FINAL Project File Report

New Alliston Production Well Class Environmental Assessment Study

Date: February 22, 2021

T000884A

CIMA+

500-5935 Airport Road
Mississauga, ON L4V 1W5
T 905 695 1005 F 905 695 0525
cima.ca

Contact

Sandra Rodriguez
Sandra.rodriguez@cima.ca
T 905 695 1005, 6718

Town of New Tecumseth

Project File Report

New Alliston Production Well

Class Environmental Assessment Study

Project no T000884A

PREPARED BY: _____

Nisha Jha, M.Sc., EIT.

VERIFIED BY: _____

Sandra Rodriguez, M. Eng. P.Eng

Executive Summary

Introduction and Background

The Town of New Tecumseth (Town) is located in Southern Ontario, within the County of Simcoe. The Town's drinking water system services the communities of Alliston, Beeton and Tottenham.

The communities of Alliston and Beeton are serviced primarily by a pipeline supplying water from the Raymond A. Baker (RAB) Water Treatment Plant in the Town of Collingwood and supplemented by a municipal groundwater system, consisting of several municipal wells in the community of Alliston. The community of Beeton is supplied from a transmission main fed directly from the Alliston distribution system. Tottenham is supplied through a system of municipal groundwater wells located in the Tottenham area.

In September 2016, the Town completed its Water Supply, Distribution and Storage Master Plan (Water Master Plan) which identified the preferred water servicing strategy to provide security of water supply and to accommodate current and long-term growth needs in the Municipality to the horizon year 2031.

The Water Master Plan study identified the following key findings:

- The combined supply capacity between the existing Alliston groundwater wells and the anticipated increased supply line capacity from the Town of Collingwood pipeline cannot meet the projected 2031 water demands in Alliston, Belterra and Beeton.
- The existing Tottenham groundwater wells cannot meet the projected water demands in Tottenham. In addition, the Town experiences operational and maintenance challenges with these wells due to sand production. A separate study completed in 2008 – The Tottenham Secondary Plan, Water and Wastewater Servicing Municipal Class Environment Assessment (MacViro, 2008) recommended that Tottenham be connected to the Alliston system and supplied with drinking water from the Town of Collingwood pipeline.

The 2016 Water Master Plan exercise determined an overall water supply deficit of (3,500 m^3/day) for the Town, relative to the long-term growth needs in the Municipality to the horizon year 2031, as well as security concerns with the Collingwood supply pipeline. It concluded that increasing both the groundwater supply and the Collingwood pipeline supply capacity was the preferred servicing approach.

The groundwater supply capacity increase by 3,500 m^3/day was identified as one of the highest priorities of the recommended approach in the Town's 2016 Water Master Plan

to address supply security concerns and to accommodate planned growth. A desktop Preliminary Hydrogeological Study, completed to support the recommendations of the 2016 Water Master Plan study, identified potential test drilling areas for new supply well(s) between Alliston and Tottenham. After completion and approval of the Town's Water Master Plan study, Town Council approved an additional 400 m^3/day supply to the Township of Essa (to be supplied starting 2021), increasing the total water supply deficit to 3,900 m^3/day.

Consistent with the recommendations of the 2016 Water Master Plan study, the Town initiated a Schedule B Class Environmental Assessment (Class EA) study to determine the preferred water supply servicing solution to address the projected supply deficit and the supply security concerns. CIMA+ was retained by the Town to undertake the Class EA study for the New Alliston Production Well.

Municipal Class Environmental Assessment Process

The Class EA study for the New Alliston Production Well has been completed in accordance with the requirements of a Schedule B undertaking of the Municipal Class Environmental Assessment document (Municipal Engineers Association, October 2000 as amended in 2007, 2011 & 2015).

As part of the study, a comprehensive review of background information, planning projections and an assessment of the existing Alliston drinking water supply system and capacity was undertaken to confirm and formulate the need for the project and the opportunity being addressed (Phase 1), and to develop the basis for the identification and evaluation of potential alternative water supply servicing solutions (Phase 2). Public and agency consultation was carried out throughout the study in conformance with the consultation requirements for Phase 2.

