred planning alternative. Consultation with the public, review agencies and interested parties is mandatory in Phase 2 to solicit input and comment. Schedule B projects typically end following the completion of Phase 2, following the filing of a Project File and a minimum 30-day review period.

Phase 3: Alternative design concepts for the implementation of the preferred solution identified in Phase 2 are developed and evaluated, including additional mandatory consultation with the public, review agencies and interested parties.

Phase 4: This is the culmination of the planning and design process for Schedule C projects in which all project activities, including the consultation process and results, are documented and published in an Environmental Study Report.

Phase 5: Implementation of the preferred alternative including applicable mitigation measures as identified through the Class EA process.

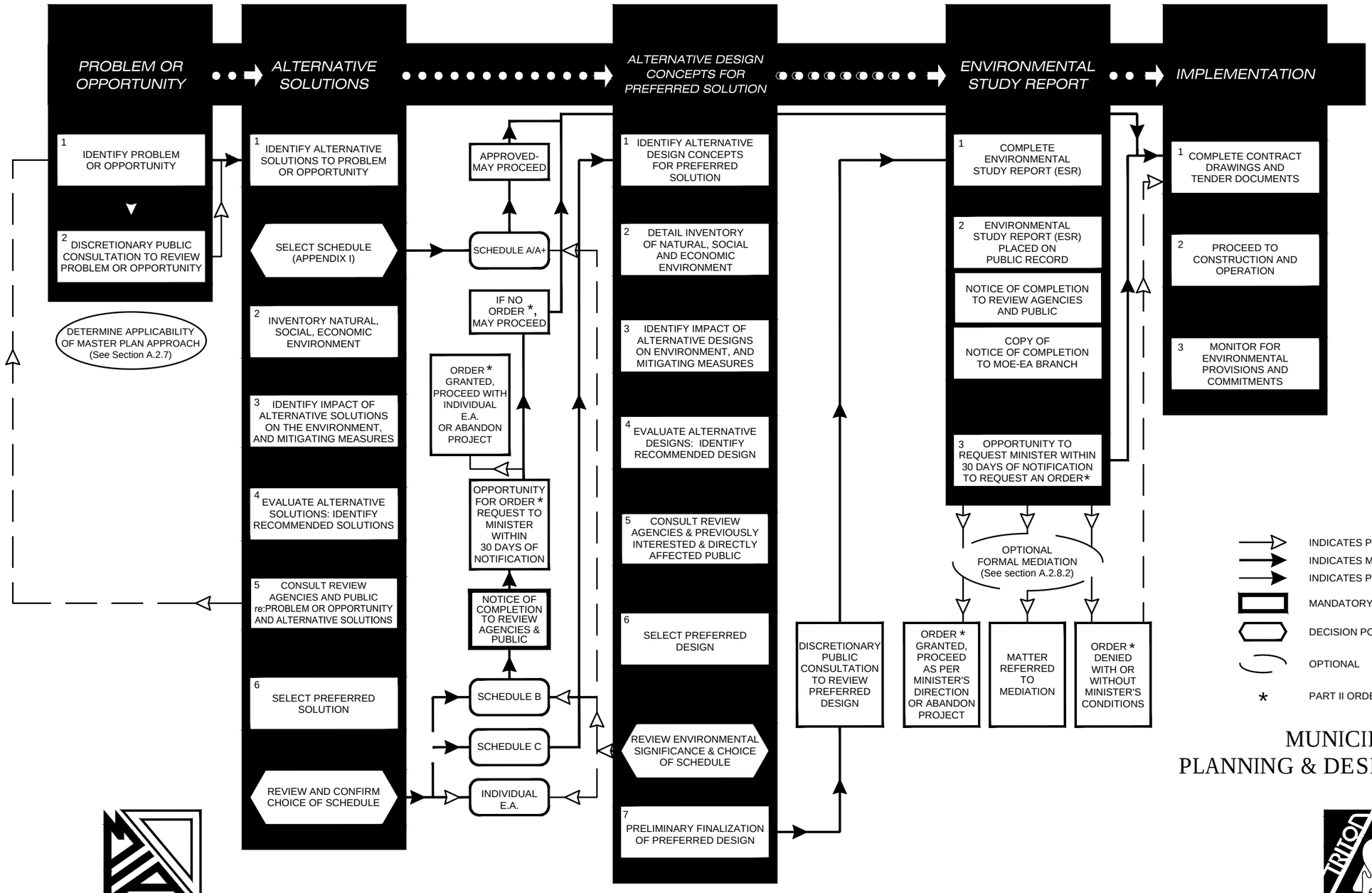
The Municipal Class EA is a self-assessment process, completed by the municipality, that places

emphasis on project evaluation and public involvement rather than formal review and approvals.

The Class EA undertaking by the Town of Erin is similar in nature to many other municipal projects where municipalities require improvements to a municipal water supply and distribution system. As a result, the range of environmental effects is known and typically the solutions to such problems respond to mitigating measures. The establishment of a new well or redevelopment of an existing well or increase pumping capacity of an existing well beyond the existing rated yield or the addition of new or expanded water storage facilities are considered Schedule B projects under the Municipal Class EA.

MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: *This flow chart is to be read in conjunction with Part A of the Municipal Class EA*



MUNICIPAL CLASS EA
PLANNING & DESIGN PROCESS
FIGURE 1

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NOTE: THE PLANNING AND DESIGN PROCESS FOR SCHEDULE 'B' PROJECTS REQUIRES PHASES 1, 2, AND 5 (MINIMUM REQUIREMENTS).

2.2 Project File Report

The Project File Report provides a complete account of the planning procedures followed for the project. The Project File documents the project's history and purpose, the project approach, evaluates the existing environment and evaluates alternative solutions that resolve the identified problem.

Upon its completion, the Project File is filed for public review for a period of at least 30 calendar days with the Town's Clerk. At the time of filing, a Notice of Completion is published to advise the public, particularly those who have expressed an interest in the project, where the Project File is available for review and the manner in which public comment is to be received. The Notice of Completion advises the public of their rights with regard to Part II Order requests.

Under the terms of the Class EA, the requirement to prepare an individual environmental assessment for approval is waived; however, if it is found that a project going through the Class EA process results in significant environmental impacts, a person/party may request that the Municipality voluntarily elevate the project to a higher level of environmental assessment. If the Municipality declines, or if it is believed that the concerns are not properly dealt with, any individual or organization has the right to request that the Minister of the Environment, Conservation and Parks make an order to the project to comply with Part II of the Environmental Assessment Act. A Part II Order is the legal mechanism whereby the status of an undertaking can be elevated from an undertaking within a Class EA to a higher level of review including an IEA. This request must be submitted to the Minister within the specified review period (minimum of 30 days is required) of the publication of the Notice of Completion of the Class EA process. The Minister does not consider requests received after the specified review period.

If concerns are raised within the specified review period (minimum of 30 calendar days) that cannot be resolved between the concerned party and the proponent, the objecting party may request the Minister of Environment, Conservation and Parks to require the proponent to comply with Part II of the EA Act before proceeding with the project. The Minister's decision, which is final, determines whether or not this is necessary, through consideration of the following:

- Extent and nature of public concern.
- Potential for significant adverse environmental effects.
- Need for broader consideration of alternatives by the proponent.
- Consideration of urgency.
- Participation of the requester in the planning process.
- Nature of request.
- Degree to which public consultation and dispute resolution have taken place.

An elevated review and an IEA require more extensive study. The MECP Environmental Assessment and Approvals Branch (MECP EAAB) has a minimum target of 45 calendar days from the day the 30-day (minimum) public review period lapses to review the information and prepare a report for the Minister's consideration. The Minister must then make a decision on the Part II Order request. The Minister may make one of the following decisions:

a) Proponent may proceed with the project with conditions.
b) Proponent must do further study under an elevated Class EA Schedule or IEA.
c) Proponent must engage a mediator to resolve issues with a report by the mediator back to the Minister within 60 days following appointment.
d) Proponent may proceed with the project without conditions.

If the Minister receives no Part II Order requests, then the project proceeds to Phase 5 – Implementation, which includes detailed design and construction.

2.3 Consultation

Consultation with government approval agencies, First Nation and Aboriginal communities and the general public is an important element of responsible environmental decision making. These parties must be provided with opportunities to contribute to the decision-making process. Consultation protects the public interest and helps to ensure that concerns are identified early and addressed where possible.

As per the Code of Practice titled: Consultation in Ontario's Environmental Assessment Process, the purpose of consultation is as follows:

- to provide information to the public.
- to identify persons, groups and communities who may be affected by or have an interest in the undertaking.
- to ensure that government agencies and ministries are notified and consulted early in the process.
- to identify concerns that might arise from the undertaking.
- to create an opportunity to develop proponent commitments in response to local input.
- to focus on and address public concerns rather than regulatory procedures and administration.
- to provide appropriate information to the MECP to enable a fair and balanced decision.
- to expedite decision making.

Section 8 of this Report outlines and documents the consultation completed for this Class EA project.

Section 3: Project Background

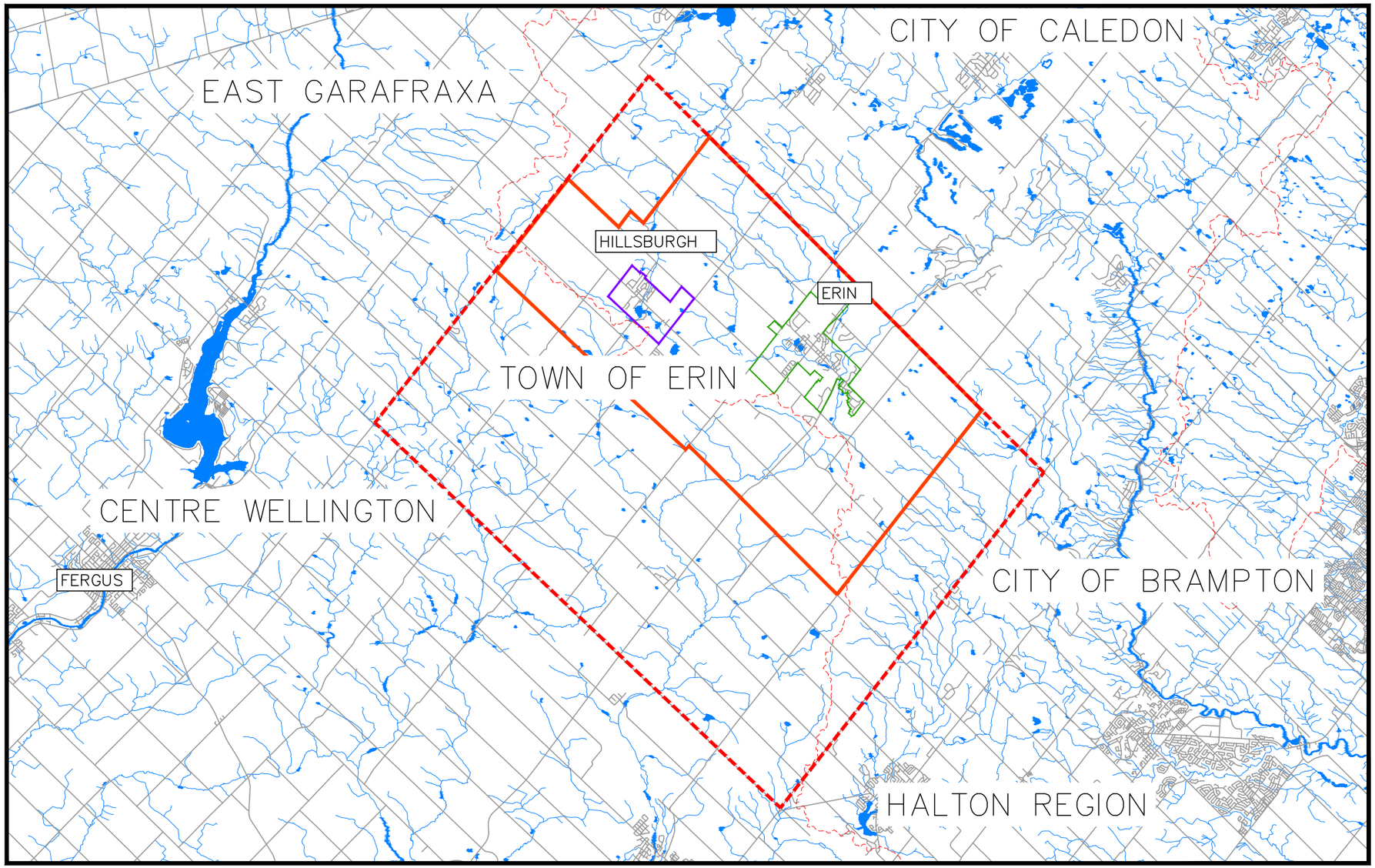
3.1 General Description of the Study Area and Existing Conditions

The Town of Erin is a predominately rural municipality, located in southeastern Wellington County, Ontario. The Town is bordered to the east by the Town of Caledon, the Town of Halton Hills to the south, Guelph and Guelph/Eramosa Township to the west, and the Township of East Garafraxa to the north. Located within the Town boundaries are the headwaters for the West Credit River. Generally, the Town of Erin is characterized by rolling topography, numerous wetlands and woodland areas. Figure 2 presents the geographical location of the Town.

FIGURE - 02

TOWN OF ERIN GEOGRAPHICAL
LOCATION PLAN

TOWN OF ERIN



LEGEND

- TOWN OF ERIN MUNICIPAL BOUNDARY
- ERIN URBAN BOUNDARY
- HILLSBURGH URBAN BOUNDARY
- WATERSHED BOUNDARIES
- SSMP STUDY AREA

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The Statistics Canada Census data for calendar year 2016 indicates that the Town's population was 11,439 (or 11,900 including the net Census undercount) with 4,258 private households (predominantly single detached units) and a land area of 297.76 km^2. As presented in the Growth Management Strategy (GMS) Final Report (Dillon, October 2019), the majority of residents reside within the Village of Erin, which has a population of 3,100 with 1,200 private households and a land area of 4.03 km^2 and secondly within the Village of Hillsburgh, which has a population of 1,400 with 500 private households and a land area of 2.92 km^2 (Dillon, October 2019). As per the SSMP, "population growth in the Town is significantly lower than that observed on average in Wellington County and Ontario as a whole. It is suspected that the lack of full municipal services in the villages may be a contributing factor to the low rates of development and growth" (BM Ross, August 12, 2014).

Both villages are characterized by a traditional downtown commercial core; however, the commercial core of Hillsburgh is interspersed with residential development, which creates a fragmented core. Most industrial development is in Erin; however, both villages have vacant lots available of sufficient size for new industrial development or expansions. Outside of the villages, the industry of aggregate extraction is prominent and represents a significant component of the local economy.

Within both of the urban centres (i.e. villages), drinking water is supplied by municipal water systems which are sourced from groundwater. However, not all properties are connected to these municipal systems; rather, they are supplied by private well sources. Residences located outside of the urban boundaries are supplied drinking water by private wells.

The existing (2019) municipal water system in Erin is supplied by two wells, identified as Well No. E7 and E8, and services a population of 2,650 people occupying 1,019 households (connections) along with additional non-residential users. Figure 3 shows the location of the existing water supply wells and distribution system which consists of approximately 25 km of watermain. The existing distribution system has the potential to physically service (without consideration of supply) additional properties within the urban boundaries of the village where water main and service connections are in place or can be added. Alternatively, there also exists a number of properties within the village where infrastructure for the municipal water system is not present.