This document summarizes Phases 1 and 2 of the Class EA Study and completes Phase 4 (Preparation of the Project File Report). The Project File Report will be placed on the public record and will be available for review by the general public for thirty (30) calendar days, as per the Municipal Class EA document. Agencies and the public will be notified through the issuance of a "Notice of Project Completion". Provided that no significant issues arise during the review period which cannot be resolved in consultation with the Town, and that no Part II Order requests are received, the recommendations of the Class EA study, as outlined in this report, will be approved and may proceed to implementation. Detailed design and the required testing and securing of approvals will be completed prior to construction.

In the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Part II Order requests on those

matters should be addressed in writing to the Minister of Environment, Conservation and Parks (MECP) and the Director of Environmental Assessment Branch. Interested persons may provide written comments and concerns related to the project. All comments and concerns should be sent directly to the Project Team members through the Project's dedicated webpage www.newtecumseth.ca/newproductionwell.

Identification of the Problem/Opportunity Statement

The problem/opportunity statement for the New Alliston Production Well Class EA Study has been defined as follows:

The 2016 Town of New Tecumseth Water Supply, Distribution and Storage Master Plan identified the preferred water servicing strategy to accommodate the current and long-term growth needs in Alliston, Beeton and Tottenham to 2031 and beyond. Increasing the existing groundwater supply capacity was identified as one of the highest priorities of the servicing approach recommended in the 2016 Water Master Plan. Increased groundwater supply capacity will address:

- *Security of water supply, since the primary source of supply to the Alliston Drinking Water System is a single transmission watermain from the Town of Collingwood.*
- *Projected supply deficit capacity as a result of planned growth in the Town to 2031.*

This Class EA study will identify the preferred water supply servicing solution to meet the projected water demands for Alliston, Beeton and Tottenham communities to the year 2031, in a way that is reliable, sustainable and environmentally and financially responsible.

Groundwater Exploration Program and Hydrogeological Investigation

A preliminary hydrogeological study was completed as a part of the Water Master Plan (2016) to determine the potential to find additional groundwater supplies in the area of Alliston, Beeton and Tottenham. The preliminary hydrogeological study suggested three (3) potential target areas for test drilling:

- the area south of Alliston Well 7,
- the area west of Alliston Well 1, and
- the area along Tottenham Road between Alliston Well No.4 and Tottenham wells (North of Tottenham community)

Consistent with the recommendation of the 2016 Water Master Plan study, a comprehensive groundwater exploration program was undertaken in 2018/2019 as a

key component of the New Alliston Production Well Class EA study, to support the decision-making process. Geo Kamp Limited was retained by CIMA+ to complete the groundwater exploration program and provide technical expertise on the hydrogeological components of this project.

Based on the three (3) potential target areas, suggested in the 2016 preliminary hydrogeological study, a study area for the groundwater exploration program was defined. The boundaries of the study area include Highway #89 to the north/east, the community of Alliston to the North, 9th Line to the South, 10th Sideroad to the East, and the Adjala Tecumseth Townline boundary to the West. The test drilling site selection process included a cursory review of background data within the study area, identification of a long list of potential drilling locations, and a comparative assessment of the locations based on a review of existing available information and professional judgement. The comparative assessment of the potential sites included both technical and non-technical considerations or criteria.

A long list of 19 potential well sites were identified and ranked in order of drilling sequence. The test drilling program proceeded as a phased approach to avoid supply sources containing methane and ammonia (naturally occurring in the Town). Phase 1 consisted of a test drilling program to explore water quality with small diameter monitoring wells and Phase 2 was an aquifer performance assessment of the two best/preferred sites with six-inch diameter test wells. A total of 11 test holes were drilled during the Phase 1 test drilling program and five monitoring wells were established. A total of two test wells were drilled during the Phase 2 program and one test well was established. Further to well performance tests and the collection of water samples, it was concluded that the test drilling program was unsuccessful in locating a suitable groundwater supply with preferred quantity and quality.

In light of the unfavourable results of the extensive groundwater exploration and testing program, a re-evaluation of possible suitable sources for additional groundwater supply was considered necessary. The project team reconsidered an existing municipal site, the Hillcrest well (currently not in service), as a potential source of supply. In addition, further review of historical information revealed a potential new site, CLASS TW1-93 at 233 Church Street in the community of Alliston, for further exploration.

Step testing at both Hillcrest and TW1-93 well sites was completed by May 2020, with the following key findings:

- Hillcrest Site: Step testing results suggest that the existing supply well can produce groundwater at a maximum rate of 12.6 L/s (1,089 m^3/d). A new production well on the same site, could potentially produce approximately 19 L/s (1,640 m^3/d). Analyses

of raw water quality collected during the step test indicate a groundwater source of relatively high quality, necessitating treatment for disinfection only.

- CLASS (TW1-93) Site: Step testing results suggest that the existing well can produce between 7.6 L/s to 12.2 L/s (657 m^3/d to 1,054 m^3/d) of groundwater. A new production well in the vicinity could potentially produce approximately 15 L/s (1,295 m^3/day). Analyses of raw water quality collected during the step test indicate a groundwater source of relatively high quality, necessitating treatment for disinfection and iron removal/control.

Based on the above, both Hillcrest and CLASS (TW1-93) well sites were selected as potential candidates for further consideration in the Class EA study.

Development and Evaluation of Alternative Water Supply Solutions

In accordance with Phase 2 of the Municipal Class EA process, alternative solutions were identified to address existing concerns associated with the security of the Alliston Water Supply System and the need to provide additional groundwater supply capacity. Considering that the New Alliston Production Well Class EA study was undertaken on a project specific level, general available alternative solutions were identified, which included few alternatives originally evaluated in the 2016 Water Master Plan exercise.

A preliminary review of the available water supply servicing solutions was carried out to assess the feasibility of the alternatives based on major technical or financial considerations that would affect project implementation and their ability to meet the Problem/Opportunity Statement. Table ES-1 presents the preliminary screening results of the alternative solutions considered in the study.

Table ES-1: Preliminary Screening Results

Alternative Solution	Screening Results and Recommendation
1 – Do Nothing	Eliminated – Unable to accommodate future supply servicing needs
2 – Limit Growth	Eliminated – Unable to accommodate future supply servicing needs
3 – Reduce Water Demands through Conservation Measures	Option on its own cannot provide the required supply servicing needs. Not recommended as a stand-alone solution but should be considered in combination with the preferred solution.
4a – Construct New Groundwater Production Well at New Site	Carried forward – A potential new site was identified through the groundwater exploration program.
4b – Construct New Groundwater Production Well at Existing Site	Carried forward – The existing Hillcrest well (not operational since 2005) was recommended for further exploration.

Alternative Solution	Screening Results and Recommendation
4c – Connect to an Existing Water System (i.e., City of Barrie, Town of Innisfil/Town of Bradford West Gwillimbury)	Eliminated – Validation of the previous recommendations of the 2016 Water Master Plan. Option not feasible due to capacity, complexity and economics.
5 – Increase Town of Collingwood Pipeline Supply Capacity	Option does not address the current concerns with the security of supply. Not recommended as a stand-alone solution but should be considered in combination with the preferred solution and discussion with the Town of Collingwood.
6 – Expand, Upgrade, Optimize Existing Groundwater System	Optimization of the existing groundwater system on its own cannot provide the required supply servicing needs. Not recommended as a stand-alone solution but should be considered in combination with the preferred solution.
7 – Construct a New Surface Water Treatment System	Eliminated – Significant economic implications compared to other alternatives

Preliminary screening identified the following feasible options:

- Alternative 4a – Construct a New Groundwater Production Well at a New Site (i.e., TW1-93 test well, previously built by a private developer on the grounds of the Community Living Association, referred herein as the CLASS site)
- Alternative 4b – Construct a New Groundwater Production Well at an Existing Site (i.e., the Hillcrest well site).