FIGURE - 03

ERIN POTENTIAL WATER SOURCE LOCATIONS

TOWN OF ERIN

TRAFALGAR ROAD

8TH LINE

WELLINGTON ROAD 23

10TH LINE

SIDEROAD 17

WELLINGTON ROAD 124

ERIN 3

ERIN 2

E7

E8

ERIN 5

DUNDAS STREET EAST

MAIN STREET

8TH LINE

BEL-ERIN

ERIN 1

ERIN 4

WELLINGTON ROAD 52

WELLINGTON ROAD 124

9TH LINE

10TH LINE

SIDEROAD 10

LEGEND

- ERIN URBAN BOUNDARY
- TOWN OF ERIN MUNICIPAL BOUNDARY
- EXISTING WELL CONNECTED TO MUNICIPAL WATER SYSTEM
- POTENTIAL NEW WELL LOCATION
- EXISTING WELL NOT CONNECTED TO MUNICIPAL WATER SYSTEM

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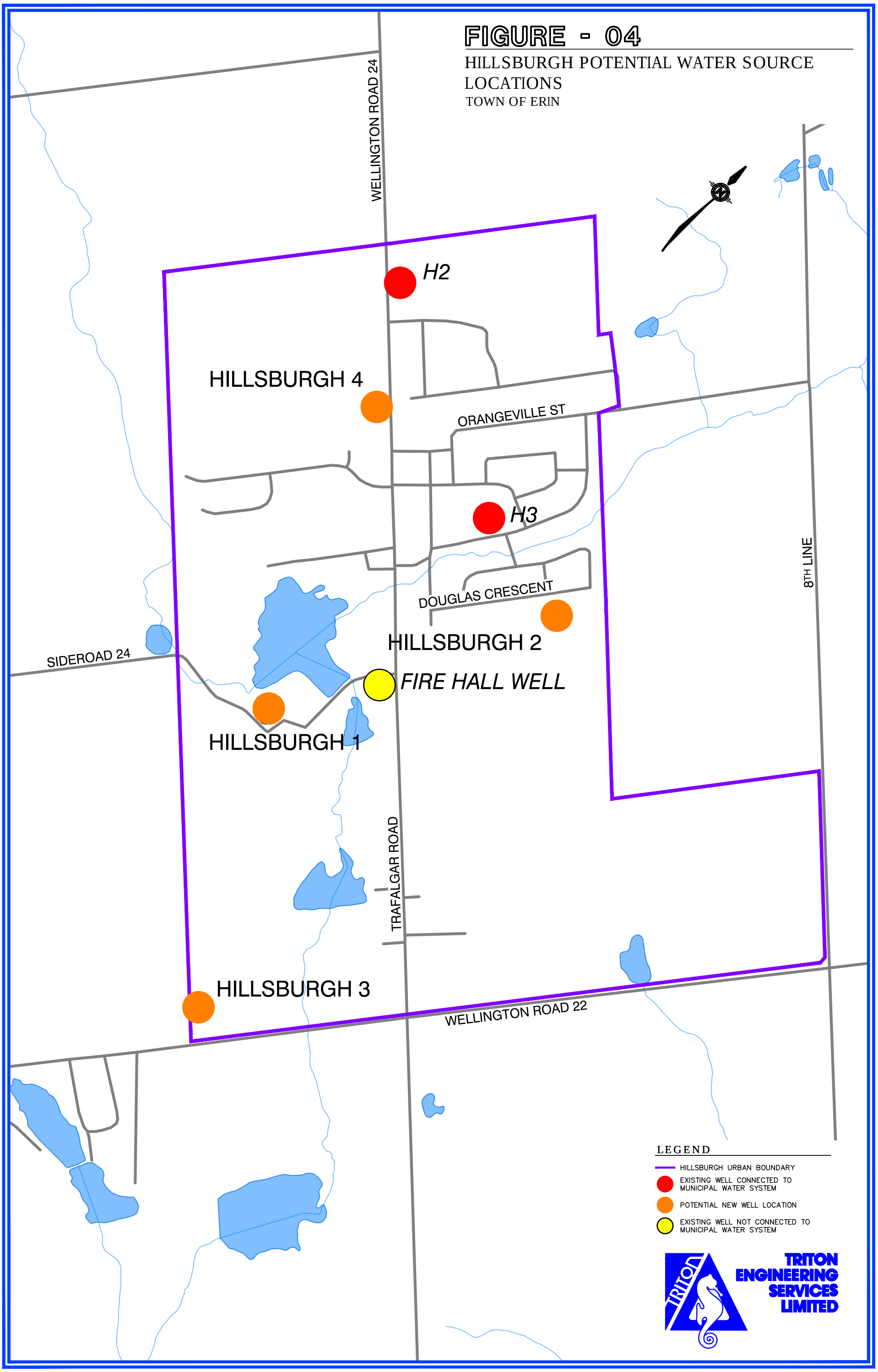
The existing (2019) municipal water system in Hillsburgh is supplied by two wells, identified as Well No. H2 and H3, to service a population of 715 people occupying 275 households (connections) along with additional non-residential users. Figure 4 shows the location of the existing water supply wells and distribution system which consists of approximately 7km of watermain. There exists a significant number of un-serviced properties within the urban boundary and several that are serviced but have not connected.

There are currently no municipal wastewater services available within the Town. An Urban Centre Wastewater Servicing Schedule C Municipal Class EA has been completed, which determined the preferred design alternatives for major system components of the proposed communal wastewater collection and treatment system to service Erin and Hillsburgh. The Assimilative Capacity of the West Credit River is the limiting factor for the wastewater servicing for future growth, which in turn dictates the population representing full build-out of the future growth community. An updated Assimilative Capacity Study was completed in 2016 to support the Urban Centre Wastewater Servicing Class EA (WWEA). The 2016 Assimilative Capacity Study determined the servicing potential of the West Credit River based on Best Available Technology for wastewater treatment is an equivalent population of 18,873. The 30 day public review process for the Environmental Study Report completed for the WWEA ended on June 12, 2018. Three Part II Order requests were received by the Town within the public review period. On August 30, 2019, the Minister of the Environment, Conservation and Parks approved the Class EA without imposing any changes or requirements for further study.

FIGURE - 04

HILLSBURGH POTENTIAL WATER SOURCE LOCATIONS

TOWN OF ERIN



LEGEND

- HILLSBURGH URBAN BOUNDARY
- EXISTING WELL CONNECTED TO MUNICIPAL WATER SYSTEM
- POTENTIAL NEW WELL LOCATION
- EXISTING WELL NOT CONNECTED TO MUNICIPAL WATER SYSTEM

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3.2 Servicing and Settlement Master Plan

The Town completed a Servicing and Settlement Master Plan in 2014, in accordance with the requirements of the Class EA using the Master Plan, Approach 1. The SSMP was initiated to address servicing, planning and environmental issues within the Town, including the Villages of Erin and Hillsburgh, and a portion of the surrounding rural lands (Study Area). The intention of the SSMP was to develop a long-term (over the next 25 years) comprehensive strategy for the provision of water and wastewater servicing in the villages of Erin and Hillsburgh and to serve as a basis for future investigations for specific Class EA projects identified within it.

With respect to the Town's water systems, the SSMP reviewed the available and firm system capacities for each municipal water system. The available capacity is defined as the capacity of the system with all municipal wells available for production. The firm capacity of a water system is defined as the capacity of the system with the largest pump or source out of service. Water supply reserve capacity calculations typically use firm capacity of the water system to ensure that there is sufficient redundancy in the system for water supply and treatment in case of a well or equipment failure. Consideration of firm capacity for water pumping stations is consistent with MECP's *Design Guidelines for Drinking-Water Systems*.

Based on the conditions in 2014, the SSMP determined that the maximum day demand in each urban centre had exceeded the firm capacity of its respective water system, indicating the need for additional source capacity to provide adequate system redundancy and permit future growth. Additionally, there exists properties within both urban centres that are not connected to the municipal water system due to lack of access to the water distribution infrastructure or because they were not connected as the properties were developed. The connection of these existing properties would further increase this supply deficit. The current Class EA has considered the recent water demand available up to the end of 2019 and updated the supply capacity calculations accordingly, these are presented in subsequent sections on this report. Based on current Reserve Capacity Calculation, there is sufficient supply to accommodate the existing serviced population in each community. This change in available Reserve Capacity between the completion of the SSMP and present day is a result of a significant decrease in the Maximum Day Demand for both the Erin and Hillsburgh water systems.

In addition to supply capacity, MECP provides guidelines to estimate the required water storage and/or pumping infrastructure requirements for municipal water systems to allow adequate supply, distribution and pressure in the system during peak water demands and to meet critical water demands during fire flow and emergency conditions. At the time of the SSMP, with consideration of having the entire existing community connected to the municipal system, the Hillsburgh water system had a storage deficit, while the Erin water system had adequate storage to satisfy fire and emergency demands for the exiting population (BM Ross, August 12, 2014). The current Class EA has considered the recent water demand available up to the end of 2019 and updated the storage requirement calculations accordingly, these are presented in subsequent sections on the report.

The SSMP recommended "that the Town undertakes water servicing upgrades so that appropriate facilities are in place when required to service future growth" (BM Ross, August 12, 2014). To address these limitations for the existing community and new growth, the SSMP identified future considerations and project work to be investigated and evaluated in a Schedule B undertaking.

It should be noted that the growth projections considered in the SSMP, were subsequently significantly increased as a result of further assessment (i.e. Assimilative Capacity Study) completed as part of the Town's WWEA. These updated growth projections/scenarios were further refined as part of the GMS. This Class EA considers the preferred growth allocation scenario as presented in the GMS.

3.3 Project Terms of Reference

As stated in the previous section, limitations in the Town's water systems were identified which needed to be resolved in order to meet the requirements of the future supply and storage demands of the preferred growth allocation scenario presented in the GMS. The purpose of this Class EA is to examine feasible alternatives to provide additional firm capacity and supply redundancy for the Town's municipal drinking water systems. Further, to evaluate water system operating configuration and water storage requirements for both the existing community and future development. Following a review of these alternatives, a preferred strategy to upgrade the water systems will be established.

A Terms of Reference for the Class EA was prepared by Blackport Hydrogeology Inc. (BHI) to consider the water system limitations identified in the SSMP for existing and future development scenarios. A copy of the BHI Terms of Reference is provided in Appendix A. Future development scenarios presented in the Terms of Reference have been refined to be consistent with the preferred growth allocation scenario presented in the Final GMS Report (Dillon, October 2019).

3.4 Problem/Opportunity Statement

Consistent with the SSMP, the following project problem/opportunity statement was identified as part of Phase 1 of the Class EA process for the project:

"Partial water servicing, in Hillsburgh and Erin Village, limits the operational and cost efficiency of the systems and inhibits redevelopment and future development. The capacity of the existing system will need to be augmented to address current limitations and the needs of future development."

It is on the basis of this problem definition that the planning for this Class EA has been undertaken.

Section 4: Project Background – Existing Conditions

As part of Phase 2 of the Class EA process, a general inventory of the existing conditions of the Study Area was completed to support the evaluation of alternatives and selection of the preferred alternative. Data was collected from previous studies, including the background studies and findings of the SSMP and WWEA, as well as a number of additional studies, to document the existing conditions of the economic, social, cultural, natural, and technical environments. Details of the existing conditions are summarized in the following sections.

4.1 Economic Environment

4.1.1 Existing Development Pattern

The Town has a predominantly rural character. Although a wide range of housing types are encouraged, the existing predominant housing type is single detached homes with a small number of semi-detached units and duplexes, apartment buildings and trailer park. Erin Village is the largest urban settlement within the Town, followed by Hillsburgh. For both urban centres, development is off of the Main Street.

Existing commercial development is located along the main streets (Main Street and Trafalgar Road) of both urban centres. Industrial development is located primarily to the north of the Cataract Trail in Erin Village. Both urban centres have vacant lots large enough for new industrial development or expansions. Five aggregate operations are located within the Town, outside of the urban areas, which represent a significant component of the local economy. Rural lands predominantly used for agricultural purposes represent a large portion of the remaining lands within the Town. Recent residential development in both urban centres has occurred on large lots with large estate-type residences.

Over the last ten years, the Town has experienced an average annual rate of growth of 0.04 percent, which is significantly lower than the average growth observed in Wellington County and Ontario. Lack of full municipal services in the urban areas may contribute to the low rates of development and growth.

4.1.2 Growth Projections

The Town's goal is to provide a full range of municipal services to support additional development and redevelopment. At the beginning of calendar year 2019, the Town undertook a Growth Management Strategy (GMS) with the intent to provide a long-term plan for the location, timing, phasing, servicing and financing of growth of the Town's population and employment base in the urban centres of Hillsburgh and Erin through to year 2041. The GMS, which was finalized in October 2019, was undertaken with consideration of this Class EA, the Development Charges Background Study and WWEA

As per the SSMP, a study of the assimilative capacity of the West Credit River with target year 2035 was completed by BM Ross in 2014 to provide a basis for a locally based servicing solution, consistent with the recommendations in the County's Official Plan (OP) for settlement areas within the Greenbelt (protected countryside). At the time, through consultation with MECP and Credit Valley Conservation Authority (CVC), a conservative population of 6,000 persons of assimilative capacity was recommended to be used as the limits (i.e. estimated maximum serviceable population) of treating sewage and discharging effluent to the West Credit River. This maximum serviceable population is significantly less than the population that can be accommodated by the potential development lands.

The SSMP assimilative capacity study was reviewed and revised as part of the WWEA which determined that a future residential population of 14,559 or equivalent population of 18,873 could be serviced based on the capacity of the river. The preferred growth allocation scenario presented in the Final GMS Report (Dillon, October 2019) is based on this assimilative capacity.

4.2 Social Environment

The Town of Erin is comprised of two Urban Centres – Erin and Hillsburgh, with the remainder of the Town's lands categorized by Greenlands and Rural systems (Town of Erin Official Plan). As stated in the Town's Official Plan, "The Town of Erin is a primarily rural community in south Wellington County characterized by scenic rolling countryside, good quality farmland, important river, wetland and forest systems and small settlement areas. These attributes provide an enjoyable rural and small-town living environment which residents wish to maintain. The people of the Town place great value on rural amenity values, natural resources and environmental systems within the community and are committed to ensuring that these unique resources will be protected and wisely managed. The Town was formed in 1998 from the amalgamation of the former Township of Erin and Village of Erin. The Town includes the two urban centres, which are the Village of Erin and the Village of Hillsburgh, where the majority of residents within the Town live. The Town is also comprised of six hamlets, which are the hamlets of Ballinafad, Brisbane, Cedar Valley, Crewson's Corners, Ornton and Ospringe. The remainder of the Town is characterized by agricultural land and natural heritage areas. Due to the Town's location proximate to the Greater Toronto Area (GTA) and identified settlement areas with available vacant and developable lands within the provincially designated "Greenbelt", there is interest for development and growth. The Town's Official Plan states: "The municipality will manage these growth pressures in a positive manner which safeguards the public interest, yet fosters private initiative." It also states that "The purpose of the official Plan is to provide a municipal statement of intent on how future growth and development will be managed…The Plan attempts to identify and safeguard public interest including important natural resources, cultural resources and economic resources." With respect to the provision of municipal water services, the Official Plan for the Town indicates that "It is the intention of the Town,

over time and where practical to provide municipal water service from the Town's central systems to all lands within the designated Urban Centres." Residential growth will occur primarily within and by expansion of existing settlement areas of Erin and Hillsburgh, and will be in accordance with the Town's urban design standards to "retain the traditional small-town character of the Town's urban centres" (Town of Erin Official Plan). In order to satisfy the County's overall growth targets, "The Town will contribute to the achievement of these targets, subject to servicing constraints." Extension of water services and the provision of sanitary sewage services to new development within Erin and Hillsburgh is required if continued growth is to occur and in order to meet the requirements of the Provincial Policy Statement.