Other short-listed alternative solutions recommended to be considered in combination with the preferred option, to close the gap between available and required water supply in the system, include:

- Alternative 3 – Reduce Water Demands through Conservation Measures. This would include a reduction in water demands through mandatory/voluntary conservation measures. The Town has an incentive program in effect that provides a rebate for low flush toilets and rain barrels and disseminates water conservation facts and information. In addition, the Town has by-laws to enforce water conservation measures by restricting the use of water for lawn care and car washing. Additional water conservation initiatives may include programs to educate both the general public and industrial users of ways to reduce water usage.
- Alternative 5 – Increase Town of Collingwood Pipeline Supply Capacity. The Town is in discussions with the Town of Collingwood; however, the RAB Water Treatment Plant is currently constrained at meeting their own demands and signed agreements. This alternative will require the Town to re-negotiate the existing agreement to increase the 2030 maximum pipeline supply beyond 23,500 m^3/d. The supply of additional capacity over the agreed amount is subject to negotiation but timing is a more critical concern to the Town.

- Alternative 6 – Expand, Upgrade, Optimize Existing Groundwater System. This alternative involves potential expansion, upgrades, or modifications to the existing municipal groundwater systems to satisfy the projected water supply deficit. Other municipal wells may have the potential for improvement of their current production and/or treatment capacity. Implementation of an optimization study would be required to confirm the aquifer potential and any possible upgrades or expansions to the existing treatment and/or distribution systems, associated with each of the municipal wells.

Additional well testing was undertaken at the CLASS TW1-93 test well and at the existing Hillcrest production well to support further development of the recommended Alternatives 4a and 4b, respectively. Consistent with the preliminary step-test results, four (4) sub-options representing possible implementation scenarios for Alternatives 4a and 4b, were developed to include:

- Option 1A – Use existing Hillcrest well and retrofit existing treatment facility
- Option 1B – Use existing Hillcrest well and build a new treatment facility
- Option 2 – Use existing Hillcrest well, build a new treatment facility and develop a new production well onsite
- Option 3 – Build a new production well at a new site (adjacent to CLASS site) and build a new treatment facility at an existing municipal site

A detailed evaluation of the four (4) sub-options or implementation scenarios was completed on a comparative basis and based on a set of specific considerations grouped into four (4) major evaluation categories to include; natural environmental, technical and operational, socio-cultural, and economic criteria. Each of the primary evaluation categories was further subdivided into specific considerations or criteria and assigned scores, respectively, in consultation with the Town. The option that achieved the highest score was considered the preliminary preferred water supply solution. A summary of the overall scores obtained for each sub-option, and the ranking is provided in Table ES-2.

Table ES-2: Ranking of Sub-Options

Implementation Options	Overall Score	Overall Ranking
Option 1A - Use existing Hillcrest well and Retrofit Existing Treatment Facility	79	3
Option 1B - Use existing Hillcrest well and New Treatment Facility	81	2

Implementation Options	Overall Score	Overall Ranking
Option 2 - Use existing Hillcrest well, New Treatment Facility and Develop New Production Well onsite	89	1
Option 3 - Build New well on a new site (adjacent to CLASS site) and New Treatment Facility at Existing Municipal site	78	4

The results of the detailed evaluation revealed that Option 2 – Use existing Hillcrest well, Build a New Treatment Facility and Develop a New Production Well onsite was ranked the first amongst all four (4) options. Consistent with the evaluation methodology and the results, Option 2 was selected and presented to the public as the Preliminary Preferred Solution at the online Public Information Centre (PIC), in conjunction with other short-listed alternatives 3, 5 and 6.

Following the online PIC, comments and questions were received from three (3) separate members of the public. Comments were generally about the process to select the preliminary preferred option, sizing of the proposed new infrastructure, concerns with respect to the proximity of the proposed works to the immediate private residents and additional supply sources to meet the projected demands. Responses to all comments received were provided by the Project Team to each member of the public.