The Town is located at the headwaters of the Grand River and part of the Town lies within the Haldimand Tract. The Six Nations of the Grand River have an unresolved land claim throughout the Grand River watershed including a portion of land located to the southwest of Hillsburgh, within the Town's boundary. The Haldimand Proclamation of 1784 authorized Six Nations to possess all of the land six miles on each side of the Grand River from its mouth to its source (to be held in trust by the Crown) comprising a total of approximately 950,000 acres. The lands were granted in partial recognition of the loss sustained by Six Nations of millions of acres of land in the aftermath of their alliance with the British Crown during the American War of Independence. The Haldimand Proclamation is not anticipated to influence the project as the potential well sites considered in this Class EA are located outside of the areas that are subject to this land claim. Additionally, First Nations and/or Metis have the right of access; however, the proposed project sites are not in proximity to forested areas where hunting or trapping could take place.

4.3 Cultural Environment

4.3.1 Archaeological Features

Consistent with the Ministry of Tourism, Culture and Sport checklist for Criteria for Evaluating Archaeological Potential, it was determined that the potential for archaeological resources exist within the project Study Area since agricultural areas are very commonly high potential areas for archaeological resources to be present, as per the advice from the heritage consultants, as well as other factors such as proximity to historic settlement areas (historic farmsteads) and known historic transportation routes. Therefore, a Stage 1 Archaeological Assessment was required to be completed for this Class EA by qualified person(s). A copy of the checklist is included in Appendix B.1.

Archaeological Research Associates Limited (ARA) were retained by Triton to complete an archaeological assessment of the proposed well sites that are described in Section 7 of this Report. The stage 1 archaeological assessment was conducted in December 2017 and November 2019, following legal permission from the respective property owners to access the property for assessment. The stage 1 archaeological assessment involved background desktop research, which determined that each of the sites had archaeological potential and therefore required stage 2 archaeological assessment.

The stage 2 assessment was conducted in May 2018 at all potential well sites, except Erin 3, following legal permission from the respective property owners to access the property for assessment. A plot measuring approximately 30 metres by 40 metres was staked out at each well site to demarcate the limits for the archaeological assessment. The plot size is in excess of the footprint required by a well and pumphouse construction (typically 18 metres by 30 metres) as a conservative measure to prevent the need for another stage 2 assessment should it be determined that the well site can provide adequate quality and quantity following test drilling activities. The stage 2 assessment involved visual inspection of the plots to evaluate archaeological potential, monitoring of artificial weathering, and pedestrian survey of all areas identified as having archaeological potential. No archaeological materials were encountered during the visual inspection and pedestrian survey and it was concluded that further assessment is not required prior to any development within the assessed plots of land.

At the request of the property owner, the location of Erin 3 changed from the initial location that was assessed for archeological resources in 2017 and 2018. The initial Erin 3 site was investigated in terms of a stage 1 and stage 2 archeological assessment; however, the new Erin 3 site is located outside of the plot area of the initial Erin 3 well site and therefore required another archaeological assessment. A stage 1 archaeological assessment was completed for the current Erin 3 site in November 2019. Consistent with ARA's recommendations, due to the timing of their assessment (winter), a stage 2 archaeological assessment will be required at the Erin 3 site when weather conditions permit this activity (i.e. Spring when snow is gone and the land has to be dry enough to walk on) as the site has archaeological potential.

A copy of ARA's Report dated October 11, 2018 detailing the stage 1 and 2 assessments is provided in Appendix B.2. ARA submitted their report to the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI, formerly known as Ministry of Tourism, Culture and Sport, MTCS) on October 25, 2018 for review and entry into the Ontario Public Register of Archaeological Reports. In a letter dated February 12, 2019, MHSTCI confirmed that the stage 1 and 2 assessments completed by ARA for the project were completed in accordance with the Ministry's 2011 Standards and Guidelines for Consultant Archaeologists and the terms and conditions for archaeological licenses and that the report has been entered into the Ontario Public Register of Archaeological Reports. A copy of MHSTCI's letter dated February 12, 2019 is provided in Appendix B.3.

A copy of ARA's Report dated February 14, 2020 detailing the Stage 1 assessment of proposed potential well E9/Erin 3 site is provided in Appendix B.4. ARA submitted this report to MHSTCI in February 2020 for review and entry into the Ontario Public Register of Archaeological Reports. Confirmation from MHSTCI is pending.

4.3.2 Cultural Heritage Features

Consistent with the MHSTCI checklist for Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes, it was determined that the potential for cultural heritage resources exist within the project study area. Therefore, a Cultural Heritage Evaluation Report (CHER) was required to be completed for the Class EA by qualified person(s).

ARA were retained by Triton in November 2017 to complete the CHER for structures and landscapes with the potential to be impacted by the construction of the proposed potential future well sites (described in Section 7 of this Report) The project area for the CHER was divided into two distinct study areas: one for Hillsburgh and the other for Erin, each consisting of the proposed well sites and all property parcels abutting the proposed well sites. A copy of ARA's Cultural Heritage Evaluation Report is included in Appendix C.2. ARA completed a CHER for the current Erin 3 site in October 2019. A copy of ARA's CHER Addendum covering the current location of Erin 3 is included in Appendix C.3.

Each of the proposed potential well sites, including the current Erin 3 site, were assumed to include the construction of a well house similar to existing Well E7 (Erin Village), with a ground level reservoir for disinfection treatment and a masonry superstructure with approximate dimensions of 20 to 25 m long by 10 to 15 m wide and having a flat roof. For the purpose of the CHER, it was assumed that the proposed potential future well sites will be enclosed by chain link fence. Map 1, as presented in ARA's CHER found in Appendix C.2, depicts the study area and abutting properties for the CHER, as well as the proposed potential well sites.

As a result of ARA's consultation and field survey, no cultural heritage landscapes were identified within the Hillsburgh study area and abutting properties. Three cultural heritage landscapes were identified within the Erin study area and abutting properties. Both study areas had identified the presence of Built Heritage Resources.

In Hillsburgh, one proposed potential well site (Hillsburgh Site H2) is located on a property having an identified built heritage resource. Eight other built heritage resources were identified on abutting properties to the proposed potential well sites. In Erin, proposed potential well Sites Erin Site 4 and Erin Site 5 are located on properties having an identified built heritage resource. With the exception of Erin Site 1 (Mountainview), all proposed potential well sites within Erin Village are located on properties that are abutting properties with identified built heritage resources.

ARA evaluated the anticipated negative impacts (direct or indirect) to the identified cultural heritage landscapes and built heritage resources as a result of the construction of the proposed potential future well sites. ARA's evaluation determined that no direct impacts to heritage attributes of the identified built heritage resources and cultural heritage landscapes will occur as a result of construction of the well sites; however, a potential impact of the proposed well sites is that they are not sympathetic with the historic fabric and appearance of the built heritage resources and cultural heritage landscapes. With the exception of Erin Well Site 5, vegetation and/or topographical features are present that would screen the proposed well house from the built heritage resource or cultural heritage landscape. For potential well sites without vegetation or topographical features to screen the proposed well houses, mitigation measures involving the installation of natural or built buffers to protect heritage resources and view would be implemented.

The heritage attributes of the identified cultural heritage landscapes and built heritage resources are mainly defined by intrinsic values (e.g., architecture and associated values), which will continue to exist with or without the installation of proposed well site infrastructure. Mitigation measures to conserve the identified cultural heritage value or interest were identified in the ARA reports to limit identified potential impacts of the proposed well sites and were considered in the evaluation of alternatives.

4.4 Natural Environment

Triton retained the services of Aboud and Associates Incorporated (Aboud) to complete a Natural Heritage – Existing Conditions Report (Existing Conditions Report) to document the natural heritage inventory of the proposed locations identified as being a potential source location for new water supply wells. The Existing Conditions Report characterizes the existing natural heritage features within the 30 m by 40 m plot at each location and the adjacent natural lands within a 120 m radius of each location and identifies constraints and recommendations for each location. All locations are within CVC jurisdiction. A copy of Aboud's Natural Heritage – Existing Conditions Report is included in Appendix D.

4.4.1 Vegetation

The project study area is located within Ecoregion 6E, the second most densely populated ecoregion in Ontario (MNRF, 2009). Majority of the study area is within or adjacent to actively farmed agricultural fields and do not provide direct linkages to any natural features within the broader landscape. Within ecoregion 6E, forest cover represents approximately 30.1 percent of the land and consists of a diverse mixture of hardwood forests, lowlands and flood plain forests.

Aboud completed a one-season Ecological Land Classification (ELC) evaluation and a one-season botanical inventory in June 2018. Nine different ELC communities were identified. Based on comparison with the Natural Heritage Information Centre (NHIC) Rare Plant Communities, provincially rare plant communities were not identified within the study area. The botanical inventory identified 56 species (22 species native and 34 species non-native) of vascular plants from 25 families. No nationally or provincially rare, threatened or endangered species were observed.

Potential minor impacts, if any, may occur as a result of development of a well at any of the proposed potential locations. Aboud has provided recommendations for mitigation and monitoring in Section 4.1 of their Existing Conditions Report.

4.4.2 Breeding Birds, Reptiles and Amphibians, Mammals

Aboud completed a background review of publications including the 2001-2005 Ontario Breeding Bird Atlas, Ontario Reptile and Amphibian Atlas and the Atlas of the Mammals of Ontario for the 10km square area that encompasses the study area (Erin and Hillsburgh).

Listed within Erin are 118 breeding bird species, 10 of which are considered SAR under the ESA and SARA. In terms of reptiles and amphibians, 17 species were listed, with the Snapping Turtle being the only one considered a SAR under the ESA and SARA. Milksnake and Western Chorus Frog are considered SAR under the SARA.

Listed within Hillsburgh are 108 breeding bird species, eight of which are considered SAR under the ESA and SARA. In terms of reptiles and amphibians, seven species were identified, with the Snapping Turtle considered a SAR under the ESA and SARA.

As described above, none of the species considered SAR were observed during site investigations of the study area.

Nineteen and 16 mammal species were identified within Erin and Hillsburgh, respectively. Little Brown Myotis was identified as a Species of Conservation Concern, listed as Endangered under the ESA and SARA. Potential bat maternity habitat for bat SAR was not observed within the forested communities of the study area.

Potential impacts are rated as minor, if any. Measures for monitoring and to mitigate impacts during well construction are recommended by Aboud.

4.4.3 Species at Risk (SAR)

A background review of the Natural Heritage Information Centre (NHIC) indicates the presence of four provincial Species at Risk under the Endangered Species Act (ESA) within two kilometers of the proposed potential well sites. Additionally, one Restricted Species was listed within two kilometers of Erin 3 and Hillsburgh 1 sites. None of these species were observed during site investigations of the study area; however, observations of single individuals of eight species of birds and one species of mammals were identified. None of the incidental wildlife observations are considered species of Conservation Concern or provincial or federal SAR.

Potential impacts are rated as minor, if any. Measures for monitoring and to mitigate impacts during well construction are recommended by Aboud.

4.4.4 Significant Wildlife Habitat

Based on Aboud's investigation of the study area, it was determined that Significant Wildlife Habitat (SWH) in the form of Waterfowl Stopover and Staging Areas may be present in the study area. Given the total area of the agricultural and meadow communities these qualify as candidate Waterfowl Stopover and Staging Areas; although, no evidence of flooding was observed through examination of past aerial imagery. Since the SWH cannot be confirmed, it was recommended that any drilling in these areas should be completed outside of the spring staging window (mid-March to May) to avoid any adverse impacts to wildlife and habitat.

4.4.4.1 SAR Habitat

Aboud's review (background and field investigation) of the study area determined that the presence of habitat suitable for SAR (bobolink and eastern meadowlark) may occur within the study area. Consistent with communication with Ministry of Natural Resources and Forestry (MNRF) Guelph District, in order to avoid harm to the species and/or habitat, grassland bird surveys completed in accordance with Ontario Breeding Bird Association and MNRF-Guelph District protocol, are required if drilling activities

are planned to occur between May 1 and July 31 within the open graminoid communities (i.e. agricultural [hay, wheat] and meadow or pasture) located within the study area.

4.4.5 General Hydrogeological/Groundwater Environment

The physiographic and geologic setting within the study area is characterized in detail in the SSMP and Source Protection reporting, and is summarized in the hydrogeologic assessment completed as part of this project (Appendix E). The following summary focuses on the bedrock aquifer system, which is the source of existing and newly developed municipal wells.

The Town relies on groundwater for its water supply. The municipal water systems and majority of private residential wells obtain water from the Silurian dolostone bedrock aquifer system. As outlined in the SSMP reporting, in the Hillsburgh village area the bedrock aquifer system consists of the Guelph Formation and underlying sequence formerly known as the (unsubdivided) Amabel Formation. The Eramosa Formation (former member), where present, occurs between the Guelph and Amabel Formations. Portions of the Eramosa Formation are considered an aquitard. In the Erin village area the bedrock aquifer system consists of the (unsubdivided) Amabel formation. The dolostone sequence is underlain by shale units that form the base of the bedrock aquifer system.

Vulnerability to contamination of the bedrock aquifer that supplies the municipal wells in Erin Village and Hillsburgh is generally medium to low (Golder and Associates, 2006). The overburden thickness ranges from approximately 10 m in the vicinity of the wells to over 40 m in other areas of the well capture zones. There are, however, areas of high vulnerability in the vicinity of Erin Well E8 and Hillsburgh Well H3. The area of high vulnerability around Well H3 is found in the two-year capture zone around the well; however, water quality data for the well does not indicate any surface source of contamination (Credit Valley Conservation, Aquafor Beech Inc., Blackport Hydrogeology Inc., 2011).

The Town is largely characterized as having a high level of recharge that results in a significant groundwater contribution to baseflow in the West Credit River and tributaries of the Eramosa River and Blue Springs Creek in the Grand River watershed and maintains a minimum depth of water in various streams and moderates stream temperature (CVC, 2011). Details are provided in the Erin SSMP Phase 1 - Environmental Component - Existing Conditions Report by Credit Valley Conservation, Aquafor Beech Inc., Blackport Hydrogeology Inc. (2011).

Groundwater usage within the Town includes municipal drinking water, private water wells, commercial water taking for purposes of water bottling, golf course irrigation, aquaculture agriculture and industrial (i.e. aggregates washing). Most of the water takers require a Permit to Take Water (PTTW) from MECP due to the volume of water taken per day.

4.4.6 Source Water Protection

The Town of Erin is located within the Credit Valley, Toronto and Region and Central Lake Ontario (CTC) Source Protection Region, specifically within the Credit Valley Source Water Protection Area. The CTC Source Protection Plan (effective December 31, 2015) for the Credit Valley Source Water Protection Area outlines source protection policies related to existing and future threats to drinking water sources for the Town of Erin.

The Credit Valley Source Protection Assessment Report (approved July 22, 2015) identifies location and nature of threats (including potential threats) to the Erin and Hillsburgh water systems groundwater sources and provides a delineation of vulnerable areas and an overview of water quality and quantity. Vulnerable areas include Wellhead Protection Areas (WHPA), Intake Protection Zones (IPZ), Highly Vulnerable Aquifers (HVA), and Significant Groundwater Recharge Areas (SGRA). Four WHPAs are specified, one is a proximity zone (Zone A) and the others are time-related capture zones, as follows:

Zone A 100m radius from wellhead
Zone B 2-year time of travel (TOT) capture zone
Zone C 5-year time of travel capture zone
Zone D 25-year time of travel capture zone

4.5 Technical Environment

4.5.1 Existing Facilities

The Town owns, operates and maintains two residential drinking water systems, which are the Erin Municipal Water System and the Hillsburgh Municipal Water System, each being serviced by two communal wells drilled into the bedrock aquifer. The drinking water systems for each of the villages do not serve all properties within the urban centres, as some properties are serviced by private well systems. Each system operates in accordance with the respective Municipal Drinking Water License (MDWL), Drinking Water Works Permit (DWWP) and Permit to Take Water (PTTW). The MDWL provides authorization for the operation of the system, the DWWP describes the scope of the system and authority to establish and make changes to the system, and the PTTW describes the approved rate of water taking for the system.

4.5.1.1 Erin Village Water System Summary

Raw water from operational Well Nos. E7 and E8 is directed to a pumphouse housing water storage, treatment facility, and monitoring equipment, in accordance with the Safe Drinking Water Act 2002. A third water supply system exists in Erin Village, known as the Bel-Erin wells; however, these have been taken out of service due to water quality issues. Disinfection of the raw water is by gaseous chlorine. Both wells are drilled into the fractured limestone bedrock and have a total rated capacity of 4,128 m^3/d. Each well operates under a PTTW, with E7 having a daily production limit of 2,160 m^3 and E8 having a daily production limit of 1,968 m^3.

The Erin Municipal Water System serves an estimated connected population of approximately 2,650 people in the former Village of Erin, with approximately 1,019 residential connections (including 6 moderately sized multiple dwelling buildings) and 108 non-residential connections. The Stanley Park development with 97 mobile homes and 11 cottages is also serviced by the Erin Water System. Erin Village has a population of 3,100 (2019) with approximately 1, 200 private dwellings. (Final Growth Management Strategy, Dillon, October 2019). Most dwellings are single detached units. A figure showing the location of the existing wells and watermains which make up the Erin water system is presented in Appendix F.

Pressure in the water system is maintained by the existing water tower; however, pressure tanks are required to maintain adequate pressure for the 65 residences in the Erin Heights subdivision. The water tower provides approximately 77 percent of the system's total water storage which is 2,200 m^3. The remainder of storage is provided at the two well house reservoirs.

Details regarding the history, construction and operational background of Well Nos. E7 and E8, the non-operating Bel-Erin water supply wells, and former/abandoned well supply systems have been provided in the SSMP Final Report (B.M. Ross, August 12, 2014) in Appendix A.

4.5.1.2 Hillsburgh Village Summary

Raw water from Operational Well Nos. H2 and H3, is directed to a pumphouse (each well has its own pumphouse with an inground reservoir) that provides housing for water storage, treatment facility, and monitoring equipment, in accordance with the Safe Drinking Water Act 2002. Disinfection of the raw water is by sodium hypochlorite solution. Ferric chloride solution is also used to treat raw from Well No. H2 for the presence of naturally-occurring lead. The system is separated into two pressure zones where

Well No. H2 supplies water to the Upper Zone and Well No. H3 supplies water to the Lower zone.

Both wells are drilled into the fractured limestone bedrock and have a total rated capacity of 1,637 m^3/d. Each well operates under a permit to take water, with H2 having a daily production limit of 655 m^3 and H3 having a daily production limit of 982 m^3.

The Hillsburgh Municipal Water System serves an estimated connected population of approximately 715 people in the former Village of Hillsburgh, with approximately 275 residential connections, including the multiple dwelling complex, and 4 non-residential connections. Hillsburgh has a population of 1,500 (2019) with approximately 500 private dwellings. (Final Growth Management Strategy, Dillon, October 2019). Most dwellings are single detached units. A figure showing the location of the existing wells and watermains in the Hillsburgh water system is presented in Appendix G.

Between the two inground reservoirs (Well No. H2 and H3), approximately 790 m^3 of water storage is provided. The Hillsburgh Booster Pumping Station allows for the transfer of water between the Upper and Lower zones in order to meet demand in each zone. The Booster Pumping Station is able to maintain pressure in the upper zone of the distribution system during peak and minimum demand periods.

Details regarding the history, construction and operational background of Well Nos. H2 and H3 and former/abandoned well supply systems have been provided in the SSMP Final Report (B.M. Ross, August 12, 2014) in Appendix A.

4.5.2 System Capacity

The available capacity of the Erin and Hillsburgh municipal water systems with both wells in each system operational is 4,128 m^3/d and 1,637 m^3/d, respectively. The system capacity represents the cumulative sum of all the well capacities, which is based on the limiting condition (i.e. production limit) of the capacity of the PTTW, DWWP or pumping equipment. The existing treated water storage for each system is 2,200 m^3 and 790 m^3 for Erin and Hillsburgh, respectively. Treated water storage requirement is determined in accordance with MECP guidelines which considers fire, equalization and emergency components of storage.

The firm capacity of a water system is defined as the capacity of the system with the largest pump or source out of service. This ensures sufficient redundancy in the system for water supply and treatment in case of an equipment failure. For the Erin water system, the largest source is Well E7 with a capacity of 2,150 m^3/d. This results in a system firm capacity of 1,968 m^3/day. For the Hillsburgh water system, the largest source is Well H2 with a capacity of 982 m^3/d. This results in a system firm capacity of 655 m^3/day. *Table 1*, below, provides a summary for each municipal water supply.

Table 1: Summary of Municipal Water Supply Systems

Municipal Water System	Erin		Hillsburgh	
Well	E7	E8	H3	H2
PTTW Capacity (m^3/d)	2,160	1,968	655	982
DWWP Capacity (m^3/d)	2,592	2,361	654	982
Production Limit (m^3/d)	2,160	1,968	655	982
Existing Pumping Equipment (m^3/d)	2,592	2,356	656	1,011
System Capacity (m^3/d)	4,128		1,637	
Firm Capacity (m^3/d)	1,968		655	
System Storage (m^3)	2,200		790	

4.5.3 Existing Water Demands.

The Town of Erin Council passed By-Laws 15-41 and 15-42 on October 20, 2015. These by-laws enact rules and regulations for the distribution, use and the establishment of municipal water within the Town (By-Law 51-41) and for establishing water service rates and fees for the municipal water systems servicing the Town (By-Law 15-42). The by-laws became effective January 1, 2016. Copies of the By-Laws are provided in Appendix H. As noted in By-Law 15-42, water billing rates and charges are consistent each year from 2016 through 2020, as per the by-law, Schedule "A".

Tables 2 and 3, below, summarize the total annual pumping volume of raw water from the wells between 2016 and 2019, along with the total annual rainfall and the number of new residences built each year.

Maximum day demand is expected to vary yearly as it is attributed to many factors. Water demands often increase during dry weather resulting in consumers using water to water gardens, lawns, etc., during extreme cold weather resulting in consumers having to continuously run a water tap in their residence to prevent water services from freezing, during system maintenance events such as watermain flushing and reservoir cleaning, system failures (watermain breaks) or for new development. Water demands typically decrease in the event of loss of significant users (i.e. industrial) or when water conservation measures are implemented.

Table 2: Erin Water System Historical Well Pumping (Based on Annual Summary Reports)

Year	2016	2017	2018	2019
Total Volume (m^3)	281,334	281,900	275,761	244,107
Change (m^3)	-10,044	566	-6,139	-31, 654
Rainfall (mm)	755	971	773	968

Table 3: Hillsburgh Water System Historical Well Pumping (Based on Annual Summary Reports)

Year	2016	2017	2018	2019
Total Volume (m^3)	59,529	66,152	77,277	78,938
Change (m^3)	1,896	6,623	11,125	1,661
Rainfall (mm)	755	972	773	968

When the Class EA project was initiated in May 2015, flows for the years 2012 through 2014 were reviewed which indicated a supply deficit for both the Erin and Hillsburgh Water Systems. However, given that newer data is available, the available capacity of the system has been re-assessed. The following *Tables 4 and 5* summarize the average day and maximum day demand for each month of the last three years as reported in the annual Well Supply Summary Reports for each municipal water system.

Table 4: Erin Water System Demands (2017 to 2019)

Year	2017		2018		2019		
Month	**Average Day Flow (m^3/day)**	**Maximum Day Flow (m^3/day)**	**Average Day Flow (m^3/day)**	**Maximum Day Flow (m^3/day)**	**Average Day Flow (m^3/day)**	**Maximum Day Flow (m^3/day)**	
January	800.9	1126.3	671.2	916.8	665.7	858.1	
February	788.4	913.7	664.2	834.1	660.7	825.5	
March	811.8	1042.9	621.8	782.9	634.5	766.7	
April	780.8	921.0	603.2	940.0	608.5	865.0	
May	757.2	1208.2	744.6	1560.8	669.3	1012.9	
June	756.1	1350.5	876.8	1306.5	718.8	1507.5	
July	715.4	1116.9	1017.7	1536.3	879.6	1032.5	
August	710.0	872.8	985.2	1521.0	786.4	881.1	
September	770.6	1274.0	817.4	1293.3	649.6	809.0	
October	716.3	877.3	692.9	852.3	620.6	724.1	
November	619.0	914.7	700.5	908.7	577.9	817.0	**3 Year Average (m^3/day)**
December	679.6	870.0	661.1	909.9	617.4	1507.5	
Average	**742.2**	**1040.7**	**754.7**	**1113.5**	**674.1**	**967.2**	**723.7**
Maximum	**811.8**	**1350.5**	**1017.7**	**1560.8**	**879.6**	**1507.5**	**1472.9**

Table 5: Hillsburgh Water System Demands (2017 to 2019)

Year	2017		2018		2019		
Month	**Average Day Flow (m^3/day)**	**Maximum Day Flow (m^3/day)**	**Average Day Flow (m^3/day)**	**Maximum Day Flow (m^3/day)**	**Average Day Flow (m^3/day)**	**Maximum Day Flow (m^3/day)**	**3 Year Average (m^3/day)**
January	157.3	324.0	170.6	327.8	268.9	503.6	
February	142.5	322.3	161.7	331.6	212.8	312.9	
March	147.9	322.6	175.2	329.1	185.8	323.5	
April	153.7	319.8	160.6	308.3	208.1	358.2	
May	160.3	351.7	198.5	389.2	234.9	347.3	
June	197.8	555.3	243.2	382.8	235.7	422.7	
July	199.7	373.8	228.9	402.8	273.8	383.8	
August	192.8	349.3	222.6	531.3	229.8	348.0	
September	213.5	360.4	224.7	400.2	187.1	281.1	
October	234.0	392.6	237.3	375.1	193.5	328.4	
November	167.7	393.9	242.8	495.8	199.0	638.5	
December	199.7	733.3	275.4	447.0	186.2	638.5	
Average	**180.6**	**399.9**	**212.1**	**393.4**	**218.0**	**407.2**	**203.5**
Maximum	**234.0**	**733.3**	**275.4**	**531.3**	**273.8**	**638.5**	**634.4**

4.5.4 Projected Water Demand

In accordance with the GMS it was determined that the 2041 population would be a total of 10,300 in the urban centres of Erin and Hillsburgh. This future population is a substantial increase from the preliminary population estimate of 6,000 predicted in the SSMP (B.M. Ross, August 12, 2014). This increase in growth would result in a higher maximum day demand for the Hillsburgh and Erin Village municipal water systems, which will require changes to the reserve capacity of these systems, as summarized in the forecasted water demand for each growth scenario in *Tables 6, 7, and 8* for Erin, Hillsburgh, and Connected Systems, respectively.

Table 6: Erin Forecasted Water Demands Corresponding to Revised Growth Forecast

Year	Erin Village Independent System Firm Capacity (m^3/day)	MDD Per Unit* (m^3/d)	**Total Serviced Households	Max. Day Demand (m^3/d)	Reserve Capacity (m^3/d)
2020	1,968	1.45	1,019	1,473	495
2031	1,968	1.45	1,700	2,457	-489
2036	1,968	1.45	2,000	2,891	-923
2041	1,968	1.45	2,500	3,614	-1,646

Table 7: Hillsburgh Forecasted Water Demands Corresponding to Revised Growth Forecast

Year	Hillsburgh Village Independent				
	System Firm Capacity (m^3/day)	MDD Per Unit* (m^3/d)	**Total Serviced Households	Max. Day Demand (m^3/d)	Reserve Capacity (m^3/d)
2020	655	2.31	275	202	21
2031	655	2.31	700	515	-960
2036	655	2.31	900	662	-1,421
2041	655	2.31	1,100	809	-1,883

Table 8: Erin & Hillsburgh Forecasted Water Demands Corresponding to Revised Growth Forecast if Connected

Year	Erin & Hillsburgh Systems Connected			
	System Firm Capacity (m^3/d)	Total Serviced Households	Max. Day Demand (m^3/d)	Reserve Capacity (m^3/d)
2020	3,605	1,294	2,107	1,498
2031	3,605	2,400	4,072	-467
2036	3,605	2,900	4,967	-1,362
2041	3,605	3,600	6,151	-2,546

* As per 2020 Reserve Capacity Calculations
**As per the GMS (Dillon, October 2019)
MDD = Maximum daily demand

4.5.5 Projected System Storage Requirements

MECP design guidelines for water distribution systems require municipal storage facilities to be designed to allow maintenance of adequate flows and pressures in the distribution system during peak hour water demand and to meet critical demands during fire and emergency events. MECP design guidelines use the following equation to determine water system storage requirement:

Total Treated Water Storage Requirement (m^3) = A + B + C

Where: A (m^3) = fire storage

B (m^3) = equalization storage (25% of Maximum Day Demand)

C (m^3) = emergency storage (25% of (A + B))

Table 9 summarizes the distribution system storage requirements for 2031, 2036, and 2041-year planning horizons utilizing the 2020 per capita maximum day demand of 887L/person/day in Hillsburgh, and 556L/person/day in Erin.:

Table 9: Summary of System Storage Requirements

Village	Planning Period	Population	Duration (hours)	Fire Flow (L/s)	A (m^3)	B (m^3)	C (m^3)	Total (m^3)
Erin	2020	3,100	2	110	792	435	307	**1,534**
	2031	4,500	2	130	936	616	388	**1,940**
	2036	5,600	3	140	1,512	725	559	**2,796**
	2041	7,100	3	160	1,728	906	659	**3,293**
Hillsburgh	2020	1,500	2	90	648	289	234	**1,171**
	2031	2,000	2	90	648	404	263	**1,315**
	2036	2,500	2	100	720	520	310	**1,550**
	2041	3,200	2	110	792	635	357	**1,784**
Combined	2020	5,100	3	130	1,404	724	532	**2,660**
	2031	6,500	3	150	1,620	1,021	660	**3,301**
	2036	8,100	3	170	1,836	1,245	770	**3,851**
	2041	10,300	3	190	2,052	1,542	898	**4,492**

Section 5: Alternative Solutions

As per the project Terms of Reference (BHI, April 14, 2015) and in accordance with the Municipal Class EA Document and recommendations in the SSMP (B.M. Ross, August 12, 2014), the possible options considered as part of this Class EA include “do nothing” and alternatives to upgrade water systems to meet existing and future supply and storage requirements, as follows:

- Alternative 1: Do Nothing
- Alternative 2: Increase Water Taking from Existing Municipal Wells
- Alternative 3: Reinstate Bel-Erin Wells
- Alternative 4: Addition of New Wells for Each Existing Municipal System
- Alternative 5: Interconnect Erin and Hillsburgh Water Systems
- Alternative 6: Interconnect Existing Erin and Hillsburgh Water Systems and Addition of New Well Supply

5.1 Alternative 1: Do Nothing

This alternative does not address the lack of water supply reserve capacity, which is required to permit continued growth. Consistent with the assimilative capacity completed for the WWEA, a future equivalent population of 18,873 is anticipated for the urban centres of Hillsburgh and Erin by year 2041. Population and employment base growth is essential for the urban centres of Erin and Hillsburgh and ultimately for the Town. In accordance with the GMS, a long-term plan for the location, timing, phasing, servicing and financing is required to support population growth to the future equivalent population of 18,873. A Do-Nothing approach would not meet the Town’s goal to provide a full range of municipal services to support growth through additional development and redevelopment.