Preferred Water Supply Servicing Solution

Based on the detailed evaluation results, *Option 2 - Use the Existing Hillcrest Well, Build a New Treatment Building and a New Production Well onsite* obtained the highest score and was selected as the primary component of the overall recommended water supply servicing solution. In general Option 2 comprises the following key components:

- Decommission and demolish all existing infrastructure onsite, above and below ground, except for the existing Hillcrest well, which will remain in place and put back in service.
- Build a new pump house and treatment building towards the back of the property, by either traditional construction methods or by installation of a prefabricated facility. The new pump house will be built above grade level and equipped with the necessary treatment equipment to provide for the required disinfection.
- The existing Hillcrest well will be maintained and connected to the new treatment facility immediately after construction of the new building. The existing well will continued to be used up to its existing permitted water taking capacity of 9.5 L/s (821 m^3/d).

- Develop a new production well onsite. Preliminary step-testing completed on the existing Hillcrest well anticipates that the new production well can potentially yield a maximum production capacity of 19.0 L/s (1,642 m^3/d) and would require treatment for disinfection only. Based on the higher production capacity anticipated for the new well, the new well is expected to be larger than the existing one. Well development will include the required testing and water characterization to confirm maximum long-term sustainable well yield and treatment requirements. The new production well will be connected to the new treatment facility for further treatment prior to distribution. The exact location of the new production well will be confirmed in the next stages of the project.
- Install a new outdoor emergency standby diesel generator with a weatherproof enclosure onsite.

The site will ultimately comprise of two (2) wells. Either well can be used as a backup to the other, providing redundancy in supply, therefore, the wells are not anticipated to operate simultaneously. Alternatively, the existing Hillcrest well can be converted to a monitoring well after a new production well has been developed and connected to the new treatment system.

A new connection to the existing water distribution system will be required to connect the new treatment facility to the existing watermain running in front of the current site, on George Street. Although the current treatment facility is not connected to the municipal sanitary system, provision for a potential connection to the existing sanitary sewer on George Street may has been made. The sanitary connection will be confirmed during detailed design. A preliminary conceptual layout for Option 2 is shown in Figure ES-1.

Figure ES-1: Preferred Water Supply Solution, Option 2 – Conceptual Layout

Major advantages of the recommended implementation option for Option 2 include:

- New production well has the potential to contribute about 40% of water supply deficit.
- The recommended option provides the lowest overall life cycle cost per m3 of treated water.

- The two (2) wells (existing and new production wells) provide redundancy in supply with each of the wells acting as a back-up well.
- The new infrastructure provides treatment and operational flexibility. The configuration and layout of new treatment facility will provide safe clearances for access, operation, and maintenance activities.

The new treatment building will be designed to improve the aesthetic appearance of existing building, which is almost at the end of its service life. The construction of the new treatment building can be done by either traditional construction methods or by installation of a prefabricated facility. Opinion of probable capital costs, including contingency and engineering costs are estimated to be approximately $2.8 Million. The associated 20-year life cycle costs are estimated to be approximately $3.3 Million.

The Town will also continue to explore the viability of implementing additional approaches in combination with implementation of Option 2, including potential to reduce water demands through conservation measures, increase Collingwood supply and expand, upgrade, and/or optimize the existing groundwater system. If the development of the new production well proposed at the Hillcrest site reveals that the actual production capacity of the new supply source is significantly lower than the theoretical anticipated rate of 19 L/s, the Town may then need to re-consider the merits of Option 3 – Build a new well on a new site (adjacent to CLASS site) and build a new treatment facility at an existing municipal site.

Proposed Mitigation of Potential Impacts

Implementation of the proposed infrastructure for Option 2 is not expected to have significant impacts on the existing natural environment or cultural heritage resources. Due to the limited physical available space at the existing Hillcrest site, demolishment of existing infrastructure and construction of new infrastructure will result in moderate short-term construction impacts such as noise, dust, vibration and visuals, primarily on adjacent residents. Specific mitigation measures, as described below, are recommended for implementation to reduce anticipated potential impacts.

Water Quality/Quantity

The Hillcrest well is located within the existing pump house, which is recommended to be decommissioned and demolished. The Hillcrest well is expected to be put back in service as part of this project; therefore, appropriate protection measures would need to be implemented to ensure that the structural integrity of the existing well is maintained during demolition and construction activities. Step testing completed at the Hillcrest well

concluded that no interference with other municipal wells in the area is expected at the current well rated capacity of 9.5 L/s.

Development of the new well onsite will be carried out by a licensed well contactor and in compliance with current regulations, including Ontario Regulation 903/90 Wells (O. Reg. 903/90) and the guidance provided in the Draft GUDI TOR Technical Support Document: Determination of Minimum Treatment for Municipal Residential Drinking Water Systems Using Subsurface Raw Water Supplies, January 2019, or the most up-to-date version.

The new well, anticipated to have a larger diameter than that of the existing well, is expected to be located at the front of the property to facilitate accessibility to the site with the well drilling equipment. The exact location of the new well will be confirmed in the next stages of the project, but major consideration will be given to ensuring that surface drainage is away from the well. Corrosion resistant casings will be utilized, such as stainless steel or plastic. Testing and water quality characterization for the new well will be completed during well development to confirm maximum sustainable well yield and water treatment requirements. However, based on the water quality results obtained during step testing of the existing Hillcrest well, a new production well in the vicinity of the existing well is anticipated to be of relatively high quality, necessitating only treatment for disinfection. Re-fueling of construction equipment need to be carefully practiced.

Socio-Cultural

Demolition of the existing facility and construction of a new treatment facility at the existing Hillcrest site will have some short-term moderate impacts, such as noise, vibration, dust, traffic, etc., along with some visual impacts due to staging of construction equipment and fencing. These activities will primarily impact the adjacent residents as well as local residents using George Street, for commuting purposes.

The following mitigation measures will be taken to mitigate anticipated short and long-term impacts to the adjacent residents:

- Temporary fencing will be used around the construction areas to minimize noise, dust, mud, and visual impacts.
- Construction of the project will be carried out in accordance with the municipal noise requirements. Construction equipment will be operated according to the applicable Town of New Tecumseth's Noise Control By-Law, which imposes limitations and restrictions for operation of construction equipment between certain hours.

- Construction equipment will be appropriately maintained to ensure that exhaust emissions meet industry standards.
- Property owners adjacent to the Hillcrest site where construction activities will take place will be notified in advance and provided with Town's contact information should they encounter any problems during construction.
- Development of the new well will require temporary closure of a section of George Street to accommodate well drilling equipment for a temporary period. Continued vehicular access to private residents in the area will be maintained through alternate residential roads.
- The aesthetics of the new pump house will be improved over the existing building. The new pump house will be architecturally designed to blend-in with the residential character and feel of the community.
- Minimum Setbacks from property lines will be provided in accordance with the Town's Zoning By-Law. Fencing and landscaping opportunities will be incorporated during the detailed design stage. In addition, opportunities to reduce the footprint requirements for the proposed infrastructure will be explored in the design stages.

Climate Change

The new water treatment facility will incorporate energy efficiency lighting and equipment. Low use of chemicals is expected in the treatment facility, which will result in low volume of trucks transporting chemical to the site, and thus, minimal emissions from truck traffic.

The permanent standby generator will be located onsite; however, it is expected to be used only for emergency situations. The emergency standby genset will located outdoors and contained in a stand alone, weatherproof, noise attenuated enclosure. The genset will be designed to meet the required air emission regulations set by the MECP, such as low exhaust stack height. The performance of the genset will be monitored regularly, in agreement with the manufacturer recommendations, to ensure that the air emissions regulation compliance is continuously met.

Minor vegetation removal is expected, although, landscape opportunities to compensate for any vegetation removal, and to contribute to carbon sinks and minimize disturbances to adjacent residents will be reviewed during detailed design.

Source Water Protection

Mapping data from the Lake Simcoe Region Conservation Area confirms the presence of Wellhead Protection Area (WHPA) within the Hillcrest site, associated with the

existing municipal production well. No Significant Groundwater Recharge Areas or Highly Vulnerable Areas within the proposed construction area have been identified.