In addition to not satisfying the needs of future growth scenarios, this alternative would make no improvements or changes to address the existing lack of water supply reserve capacity to support future the extension of water service to existing unconnected residents and does not address the lack of redundancy to service the existing connected (serviced) population. Adoption of this alternative would consequently leave issues regarding housing types, property size and employment opportunities. Additionally, without available municipally serviced land, private developers (residential or employment lands) may be deterred from investing growth in the Town due to the additional time and money required to implement an independent water servicing solution for a proposed development.

The Do Nothing alternative may be implemented by the Municipality at any time. Such a decision is typically made when the costs of all alternatives including financial and environmental considerations outweigh the possible benefits.

5.2 Alternative 2: Increase Water Taking from Existing Municipal Wells

As indicated throughout this Report, the maximum water supply assumes the highest capacity well is out of service (firm capacity). It also assumes that the maximum permitted water taking capacity is available for use. This alternative solution to increase water taking from existing municipal wells was considered as a feasible alternative at the outset of this Class EA to address the demand of the existing and future growth scenario as determined in the SSMP; however, due to the increased population of the future growth scenario based on the WWEA, it has been determined that increasing water taking from the existing municipal well systems will not address the needs of the future growth scenario.

5.3 Alternative 3: Reinstate Bel-Erin Wells

The Bel-Erin wells are currently not operational; however, these wells could be reinstated following appropriate approvals and implementation of a water treatment system.

The Bel-Erin wells are classified as Groundwater Under Direct Influence (GUDI) of surface water. Water treatment options require additional assessment and it is expected that treatment costs would be prohibitive as compared to the development of a new water supply well that is not classified as GUDI. Therefore, the reinstatement of the Bel-Erin wells was not considered for further evaluation.

5.4 Alternative 4: Addition of New Wells for Each Existing Municipal System

For this alternative, the Township would need to find new municipal wells to increase firm capacity in order to satisfy the estimated maximum day demand of the future growth envisioned by the GMS. Generally, the minimum viable groundwater well capacity for a municipal water supply is in the range of 1,308 m^3/day (15 L/s or 200 IGPM) However, capacities in excess of 1,963 m^3/day (23 L/s or 300 IGPM) are typical.

As per the information presented in Section 4.5.4 Projected Water Demand, for the future growth preliminary population estimated by the GMS, it is expected that multiple wells will be required to achieve the desired long-term firm capacity.

In addition to satisfying the capacity requirements, the new wells would also need to meet water quality requirements.

5.5 Alternative 5: Interconnect Existing Erin and Hillsburgh Water Systems

On the basis of firm capacity, interconnection (i.e. trunk watermain) of the water systems would minimize the capacity upgrades needed to meet the demands of the existing community and future growth scenario by reducing the redundancy requirement from two wells to just one. This alternative solution was considered a feasible alternative at the outset of this Class EA to address the demand of the existing population and assist with future growth scenario. However, based on the GMS growth scenario, it has been determined that interconnection of the existing municipal water systems without the addition of a

new well supply will not address the capacity needs of the future growth scenario; therefore, not satisfying the problem statement of the Class EA.

5.6 Alternative 6: Interconnect Existing Erin and Hillsburgh Water Systems and Addition of New Well Supply

Similar to Alternative 5, this alternative would minimize the supply capacity upgrades needed to meet the demands of the existing community and future growth scenario; however, this alternative also includes the addition of new well supply. The Town would need to find new municipal wells to increase firm capacity in order to satisfy the estimated maximum day demand of the population of the preferred growth scenario presented in the GMS (Dillon, October 2019).

The interconnection also provides greater opportunity to access potential future wells sites since in the area between Erin and Hillsburgh should also be suitable for a new well based on reviews completed as part of the project Terms of Reference (BHI, 2015) and new water source investigations. The interconnection main would facilitate the easy connection of such a well into either or both systems.

Based on the 2041 build-out growth scenario presented in the GMS, if the systems were to be interconnected, it is anticipated that only the two additional wells would be required to satisfy these future demands assuming that each has a capacity of at least 1,300 m^3/day.

In addition to satisfying the capacity requirements, the new wells would also need to meet water quality.

Section 6: Shortlist Evaluation Of Water Supply Alternatives

The shortlist evaluation of the six alternatives listed above is based on the ability of the alternative solution to address the issues identified in the Problem/Opportunity Statement and is summarized in Table 10, as follows:

Table 10: Summary of Water Supply Alternatives Evaluation Versus Problem Statement

	Problem Statement Components			
Alternative Solutions	Increase Supply Capacity to Meet Requirements of Existing Community	Increase Redundancy in Both Communities	Increase Supply Capacity to Meet Future Requirements	Problem Statement Addressed in its Entirety?
Alternative 1: Do Nothing	No	No	No	No
Alternative 2: Increase Water Taking from Existing Municipal Wells	Yes	Yes	No	No
Alternative 3: Reinstate Bel-Erin Wells	Yes Erin Only	Yes Erin Only	No	No
Alternative 4: Addition of New Wells at Each Existing Municipal System	Yes	Yes	Yes	Yes
Alternative 5: Interconnect Existing Erin and Hillsburgh Water Systems	Yes	Yes	No	No
Alternative 6: Interconnect Existing Erin and Hillsburgh Water Systems and Addition of New Well Supply	Yes	Yes	Yes	Yes

Note: If Problem Statement is Satisfied (i.e. "Yes") = Alternative Solution is Shortlisted for Further Evaluation

Consistent with *Table 10* above, Alternatives 4 and 6 fully address the Problem Statement and are therefore carried forward for further evaluation with respect to investigation of source locations for new well supply and potential impacts on the environment. This is described in the following sections of this Report.

Section 7: Investigation Of New Water Sources

The Test Well Drilling and Testing Hydrogeologic Report (Hydrogeologic Report) by Groundwater Science Corp. dated February 2020 is included in Appendix E.1. The Hydrogeologic Report provides technical details of the new water source investigations completed as part of the Class EA. A summary of the information presented in the Hydrogeologic Report is provided in the following sections. It should be noted that the intention of the hydrogeological work program was to meet the minimum initial requirements for each community rather than a fixed water supply volume representative of the full build-out requirements, since actual development (and respective water supply capacity need) will occur incrementally in stages over the planning period (to year 2041).

7.1 Site Evaluation/Possible Well Locations

The potential locations for possible new municipal well sites were recommended by Blackport Hydrogeology Inc. through consideration of the requirement for future supply and various factors/assumptions, summarized as follows, as presented in the SSMP and project Terms of Reference (BHI, April 14, 2015):

- Wells should be located outside of the existing Well Head Protection Areas (WHPAs) to minimize the potential for mutual interference.
- Locations should be selected where a reasonable level of natural protection from surface sources of contamination can be provided.
- In general, wells should be located away from known or potential sources of contamination and/or poor groundwater quality.
- Areas where the existing well yield information shows limited promise for higher yielding wells (<500 m^3/day) should be given a low priority.
- Where possible, wells should be located in relatively close proximity to the existing distribution system.
- It is assumed that each new well will be capable of producing at least 1,000 m^3/day.

Locations should also be within the Credit Valley Watershed to avoid inter-basin transfer. Additional considerations should also be taken into account, such as: proximity to known existing, or former, high capacity wells; potential local aquifer capacity based on information available within the MECP water well record database; and, location and number of existing private wells in a potential investigation area.

A review of the existing higher producing wells in the areas of both Erin and Hillsburgh was completed to determine common patterns and provide drilling target focus. Based on the area's hydrogeology, the main drilling target is identified as the deeper bedrock zone, corresponding to the base of the Amabel Formation. Based on the considerations outlined in the TOR and the review of existing high producing wells, the potential drilling sites were identified, with the intent to serve the existing population to the future build-out. The locations of the potential drilling sites in Erin and Hillsburgh are presented on Figures 3 and 4, respectively, and include the following, which are described in the following subsections:

<u>Erin</u>

- Location 1 (Erin 1, Kenneth Ave well site), Former Mountainview Well Site
- Location 2 (Erin 2, TW1 site), Solmar lands, former Mattamy Homes Lands
- Location 3, (Erin 3, TW3 site), Tavares lands/Erin North site (Wellington Road 23)
- Location 4 (Erin 4), southeast corner of Erin Village (Wellington Road 52)
- Location 5 (Erin 5), 8th Line/Dundas Street West

<u>Hillsburgh</u>

- Firehall Well
- Location 1 (Hillsburgh 1, TW01-18 site), Nestle lands, located approximately 830 m from the existing watermain infrastructure at the intersection of Trafalgar Road and Mill/George Street, and approximately 690 m from watermain on Spruce Street.
- Location 2 (Hillsburgh 2, TW4 site), Tavares lands, located approximately 100 m from the watermain infrastructure on Douglas Crescent.
- Location 3 (Hillsburgh 3), Thomasfield Homes Lands, Wellington Road 22
- Location 4 (Hillsburgh 4), North of Upper Canada Drive

The following descriptions provide a brief summary of site selection criteria, please refer to the Test Well Drilling and Testing Hydrogeologic Report (Hydrogeologic Report) by Groundwater Science Corp. (Appendix E.1) for additional details.

7.1.1 Mountainview (Erin 1)

The Mountainview site is located on municipally owned land at the corner of Kenneth Ave and 9th Line that provides easy access and has close proximity to the existing Erin water supply distribution system. Based on a review of the location and geologic setting, the site also satisfies other considerations outlined in the TOR. Former (now decommissioned) moderate to high production wells (Gulia Well, Mountainview Well) were located in this area, indicating water supply potential.

7.1.2 Solmar/Former Mattamy Homes Lands, Wellington Road 124 (Erin 2)

This proposed test well site is located within an area of future expected development, referenced as the Solmar (former Mattamy Homes) Lands. The site is relatively close to existing municipal water supply infrastructure and future municipal water supply infrastructure is expected in this area. Based on a review of the location and geologic setting, the site also satisfies other considerations outlined in the TOR. In addition, two existing upper bedrock zone test wells are located on-site, constructed in 2006, that are reported to have moderate capacity (and potential for high capacity).

7.1.3 Tavares Lands, Wellington Road 23 (Erin 3)

This site is relatively close to existing municipal water supply structure and based on a review of the location and geologic setting the site also satisfies other considerations outlined in the TOR. A review of local water well records indicates potential that a high capacity well could be developed in this area.

7.1.4 Wellington Road 52 (Erin 4)

This site is located at the southeast corner of Erin Village. This site is relatively close to existing municipal water supply structure and based on a review of the location and geologic setting the site also satisfies other considerations outlined in the TOR. Relatively high capacity wells have been developed in this area for aggregate washing purposes.

7.1.5 8th Line/Dundas (Erin 5)

This site is located at the southwest end of Dundas Street. This site is relatively close to existing municipal water supply structure and based on a review of the location and geologic setting the site also satisfies other considerations outlined in the TOR. Based on existing municipal wells north of the site some potential exists for the development of a new high capacity well in this area.

7.1.6 Firehall (Hillsburgh)

The Firehall Well was selected as the first priority to test in Hillsburgh because it is an existing municipally owned well located in close proximity of the water distribution system, and because of the well's reported high capacity when it was initially drilled in 1989 and subsequently tested.

7.1.7 Nestlé (Hillsburgh 1)

This original site chosen is located on the eastern portion of Nestlé Canada lands. One major benefit of drilling and testing on Nestlé Canada lands is the availability of an extensive existing monitoring network with a long-term historical data base. The existing network and information could significantly enhance the ability of the Town to monitor the effects of drilling and testing a well, and may reduce the costs associated with that monitoring. This site is close to existing municipal water supply structure and based on a review of the location and geologic setting the site also satisfies other considerations outlined in the TOR.

Although the Nestlé site is closer to surface water features than the other proposed potential well sites in Hillsburgh, based on the target depth, known overlying till unit and potential presence of the Eramosa Formation, a deep source at this location is expected to provide separation from the influence of the shallow (overburden) groundwater system and surface water.

7.1.8 Tavares Lands, Currie Drive (Hillsburgh 2)

The Hillsburgh 2 site is located within an area of future expected development, referenced as the Tavares Lands. This site is very close to existing municipal water supply structure and based on a review of the location and geologic setting the site also satisfies other considerations outlined in the TOR. Some potential for high aquifer capacity is indicated by existing municipal wells completed in the upper bedrock in the area. Local water wells on record in this area do not extend to the lower (assumed productive) target bedrock zone. This site also provides distance from the Nestlé Canada well (i.e., reduces potential mutual interference).

7.1.9 Thomasfield Homes, Wellington Road 22 (Hillsburgh 3)

The Hillsburgh 3 site is located within an area of future potential development, referenced as the Thomasfield Homes Lands. Although this site is located further from existing municipal water supply infrastructure than the Nestlé and Tavares Lands, and has a larger number of private wells in the vicinity, based on a review of the location and geologic setting the site satisfies other considerations outlined in the TOR. Future municipal water supply infrastructure is expected in this area.

7.1.10 North of Upper Canada Drive (Hillsburgh 4)

The Hillsburgh 4 site is located within an area of future potential development. Portions of the site are located relatively close to existing municipal water supply infrastructure, and future municipal water supply infrastructure is expected in this area. Based on a review of the location and geologic setting the site satisfies other considerations outlined in the TOR.

One potential issue identified for this site is the proximity to existing well H2, which is known to have a natural presence of lead. Therefore, there is a concern that a well at this location could experience the same issue. Additional testing is needed to determine local groundwater quality.

7.2 Test Well Drilling and Assessment

The initial goal of the water supply assessment was to establish one new municipal water supply well in both Erin village and Hillsburgh. The timing and sequence of the well construction and testing program was related in part to factors such as: the stepwise staging of budget available for the assessment; access to individual sites for drilling and monitoring; timing of work completed by others that provided information to be considered by the Class EA; time required for essential approvals related to testing; and, the timing of the construction and testing activities undertaken by the Town.

Two existing Test Wells (one at the Erin 2 site in Erin village and one at the Firehall in Hillsburgh) were assessed as part of the program, in order to potentially reduce drilling and construction costs by utilizing existing infrastructure. Existing wells were assessed by short- or long-term pumping, and, geophysical

inspection (as needed).

Short term well development and/or pump testing was limited to less than 50,000 litres per day and involved monitoring the test well in addition to any nearby monitoring wells (or surface water features) for which immediate access was available. Long term testing included appropriate approvals, such as: A Permit to Take Water (PTTW) from the MECP; additional review and consultation with CVC regarding discharge location and groundwater and surface water monitoring requirements; a private well survey; and, monitoring of local private wells

As part of this Class EA, the construction and development of the new (nominal) 152 mm diameter Exploratory Test Wells provides a preliminary assessment of the potential capacity of the chosen investigation sites through the drilling process and some short-term testing. The Exploratory Test Well drilling does not include any long-term pumping or significant removal of water from the well.

If the initial Exploratory Test Well capacity is deemed favourable, the next step in the Town of Erin Class EA would include the construction of a (nominal) 254 mm diameter (larger, potential municipal) well, and a long-term pump test to confirm capacity, assess water quality and assess impacts to the surrounding groundwater system and private water supplies.

Testing of the existing Hillsburgh Fire Hall Well commenced in July 2016. As described later in this report, this testing was unsuccessful. Subsequently, in August 2018 Nestlé Canada initiated a well drilling and testing program on their lands (Hillsburgh 1 location) as part of their ongoing monitoring program, and, to assist the Town of Erin with the Class EA investigations in Hillsburgh. As described later in this report, the Nestlé test well capacity did not meet initial water supply targets for the community. Based on the identified capacity and uncertainty related to the timing of a potential connection to the existing water supply system from the Nestlé site, an exploratory well drilling and testing program was initiated at the Hillsburgh 2 location (Tavares Lands, Currie Drive) in December 2018. The results of the drilling and testing programs are described in Section 7.2.8 of this report.

Exploratory drilling activities at the Erin 1 location (former Mountainview Well site) in Erin village commenced in October 2017. As described later in this report, the resulting well has limited capacity. Based on those results an exploratory testing and drilling program was initiated at the Erin 2 (Solmar Lands) and Erin 3 (Tavares Lands) locations. The results of the drilling and testing programs are described in Sections 7.2.2 and 7.2.3 of this report.

The following descriptions provide a brief summary of site investigation results, please refer to the Test Well Drilling and Testing Hydrogeologic Report (Hydrogeologic Report) by Groundwater Science Corp. (Appendix E.1) for additional details.

7.2.1 Mountainview (Erin 1)

The former Mountainview Subdivision Well site on Kenneth Avenue was the first priority of the test drilling activities in Erin Village because the site is owned by the Town (which facilitates access and reduces potential costs), and the potential bedrock aquifer capacity identified at the former Gulia Well.

Based on concerns expressed by a local landowner, and consultations with the MECP, it was determined that during the drilling and testing period, monitoring should occur on the Silvercreek Aquaculture site to ensure that springs contributing to the fish farm water supply were not affected. In addition, MECP has indicated that the daily volume of water removed during the drilling process (e.g. during well development) must be measured and remain less than 50,000 litres per day (otherwise a PTTW would be required).

After MECP and landowner consultations, access was obtained and water level monitoring initiated at the Silvercreek Aquiculture site (Spring 1 and Spring 3) on October 18, 2017. Monitoring was also

initiated at two water table observation wells and one private bedrock well located between the drill site and the Silvercreek Aquiculture site.

The Kenneth Ave bedrock test well was drilled and initial well development completed on November 6, 2017. Additional test well development and testing occurred on November 10, 2017.

Water production zones at the well were identified within the relatively shallow bedrock, however not encountered at depth within the identified target zone. The overall capacity of the test well is limited, potentially in the range of 3 L/s (assuming an operationally sustainable drawdown of 10 m), which corresponds to approximately 259 m^3/d. Therefore, the well as constructed is considered very marginal with respect to the identified water supply needs. Based on the results of the Kenneth Avenue Test Well further testing and exploratory drilling was initiated.

7.2.2 Solmar/Former Mattamy Homes Lands, Wellington Road 124 (Erin 2)

The existing bedrock test well, identified as TW1 for this study, located at the north end of the Solmar Lands was identified as the second priority of the testing program in Erin Village based on location, reported historical testing results, and potential to reduce program drilling costs.

Updated testing (pumping) at TW1 for the Town of Erin Class EA was initiated on December 29, 2017. Basic water quality samples were obtained at that time. Water quality results indicate elevated sodium and chloride concentrations were present, which may indicate surficial connection (e.g. road salting impacts). In addition, elevated concentrations of iron and manganese were also noted. The 2017 TW1 pumping test results were considered marginal with respect to the identified water supply needs. In addition, video inspection indicated that the condition of the well had deteriorated over time. Based on the 2017 testing results it was determined that a new nominal 152 mm diameter exploratory bedrock test well (TW2) was required to further assess the water supply potential of the Solmar Site. This work was authorized in May 2018.

TW2 was drilled and developed on July 17, 2018. At that time TW1 was also flushed (air lifted) until the discharge water was relatively clear to attempt to rehabilitate the well. The TW2 drilling results indicate two water producing zones in bedrock (e.g. fractures) encountered at depths of 28 to 29 m, and, 43 to 43.6 m; and a projected pumping rate of 11.4 L/s at 10 m drawdown.

Video well inspection, flow profiling and step testing at TW1 and TW2 was completed on January 15 and 16, 2019. Basic water quality at TW2 was also sampled at that time. TW2 water quality results similar water quality as observed at TW1 (possible road salt impacts), however iron and manganese concentrations are reduced.

The overall test results indicated that rehabilitation efforts at TW1 did not restore the well to the original reported capacity. The projected capacity at TW2 is also at the lower end of water supply needs identified for this assessment. Based on the historical and drilling and testing it appears there may be some water supply potential at the Solmar testing site, however results to date indicate individual well capacities are limited. Additional testing may be considered in the future to determine if, for example, combined pumping at TW1 and TW2, or exploratory test wells at other well locations at the Solmar property, would result in more appropriate production rates.

7.2.3 Tavares Lands, Wellington Road 23 (Erin 3)

A nominal 152 mm diameter exploratory bedrock test well TW3 was drilled on December 12, 2018. The drilling results indicate two significant water producing zones (e.g. fractures) encountered at depths of 51.8 m, and, 73.8 m.

Video well inspection, flow profiling and step testing at TW3 was completed on January 22 and 28, 2019.

The test results are summarized as follows:

- TW3 video inspection and flow profiling indicates water production zones at depths of 56.7 m (10% of inflow), 66.1 m (15% of inflow), and 73.2 m (70% of inflow);
- TW3 step testing results in a specific capacity of 3.15 L/s/m;
- projected potential pumping rate of 31.5 L/s (2,722 m^3/d) based on an assumed operationally sustainable drawdown of 10 m; and,
- overall good water quality results are noted, however slightly elevated sulfate is present (at concentrations below drinking water guidelines), sodium and chloride are present at relatively low concentrations.

Based on the drilling and testing results a decision was made to proceed to the municipal well construction and testing stage at the Erin 3 site.

7.2.4 Wellington Road 52 (Erin 4)

Based on the successful results obtained at the Erin 3 location, no additional test drilling was completed. Future water supply investigations, as required, can be completed to assess potential water supply capacity of the Erin 4 site.

7.2.5 8th Line/Dundas (Erin 5)

Based on the successful results obtained at the Erin 3 location, no additional test drilling was completed. Future water supply investigations, as required, can be completed to assess potential water supply capacity of the Erin 5 site.

7.2.6 Firehall (Hillsburgh)

In order to assess the capacity of the Firehall Well (completed in bedrock) as a Municipal Supply, a pump test was completed in July 2016. During the test, the pumping capacity of the well varied unexpectedly; the well produced significant amounts of sediment; and a response was observed at a number of private wells completed in both the upper and lower bedrock zones.

Due to the unexpected results of the pumping test, a video flow log of the well was then completed to help determine the source of the sediment and main water production zone. The log indicated that the main water production zone is in the uppermost bedrock, near the well casing bedrock contact. This is also the source of the sediment that is noted in the well water when pumped at the higher rates that would be required to satisfy the identified water supply needs. The lowermost zone was shown to have limited water production. As a result, the Firehall Well is not recommended for use as a Municipal Supply.

7.2.7 Nestlé (Hillsburgh 1)

Based on discussions with Nestlé Waters Canada (NWC), an area of interest within NWC lands was identified for exploration as part of the Class EA. The overall area was chosen to maximize distance from the NWC supply well, and a specific green field location south of Station Street was identified by the study team that would also maximize distance from surface water features in the area.

NWC, as part of an initiative to expand their monitoring network, completed a drilling program within the former Morette Furniture site (15 Station Street). As part of that work NWC also drilled and tested a deep bedrock well adjacent to the new monitoring wells. The deep well was completed, in part, to provide a preliminary assessment of the potential for a new water supply source for Town, and thereby assist the Class EA. NWC has shared drilling and testing results with the Town of Erin. The nominal 152 mm diameter test well (TW01-18) was completed on August 9, 2018.

Subsequent testing was completed on the lower bedrock aquifer zone and a summary report was provided to the Town of Erin on September 6, 2018. The report indicates two short term constant rate

tests, as well as a step test, was completed at rates up to 11 L/s. Based on the results a specific capacity of 0.48 L/s/m was estimated. A projected lower zone potential production rate of 15.8 L/s (1,365 m3/day) was provided, assuming a total drawdown of 33.2 m.

For comparison with other testing results obtained as part of the Class EA, a revised projection based on an assumed operationally sustainable drawdown of 10 m projected a potential pumping rate of 4.8 L/s (413 m3/day). Based on the revised projection, the NWC lower zone as tested would not meet the identified water supply needs.

NWC subsequently converted the original test well to deep bedrock zone monitoring well.

Based on the TW01-18 testing results, a decision was made to proceed to additional exploratory test well drilling at the Hillsburgh 2 site.

7.2.8 Tavares Lands, Currie Drive (Hillsburgh 2)

The nominal 152 mm diameter exploratory bedrock test well TW4 was drilled and developed on December 30, 2018. The drilling results indicate two significant water producing zones (e.g. fractures) encountered at depths of 21.3 m, and, 86.3 m.

Video well inspection, flow profiling and step testing at TW4 was completed on January 22, 2019. General water quality sampling was also completed at that time. The test results indicated numerous potential water production zones at depths of 20.8 to 22.6 m (cavern, fractures, vuggs), 24.9 m (fracture), 30.6 to 34 m (fractures, vuggs), and, 76.7 to 82.6 m (cavern, fractures, vuggs) below ground surface.

TW4 open hole step testing at rates up to 9.5 L/s resulted in 0.8 m drawdown and an estimated open hole specific capacity of 12.13 L/s/m. Much of the water produced by the open hole appears to be from the upper highly fractured Guelph Formation. Generally good water quality results are noted, however elevated hydrogen sulphide is present along with elevated iron and manganese, sodium and chloride are at moderate concentrations which may indicate some surficial connection may be present as the water quality is expected to be representative of the upper zone (predominantly).

The initial drilling and testing results indicated a highly productive well as constructed. However, based on the presence of sand and gravel to surface and highly fractured upper bedrock it was decided to utilize a packer to test the capacity of the lower zone (only) in order to assess the capacity of the deep bedrock aquifer.

A short-term test of the lower aquifer zone was completed on May 3, 2019. General water quality samples were obtained during the test. An inflatable packer was set to approximately 30.5 to 31.5 m below ground surface and the lower zone pumped at rates of 3.4 and 7.2 L/s. Based on the results a lower zone specific capacity of 1.75 L/s/m was estimated, and a projected pumping rate of 17.5 L/s based on an assumed operationally sustainable drawdown of 10 m. The results are interpreted to be relatively conservative based on the video inspection identification of major water production zones at depth and due to limitations with the packer and pumping configuration.

Water quality results from the lower zone at TW4 are somewhat similar as compared to the open hole results, however based on the pumping time there may be residual characteristics from the upper zone due to the flow of water from the upper to lower zones over time. Sodium, chloride, iron and manganese concentrations are slightly lower than observed from the open hole samples, however sulfate concentrations are slightly higher (but below drinking water guidelines).

Based on the drilling and testing results a decision was made to proceed to the municipal well construction and testing stage at the Hillsburgh 2 site.

7.2.9 Thomasfield Homes, Wellington Road 22 (Hillsburgh 3)

Based on the successful results obtained at the Hillsburgh 2 location, no additional test drilling was completed. Future water supply investigations, as required, can be completed to assess potential water supply capacity of the Hillsburgh 3 site.

7.2.10 North of Upper Canada Drive (Hillsburgh 4)

Based on the successful results obtained at the Hillsburgh 2 location, no additional test drilling was completed. Future water supply investigations, as required, can be completed to assess potential water supply capacity of the Hillsburgh 4 site.

7.2.11 Summary of Test Well Assessment Results

Based on the results of the analysis, two well sites, Erin 3 (TW3 and Production Well E9) and Hillsburgh 2 (TW4 and Production Well H4) were chosen to advance forward to the long-term pump test stage.

7.3 Production Well Development and Assessment

In order for a well to be used for municipal purposes, information obtained from a pumping test completed over an extended (up to one-week period) is typically required. The testing includes a hydrogeologic study, and requires a temporary PTTW and associated pumping/monitoring plan. As part of the MECP temporary PTTW application, a pump test monitoring program was developed and submitted. CVC input to the pump test monitoring program was also sought due to the presence of natural environment features (wetlands, ponds, creeks), known cold water habitat, spring areas and/or trout spawning within 1 km of the proposed sites.

The hydrogeological work and assessment undertaken to drill and test the new municipal wells E9 and H4 for the Town are summarized in the following sections. Details of the work is provided in the Well E9 Drilling and Testing Hydrogeological Report and Well H4 Drilling and Testing Hydrogeological Report provided in Appendices E.2 and E.3, respectively.

7.3.1 Tavares Lands, Wellington Road 23 (Erin 3, TW3, Production Well E9)

The following descriptions provide a brief summary of municipal drilling and testing program at the Erin 3 site, please refer to the Erin Village Municipal Well E9 Drilling and Testing Hydrogeological Report (Hydrogeologic Report) by Groundwater Science Corp. (Appendix E.2) for additional details.

Drilling and well construction at well E9 began on July 24, 2019 and the well was largely complete and ready for testing after the final well development, which was completed on November 14, 2019. The last stage of well construction (chlorination and provision of locking well cap and well tag) was completed by December 23, 2019. Well E9 was completed to the target depth (base of the Amabel Formation) and obtains the majority of water from deep bedrock zones. Initial drilling and development results indicated that well E9 is a high capacity well, and additional testing was undertaken.

A Category 2 (temporary) PTTW was obtained from MECP to allow testing of well E9. As part of the testing and monitoring program development CVC was also consulted. At CVC's request the Town facilitated a stream inspection and trout spawning (redd) survey at accessible properties within approximately 1.5 km of E9. Property access was arranged through landowner contact, by door to door survey or requests sent by mail. The stream inspection and redd survey in the area of E9 was completed in conjunction with CVC staff in late October and early November 2018. Based on those results specific monitoring locations were established to assist in assessing impact to natural environment features, including streams and identified sensitive fish habitat areas. Stream bed piezometers were installed at 6 accessible locations and water table observation wells installed at 2 locations, to monitor groundwater

conditions at and near the local creek system. Streambed piezometer and water table observation well monitoring began in mid-November 2019 and extended to early January 2020.

A door to door water well survey was also completed within approximately 1.5 km of E9 in October 2019 to identify local water well locations and obtain monitoring access permissions. Based on access permission, well construction and physical access considerations, 10 private wells were selected for water level monitoring during the pumping test period. The private wells monitored included 1 shallow dug well and 9 drilled wells. Private well monitoring began in mid-November 2019 and extended to mid-January 2020.

Select existing observation wells, test wells and municipal supply wells in the overall area of E9 were also monitored during the test period. A total of 28 locations (including stream bed piezometers, pond stilling well, monitoring wells and private wells) were monitored as part of the E9 testing program. Detailed water level measurements were obtained using water level transducers/dataloggers.

Step and pump testing of E9 was completed from December 11, 2019 to December 17, 2019. A pumping rate of 32 L/s was achieved over a 5-day continuous pump test. Water quality samples were obtained during the test.

Over the test period 1 private water supply interference was reported on December 14, 2019. In response the pump was lowered from 21.9 m depth to 36.6 m depth by an MECP licensed water well contractor working on behalf of the Town. This action restored water service to the household on the same day the complaint was received. No other well interference complaints were received and no other interference was observed.

Based on an analysis of the pumping test results, the following conclusions are made:

1. The additional firm capacity provided by well E9 will meet the current the Class EA minimum initial water supply target (maximum daily demand) for the Village of Erin of 2,457 m^3/d (28.4 L/s over 24 hours), which corresponds to the population growth forecast to year 2031, as outlined in the Final Growth Management Strategy Report (Dillon, October 2019) for the Town.
2. A well yield of 32 L/s is achievable from well E9.
3. Based on information available at this time, routine daily use of well E9 is not expected to interrupt local water supplies in the future. If impacts do occur after E9 is in service, water supply at private wells can be reestablished through routine established methods such as lowering pumps and/or deepening wells.
4. The operation of well E9 is expected to have minimal mutual interference with existing well E7 and well E8.
5. Water quality obtained from well E9 is good, and after routine use and treatment is expected to meet applicable drinking water standards. There is no evidence of anthropogenic contamination at well E9.
6. The bedrock aquifer at well E9 is well protected by the overlying till unit, which provides hydraulic isolation from shallow overburden and surface water systems.
7. Based on the pumping test response and water quality analysis results well E9 is interpreted to be not a GUDI well, primarily due to the protection the overlying aquitard provides and depth of primary water bearing zones.

On that basis recommendations are made to obtain a long-term PTTW at E9 for a maximum rate of 32 L/s and daily maximum taking volume of 2,765 m^3/day, and, to incorporated well E9 into the Erin Village Municipal Water Supply System once all applicable permits are obtained. In addition, a monitoring program is recommended at existing observation wells and streambed piezometers in the area.:

7.3.2 Tavares Lands, Currie Drive (Hillsburgh 2, TW4, Production Well H4)

The following descriptions provide a brief summary of municipal drilling and testing program at the Hillsburgh 2 site, please refer to the Hillsburgh Municipal Well H4 Drilling and Testing Hydrogeological Report (Hydrogeologic Report) by Groundwater Science Corp. (Appendix E.3) for additional details.

Drilling and well construction at well H4 began on July 30, 2019 and the well was largely complete and ready for testing after the final well development, which was completed on December 11, 2019. The last stage of well construction (chlorination and provision of locking well cap and well tag) was completed by January 13, 2020. Well H4 was completed to the target depth (base of the Amabel Formation) and was constructed to obtain the water from lower bedrock zones. Initial drilling and development results indicated that well H4 is a high capacity well, and additional testing was undertaken.

A Category 2 (temporary) PTTW was obtained from MECP to allow testing of well H4. As part of the testing and monitoring program development Credit Valley Conservation (CVC) was also consulted. At CVC's request the Town facilitated a stream inspection and trout spawning (redd) survey at accessible properties within approximately 1.5 km of H4. Property access was arranged through landowner contact, by door to door survey or requests sent by mail. The stream inspection and redd survey in the area of H4 was completed in conjunction with CVC staff in November 2018. Based on those results specific monitoring locations were established to assist in assessing impact to natural environment features, including streams and identified sensitive fish habitat areas. Stream bed piezometers were installed at 5 accessible locations and water table observation well installed at 1 location, to monitor groundwater conditions at and near the local creek system. Streambed piezometer and water table observation well monitoring began in late November 2019 and extended to early February 2020.

A water well survey was also completed within approximately 1.5 km of H4 in October 2019 to identify local water well locations and obtain monitoring access permissions. The survey included door to door canvasing at rural properties outside the village boundary (known to be serviced by private wells), and, a mail-out within the village boundary which includes both serviced and un-serviced residences. Within the town residential area, the survey package was mailed to all residences within 500 m of well H4, and all residences within 1 km of H4 reported to not have municipal water service. A total of 338 survey packages were mailed out. Based on access permission, well construction and physical access considerations, 10 private wells were selected for water level monitoring during the pumping test period. The private wells monitored included 2 shallow dug wells and 8 drilled wells. Private well monitoring began in early December 2019 and extended to early February 2020.

Select existing observation wells, test wells and municipal supply wells in the overall area of H4 were also monitored during the test period. A total of 25 locations (including stream bed piezometers, monitoring wells and private wells) were monitored as part of the H4 test program. Detailed water level measurements were obtained using water level transducers/dataloggers.

Step and pump testing of H4 was completed from January 8, 2020 to January 18, 2020. The initial pump test was completed at an average rate of 27.6 L/s, however was terminated after approximately 1 day due to interference with the operation of the Glendevon municipal well (H3). A second 3-day pump test was completed at an average rate of 18.4 L/s. Over that test well H3 was not in use, and water levels were monitored at H3 in order to assess drawdown effects related to pumping H4. Water quality samples were obtained at H4 during the testing period.

Over the test period 3 private water supply interference was reported on December 18, 2019, after pumping was terminated at H4. At 2 of the locations water levels and water supply were restored through natural aquifer recovery, as confirmed by the residents. At 1 location restoration attempts were made to replace and lower the pump, however this was unsuccessful. A temporary potable water supply service (tank and water delivery) was installed. The Town is currently working to connect the household to the

municipal water supply, which is available at the property boundary. Once connected, the municipal supply will restore full water service to the residence. No other well interference complaints were received and no other interference was observed.

Based on an analysis of the pumping test results, the following conclusions are made:

1. The additional firm capacity provided by well H4 will meet the Class EA minimum initial water supply target (maximum daily demand) for Hillsburgh (1,615 m^3/d or 18.7 L/s), which corresponds to the population growth forecast to year 2031, as outlined in the Final Growth Management Strategy Report (Dillon, October 2019) for the Town.
2. A well yield of 27.6 L/s is achievable from well H4 over a 1-day period and 18.4 L/s (or more) is available over extended periods.
3. Based on information available at this time, routine daily use of well H4 at expected typical average daily pumping volumes and daily water taking periods is not expected to interrupt local water supplies. As daily water taking volumes and daily pumping periods gradually increase a water supply interference policy should be developed and implemented to ensure local water supplies are maintained. If impacts do occur after H4 is in service, water supply at private wells can be reestablished through typical routine methods such as lowering pumps, deepening wells, or connection to municipal water supply service.
4. The operation of well H4 can have mutual interference effects at H3, depending on water taking rates and timing. On an initial basis water taking at H3 and H4 should alternate such that simultaneous taking does not occur. Over the long-term alternatives such as lowering the existing pump in H3 can be used to mitigate mutual interference effects.
5. Water quality obtained from well H4 is good, and after routine use, and treatment, is expected to meet applicable drinking water standards. There is no evidence of anthropogenic contamination at well H4.
6. Based on the pumping test response and water quality analysis results well H4 is interpreted to be not a GUDI well, primarily due to the depth of primary water bearing zones.

On that basis recommendations are made to obtain a long-term PTTW at H4 for a maximum rate of 18.7 L/s and daily maximum taking volume of 1,615 m^3/day, and, to incorporated well H4 into the Hillsburgh Municipal Water Supply System once all applicable permits are obtained. A monitoring program is also recommended at existing observation wells and streambed piezometers in the area. In addition, a water supply interference policy and procedure is recommended to ensure local private water supplies are maintained as the municipal water supply infrastructure and service is expanded.

7.4 Identification of Project Preferred Solution

The results of the testing, monitoring and assessment of the water supply sources at E9 (Erin) and H4 (Hillsburgh) were used in the evaluation of the shortlisted Alternative Solutions. The evaluation considered the future supply demands of the Preferred Growth Allocation Scenario, in accordance with the Final Town of Erin Growth Management Strategy Report and is summarized in *Tables 11 and 12*, below.

Table 11: Reserve Capacity Evaluation of Shortlisted Alternatives Versus the Preferred Growth Allocation Scenario

Village	Year	Serviced Population	Supply Requirements (m^3/day)	Additional Supply Capacity (m^3/day)	New System Firm Capacity (m^3/day)	New Reserve Capacity (m^3/day)	Alternative
Erin	2020	3,100	1,473	2,765	4,128	2,655	Alternative 4
	2031	4,500	2,457	2,765	4,128	1,671	
	2036	5,600	2,891	2,765	4,128	1,237	
	2041	7,100	3,614	2,765	4,128	514	
Hillsburgh	2020	1,500	634	1,616	1,637	1,003	
	2031	2,000	1,615	1,616	1,637	22	
	2036	2,500	2,076	1,616	1,637	-439	
	2041	3,200	2,538	1,616	1,637	-901	
Erin & Hillsburgh Combined	2031	6,500	4,072	4,380	7,381	5,273	Alternative 6
	2036	8,100	4,967	4,380	7,381	3,309	
	2041	10,300	6,151	4,380	7,381	2,414	

Table 12: Future Storage Capacity Evaluation of Shortlisted Alternatives Versus the Preferred Growth

	Year	**Population**	**Existing Storage (m^3)**	**Required Storage (m^3)**	**Additional Storage Required (m^3)**
Erin	2031	3,100	2,200	1938	-262
	2036	5,600	2,200	2793	593
	2041	7,100	2,200	3289	1089
Hillsburgh	2031	2,000	790	1315	525
	2036	2,500	790	1549	759
	2041	3,200	790	1783	993

Identification of the Preferred Alternative is ultimately selected as the alternative that is most prepared to meet the supply and storage of the future growth scenario; since both alternatives are able to address the needs of the existing community and the potential impacts on the environment are similar between both alternatives, as summarized in *Table 13*, below.

Table 13: Evaluation of Potential Impacts

Environment	Alternative 4 - Addition of New Wells for Each Existing Municipal System	Alternative 6 - Interconnect Existing Erin and Hillsburgh Water Systems and Addition of New Well Supply
Cultural	The heritage attributes of identified cultural heritage landscapes and built heritage resources will continue to existing with or without the installation of proposed well site infrastructure. Mitigation measures to conserve cultural heritage value or interest will limit potential impacts.	
Social	Will permit the extension of water services to new developments, which is a requirement for continued growth to meet the requirements of the Provincial Policy Statement.	
Natural	Potential impacts to vegetation, wildlife and their habitat are rated as minor. Mitigation measures will be used to avoid any adverse impacts to vegetation, wildlife and habitat. Based on a preliminary assessment, 16 existing properties within a 100 m radius of the new wells may be subject to a number of requirements including septic inspections, manure application prohibitions, risk management plans for agricultural activities and for chemical handling/storage and education requirements. Conditions/restrictions (i.e. no private servicing) will be applicable to new developments created within 100 m of the new well. Further study will be required following the completion of this Class EA to delineate vulnerable areas and amend the CTC Source Protection Plan.	
Technical	This alternative would require an additional new well and increased storage due to reduced redundancy. The Town will be more resilient to extreme weather conditions as firm capacity of the municipal water system will be increased through additional well supply, storage and redundancy, should one of the well sites fail during a storm event (climate change related).	Provides greater access to potential future wells since the area between Erin/Hillsburgh is hydrologically suitable for a new well. This connection would facilitate the easy connection of such a well into either system. The Town will be more resilient to extreme weather conditions as firm capacity of the municipal water system will be increased through additional well supply, storage and redundancy, should one of the well sites fail during a storm event (climate change related).
Economic (preliminary cost estimate)	This alternative would require additional infrastructure (i.e. additional well) due to reduced redundancy which would increase both capital and operational costs. Supports the intent of the GMS regarding Growth Projections. Both alternatives require the two new wells (E9 & H4), connections to the existing mains and two elevated water storage facilities. This alternative will require another well for Hillsburgh be investigated, drilled/tested and commissioned. Total estimated cost of this supporting infrastructure is $22,605,170.00	A sewage forcemain is proposed along the same route as the interconnecting trunk watermain, so cost of construction for this interconnection will be significantly reduced. Supports the intent of the GMS regarding Growth Projections. Both alternatives require the two new wells (E9 & H4), connections to the existing mains and two elevated water storage facilities. In addition, this alternative will require a trunk watermain to connect the Hillsburgh and Erin Water Systems complete with a booster pumping / control Station. Total estimated cost of this supporting infrastructure is $24,072,265.00

Section 8: Consultation

8.1 Notice of Commencement

The Notice of Commencement was advertised for two consecutive weeks each in the Erin Advocate and Wellington Advertiser newspapers on April 29 and May 6, 2015 and May 1 and 8, 2015, respectively. At the same time, letters explaining the project and the Notice of Project Commencement were sent to various project stakeholders including government approval agencies, First Nation Communities, and upper and lower tier municipalities that may have an interest in the project. This information along with the original project contact/stakeholder list can be found in Appendix I.1.

A summary of the comments received following advertisement of the Notice of Commencement and how the comments have been addressed through the Class EA is also included in Appendix I.1. The majority of the responses received were related to updating the contact information for future correspondence related to the project.

8.2 Public Information Centre

An Online Public Information Centre (PIC) was held for this project. The PIC material was posted to the Town's website, which includes a webpage dedicated to this Class EA, and was available beginning on January 20, 2020. Town staff, its subconsultants, and various stakeholders were invited to participate in the PIC. The Notice of PIC, PIC contact list, Online PIC material, comments received and responses provided are included in Appendix I.2.

Table 14 provides a summary of the comments received in response to the Online PIC and how the comments have been addressed through the Class EA or will be addressed during the design and implementation stages of the project.

Table 14: Summary of Comments/Correspondence Received Following PIC

Date Received	Comment	Response
February 2, 2020	As a resident of Hillsburgh for 15 years I am very concerned with the environmental and financial impact this project Will have on me and my family. We are quite happy with our well and have no intention to connect to municipal water. If this project goes forward, will we be required to connect to the municipal water without the option to opt out? Since I have no intention of connecting to the municipal water, I am also concerned that the costs of such a massive undertaking will be covered, even in part, by the municipal taxes. Whomever wishes to utilize the municipal water should shoulder the costs. Not those whom have no need for it. I look forward to your reply.	Residents living within the urban boundaries will eventually be required to connect to municipal wastewater and, if not already connected, to municipal water. The Town is currently in the process of working with the Provincial and Federal levels of government to receive adequate financing towards bringing wastewater servicing solutions to the urban areas of the Town of Erin. For more information on the Town's wastewater project, please visit the website: https://www.erin.ca/town-hall/corporate-initiatives/wastewater
February 3, 2020	Throughout the public on-line consultation report from Triton Engineering Services Limited, Jan.20, 2020 there is reference to "urban" and "urban boundaries". On page seven of this report the Village of Erin boundaries are shown. Please confirm that these boundaries will remain intact. Specifically, that no encroachment will occur and that Credit River Road, Cedar Ridge and Pine Ridge are excluded from this project.	At this time, there are no current plans to alter the urban boundaries. Both the potential and future development areas are within the urban centre boundaries, which have been identified in the Town of Erin's recently adopted Growth Management Strategy.

8.3 Notice of Completion

The Notice of Completion was advertised on February 27, 2020 and a letter was sent to all stakeholders. Copies of this correspondence is found in Appendix I.3. This Project File Report was filed for public review starting on February 28, 2020 and is available for a period of at least 30 calendar days, with the review period ending on March 31, 2020.

Section 9: Recommended Preferred Alternative

Based on the evaluation of alternatives and consultation with stakeholders through the evaluation process and following identification of the preliminary preferred alternatives, Alternative 6 has been identified as the preferred solution to provide additional supply capacity and redundancy for the Town's municipal drinking water systems for the existing and future population. This additional supply is to be provided by Well E9 and Well H4 to satisfy the growth demand outlined in the GMS. This alternative will result in efficient use of the existing and future supply sources by sharing the available redundancy of

the wells for both emergency and maintenance purposes. Furthermore, by providing the interconnection of the system, a large geographic area will become available for future well exploration beyond the 2041 horizon. Details regarding the infrastructure requirements will be addressed during the design phase of the project. However preliminary considerations for potential storage facilities and the next phases of the project are described in the following sections of this Report.

Section 10: Implementation Strategy and Supporting Infrastructure Considerations

10.1 System Storage

As determined by this Class EA and described in this Report, additional water storage is required to meet the needs of the growth scenario as outlined in the GMS. Section 4.5.5 provided a preliminary estimate of the storage volumes required for each of the planning horizons.

Adequate water storage facilities are required to ensure sufficient flows and pressures during; peak hour demands, critical demands during fires, in the event of infrastructure failures such as watermain breaks and power outages, and to provide redundancy during maintenance operations. A storage facility is designed to have distinctive storage layers, each of which serves a particular purpose. The equalization storage layer is located at the top of the tank and is usually cycled on a daily basis to meet peak demands, this layer ensures adequate pressure throughout the distribution system. Emergency storage is defined as the water level in the tank above which 20 psi can be maintained within the distribution system, typically this volume is used only during fire events and emergency service. To meet current and future needs, water storage facilities are typically designed for extended planning horizons as they are often difficult to expand, and economies of scale are significant.

The type of storage facility selected is typically influenced by several factors including but not limited to function, elevation/topography, life cycle costs and the volume of storage required. The three main types of water storage facilities that are commonly used in Ontario include elevated tank/water tower, ground level or partially buried reservoir with booster pumping provisions, and standpipe with booster pumping provisions. Each of these water storage facilities have advantages and disadvantages that are discussed in the following sections of this Report.

Siting the system storage requires evaluation of various factors, including but not limited to the following:

- Land availability and ownership
- Proximity to the existing water distribution system
- Site elevation
- Potential impacts on adjacent properties
- Potential impacts on natural and heritage features.
- Type of facility being considered.

10.1.1 Elevated Tank/Water Tower

Elevated tanks provide water storage in a steel tank mounted on a support system. In recent years, the support or pedestal is usually constructed of reinforced concrete. In the past, many elevated tanks were supported by steel structures. The most prominent advantage of an elevated tank is the ability to store all of the contents at a height where it is available to feed the distribution system by gravity and provide adequate and uniform pressure to the distribution system. Filling of such a facility is typically provided by highlift pumps at well sites, or, booster pumps within the distribution system, which increase system pressures.

In addition to providing storage for the water system, elevated tanks minimize the need for continuous and emergency highlift pumping, thereby making the system more energy efficient. Often, elevated tanks are used to control the operation of the supply pumps at each of the well sites such that the elevated tank can supply water to the system during peak electricity rate periods, allowing the supply

pumps to fill the tank during off peak times resulting in cost savings and less stress on the electrical grid.

An elevated tank typically has lower operating and maintenance costs when compared to alternatives that require booster pumping due to:

- Reduced pumping during peak electrical periods resulting in lower energy costs.
- Less and simplified mechanical and control equipment reducing operating staff time for process set-up, checks and maintenance, and reduced capital cost for equipment replacement.

The steel portion of the elevated tank does require periodic maintenance to ensure that the coating continues to adequately protect the steel. This requires the tank to be taken off line for interior cleaning, inspection and re-coating. Under ideal design conditions, elevated tanks are normally located at a high elevation in the system to minimize the required height of the support pedestal thereby reducing capital costs. The initial capital cost for an elevated tank is typically higher than for a ground level reservoir or standpipe complete with booster pumping.

From an aesthetic perspective, these facilities are often utilized as a community focal point and community identification/ “way finding” or “way marking” if they are located in a visible area near main entrance roads to the community. However, they also create shadows which can be a negative impact for nearby property owners. An elevated water tower also provides the Municipality the possibility of revenue generation through renting space for the installation of communications antennae.

10.1.2 Ground Level or Partially Buried Reservoir and Booster Pumping Station

Reservoirs typically require a larger site footprint compared to an elevated tank as their height is less than or equal to their diameter. Most reservoirs require booster pumps to maintain system pressures. When there is no elevated storage on the system, booster pumps must operate continuously. As a result, this storage alternative does not improve upon the energy efficiency of the existing system. Further, this type of storage facility has more mechanical parts than other types of storage facilities due to the requirement for pumping. As a result, there are greater operating and maintenance costs. Depending on the configuration of the reservoir, it could be built in phases with additional volume added to meet system storage requirements. Revenue generation is limited with this type of facility as the height is typically not sufficient for the installation of antennae.

10.1.3 Standpipe and Booster Pumping Station

Standpipes are typically taller than their diameter. They are usually constructed of steel and contain water in the entire height of the structure. They are designed such that only the top few metres of the facility volume is available by gravity to maintain system operation/pressures. Booster pumps are often installed at standpipes to utilize the majority of the storage volume during emergency and fire flow conditions. Depending on the cost of the required pumping system, a standpipe may cost less than an elevated tank while providing some energy savings compared to a ground level reservoir.

Standpipes are not as energy efficient as elevated towers due the small storage volumes available for system pressure maintenance. The requirement for pumps also results in higher operating and, maintenance costs compared to an elevated tank. However, standpipes have two of the same disadvantages as elevated tanks in that they are difficult to expand and they can shade adjacent properties. Similar to Elevated tanks, there is some potential for revenue generation with a standpipe.

10.2 Expected Elevated Storage Requirements

As discussed in the GMS, Development Areas D, C within the village of Erin and E within the village of Hillsburgh, are the preferred growth areas. As such, the preliminary assessment and siting of the

Elevated Storage Facilities has been completed accordingly.

The two Municipal Water Systems of Erin and Hillsburgh will benefit from being interconnected from a supply redundancy and available reserve capacity perspective. However, combining the systems to share a water storage facility would result in significant volumes of water conveyed through the interconnecting main on a regular basis, resulting in reduced system energy efficiency and high losses during fire flow situations. Also, the two systems do not share the same operating levels, which would complicate the operation of a shared storage tower. Given this, it is recommended that each system be provided a separate storage facility.

For Erin it is recommended that a minimum 1,200m^3 (0.3MG) Elevated Storage Facility be installed at the highpoint (415m) within the "Development Area D" which is slated to be primarily an industrial park. This location will maximize fire flow to the existing and future industrial areas which typically have a greater fire flow requirement. A tower at this location would provide an operating level similar to the existing upper zone, however, this may not be sufficient to accommodate part of the service area within Residential "Development Area C". This area may require the creation of a small additional higher-pressure zone, however this will be reviewed and confirmed through the Draft Plan of Subdivision process and the detailed design phase. Prior to confirming final sizing for this facility, the Town should consider a longer growth period to ensure that the facility will be adequate potential development beyond 2041 since the economies of scale are significant with these facilities and they are not expandable.

In Hillsburgh, placing an additional minimum 1,200m^3 (0.3MG) Elevated Storage Facility near the end of Spruce Street will make the most efficient use of the two existing wells within the Glendevon (Lower Zone). Continued use of the existing booster pumping station will be required to fill the Hillsburgh Heights reservoir and pressurize the upper zone in the event that the Hillsburgh Heights Well is not able to keep up with upper zone demand or has operational issues. However, the expectation is that the new facility would be filled primarily by H4 and Glendevon Wells when demand is low. Water servicing within "Development Area E" will be complex due to the varying topography through the area and this will be addressed Under the Plan of Subdivision process. Prior to confirming final sizing for this facility, the Town should consider a longer growth period to ensure that the facility will be adequate potential development beyond 2041 since the economies of scale are significant with these facilities and they are not expandable.

10.3 System Distribution

In order to connect E9 to the existing municipal system approximately 1,650 meters of 200 mm diameter watermain will need to be constructed, in conjunction with the associated road and boulevard reconstruction.

The connection of H4 to the existing municipal system will require approximately 30 meters of 200 mm diameter watermain construction and the associated road reconstruction.

As the interconnection of the systems is a part of the preferred alternative, approximately 4,765 m of watermain construction and the associated road/trail restoration would also be required to connect the water to the systems. Furthermore, the two additional elevated water storage facilities require watermain connections to the municipal system.

10.4 Capital Costs

The implementation of the preferred alternative will require the construction of; well houses and associated appurtenances including treatment facilities, elevated storage facilities, booster pumping station, pressure controls, and watermain extensions to connection these facilities to the existing system.

As discussed under the Waste Water EA, the restoration costs for the work associated with the watermain installation, including the trunk main along the cataract rail trail would be shared with the Sanitary Sewer installation.

A summary of the expected capital costs is indicated below.

Table 15: Summary of Expected Capital Costs

Infrastructure	Construction and Engineering Cost
E9 Well House, Treatment Facilities & Connection to System	$4,980,500.00
H4 Well House, Treatment Facilities & Connection to System	$3,959,060.00
Erin Elevated Storage Facility	$5,642,000.00
Hillsburgh Elevated Storage Facility	$4,064,200.00
Connecting Watermain & Booster Station (Hillsburgh-Erin)	$5,426,155.00

Note: Some of these costs were not included in the DC Study and will be incorporated when it is revised in 2020.

10.5 Mandatory Connection Requirements

Mandatory connection to the Municipal Water System has been reviewed previously by the Town. A draft water servicing bylaw indicated that 51 properties in Hillsburgh and 58 in Erin would be affected by the mandatory connection by-law as of May 27, 2011; however, the by-law was not endorsed by Council. Refer to section 5.1.4.1 of the SSMP Background Report (BM Ross, March 2012)

The Development Charges Background Study discussed a reserve budget to complete a Water rate study and financial plan which in theory could facilitate the mandatory connection requirements. Refer to Section 12.0 for additional information.

The information presented in this Class EA has accounted for the connection of all existing residences in the supply and storage calculations.

10.6 Future Potential to Add Wells

The Town should monitor the existing water demand and compare this to existing system capacity and potential future growth requirements. This could be accomplished through the preparation of an annual Water Supply Reserve Capacity Calculation (RCC).

Depending on the results of the annual RCC, the Town may need to implement a further well exploratory program. The exploratory program utilized as part of this Class EA identified various potential well sites, several of these were not be investigated as part of this Class EA since the E9 and H4 sites provided adequate supply to meet the GMS growth targets.

10.7 Future Interconnection of Systems

As presented in Appendix E.2, the additional firm capacity provided by well E9 will meet the Class EA minimum initial water supply target (maximum daily demand) for the village of Erin (2,457 m3/d or 28 L/s), which corresponds to the population growth forecast to year 2041, as outlined in the GMS. However, the additional firm capacity provided by well H4 will only meet the water supply target for Hillsburgh to the population forecast to year 2031, as outlined in the GMS. In order to achieve the full 2041 target, an additional well would need to be provided. Alternatively, connecting the Erin and Hillsburgh systems would reduce the redundancy requirement and provide a greater firm capacity, thereby, allowing the 2041 GMS demand requirement to be achieved with the E9 and H4 wells.

Section 11: Potential Impacts, Mitigation Measures And Regulatory Requirements

11.1 Climate Change

11.1.1 Project's Impact on Climate Change

The development of the new well sites will not have a significant impact on climate change given the small footprint of the proposed pumphouse and reservoir. Both sites are currently in active agricultural use, so impacts to the natural environment are minimal.

There is potential to reduce greenhouse gas emissions through operational changes to the water supply and distribution system. At present in the Hillsburgh system, at least one high lift pump at one of the well sites must operate continuously to keep the distribution system pressurized. With the upper zone pumps off, both the H2 and the BPS are required to pressurize the entire system. The addition of an elevated water tower in the lower zone, only the smaller upper zone would need to be pressurized. Pumps will only need to operate when the water level in the tank falls to a point where the minimum required volume is reached which will reduce pumping time and thereby greenhouse gas emissions. Typically, these pumps would be set-up to operate in off-peak hydro usage hours to reduce energy costs and stress on the electrical system.

Additionally, the pump house buildings do not need to be heated or cooled to typical human comfort levels as they are not occupied. In the summer, the water circulating in the pumphouse and the water tower acts as a heat sink to keep the buildings cool in summer and in the winter, the buildings only need to be heated to between 10°C and 15°C to keep the buildings from freezing.

11.1.2 Impact of Climate Change on Project

Climate change has been linked to increased frequency of extreme weather events. The project will allow the Town to be more resilient to extreme weather events. This project will increase the firm capacity and redundancy of the municipal water system through additional well supply and storage, which is important, should one of the municipal well sites fail due to a several weather event.

11.2 Source Water Protection

The potential source protection implementation requirements for the new water supply wells installed as part of this Class EA are provided in a Memorandum from Kyle Davis, Risk Management Official, dated February 7, 2020. A summary provided in the memorandum reads as follows:

"Prior to distribution of water to residents from new municipal wells, the Clean Water Act and Safe Drinking Water Act require that new or changing municipal drinking water systems are included in a Source Protection Plan before water may be provided to the public. Further work will be required during the detailed design phase to delineate wellhead protection areas and to update vulnerability scoring and other reference layers. Following the technical work, there will be a public process to incorporate

the new WHPAs into the CTC Source Protection Plan. Based on the preliminary assessment of source protection requirements, existing properties may be subject to a number of requirements including septic inspections, manure application prohibitions, risk management plans for a number of agricultural activities and for chemical (DNAPL) handling / storage and education requirements. There will also be prohibitions applicable to new lots created within the WHPA-A (100 metres radius) that are serviced by septic systems. New lots serviced by sanitary sewers would be allowed within the WHPA-A.

Based on the preliminary assessment, it is estimated that approximately eleven existing properties will be subject to septic inspections, five properties subject to agricultural requirements and a small number properties subject to DNAPL risk management plans. All properties within the WHPAs will be subject to education policies. The number of properties is a preliminary estimate and will change once the WHPAs are delineated."

A copy of the Memorandum is provided in Appendix J.

11.3 Mitigation Measures

During development of the well sites, the following mitigating measures will be utilized to minimize impacts on the natural environmental features adjacent to the proposed well site:

- sediment and erosion control measures will be installed and inspected to minimize impacts on surrounding properties, streams and wetlands
- construction activities will be undertaken during the hours specified in the Town's Noise By-Law
- if tree removal or trimming should be required during the generalized nesting period of April 1 to August 31, a wildlife ecologist will be employed to undertake an active nest survey to establish nest protection zones
- implement a monitoring program, as part of an eventual Permit To Take Water for E9 and H4 to examine potential for longer term impacts to natural environment features and to assess potential for impact during dry annual conditions, as well as to assess long-term effects on the bedrock system (and potential private well interference).

11.4 Anticipated Approvals

- Application to MECP for amendment of existing Drinking Water Works Permit and Permit To Take Water for Erin and Hillsburgh municipal water systems.
- Approval from applicable agencies for associated works (i.e. TSSA for generators).
- County of Wellington approval to install watermain along roads under their jurisdiction.
- Update the new WHPAs into the CTC Source Protection Plan, which is required by the Clean Water Act and Safe Drinking Water Act.
- Building permit from the Town for building works including well houses, water treatment facilities and water storage facilities.
- Rezoning applications for proposed use.

Section 12: Next Steps

It is anticipated that the next phase of the Project will include but not be limited to the following tasks:

- Consult with Town to prepare an implementation strategy for required water system infrastructure upgrades including phasing and scheduling. This strategy will depend primarily on development timing and funding sources.
- Town should proceed with acquisition of the H4 and H9 well sites from the current owner.

- Complete a Stage 2 archaeological assessment at Well Site Erin 3 (E9).
- Complete the next steps/recommendations provided in the Preliminary Assessment of Source Protection Implementation Requirements for Potential New Well Sites dated February 7, 2020 (included in Appendix J). This includes but is not limited to completing the WHPA delineation and vulnerability assessment for which the Town Risk Management staff will then include the results in the updated Assessment Report drafted by the Credit Valley Source Protection Authority.
- Applications for production well Permit To Take Water approvals for E9 and H4 wells including implementation of the recommendations provided in the Well E9 and Well H4 Drilling and Testing Hydrogeological Reports provided in Appendices E.2 and E.3, respectively.
- Preliminary design of required infrastructure including well pumping/treatment facilities, transition watermains, storage facilities and booster pumping / pressure control facilities.