The development of a new production well at the Hillcrest site will require an assessment of the vulnerability of the new well within the existing drinking water system and an update of the existing Source Water Protection Plan. Due to the close proximity between the existing and the new production well, source water protection plan policies for the new WHPAs are not anticipated to apply to new large geographic areas or to a very limited extent.

The new permanent outdoor standby generator would include handling and storage of fuel to operate the generator. The handling and storage of fuel is considered to be a significant threat to drinking water as listed in the Source Water Protection Plan for the Nottawasaga Valley Source Protection Area. The proposed works also include the construction of underground watermains to provide for the connection of the supply well(s) to the new treatment facility and the connection to the existing distribution system. Pipeline installation is generally considered a low threat to municipal drinking water. The only chemical anticipated to be used for treatment in the new facility is sodium hypochlorite; nevertheless, to reduce, manage or eliminate any threats, the Town will exercise every effort to reduce the potential for release of chemicals (common in such treatment facilities and pumping stations) and fuel by applying best available design and construction practices in accordance with the governing regulations and standards, such as secondary containment for fuel storage, monitoring process for spill/ leak detection, and obtaining any necessary approvals from the approval agencies.

Disturbance to Natural Environmental Features

Other than ornamental grass and a few shrubs, there is no significant environmental features within or in the vicinity of the existing Hillcrest site. Minimal impact is expected from the removal of an existing tree adjacent to the existing pump house for the proposed construction works. Landscape opportunities will be reviewed during the detailed design stage. Potential indirect impacts to environmental features, within and around the construction zones, can be avoided by using standard mitigation measures during construction such as:

- Clear delineation of work site vegetation clearing zone and vegetation retention zones will be established in both the contract documents and in the field.
- Erosion and sediment control fencing will be designed, installed, and maintained throughout the construction stages, as required. Adequate containment of all construction generated sediment will be implemented, specifically for the downstream side of any temporary topsoil stockpile locations.

- Appropriate vegetation clearing techniques should be used during construction, as well as appropriate clearing and disposal of all construction-related debris following construction.
- Contamination of soils through spills and leaks can be avoided by ensuring that the fuel storage, refueling and maintenance of construction equipment is handled properly as per standards and provincial regulations. Construction equipment should never be allowed into or adjacent to drainage swales on-site. The Contractor will be required to submit a detailed response and action plan for dealing with the containment and cleanup of any spills during construction.

Public and Agency Consultation

Public and agency input was sought at key stages of the Class EA study process. An Online PIC was held between September 30 and October 23, 2020. All PIC related materials, including a PowerPoint presentation, video and narrative of the video presentation were available on the project webpage.

Public concerns were raised mainly related to concerns regarding the sources for additional supply capacity, including the Collingwood pipeline, the Tottenham wells, the new Hillcrest well site, as well as other supplementing sources to achieve the total projected demands in the system. Other concerns raised by an adjacent resident were related to the footprint of the new building, proximity to his residence and potential ways to mitigate visual disturbances. Official responses to the residents were provided by the Project Team. Public feedback was considered to confirm the recommended water supply solution.

Public consultation with the immediate residents will continue during the design and construction of this project. The Town will continue to inform and provide updates as the project progresses. A dedicated contact person from the Town will be available to respond to any immediate issues or concerns that may come up before or during construction.

Conclusions and Recommendations

Through completion of a Municipal Class EA study, Option 2 – using the existing Hillcrest well, as well as developing and installing a new production well onsite has been identified as the primary component of the preferred water supply servicing solution. Other supplementing alternative strategies recommended to be implemented in conjunction with Option 2 include:

- Reducing Water Demands through Conservation Measures.

- Increasing the Town of Collingwood Pipeline Supply Capacity; and,
- Expanding, Upgrading, Optimizing the Town's Existing Groundwater System

Public and agency input was sought at key stages of the Class EA process to provide the public with opportunities to comment on the project. Through the consultation process, some public concerns and issues were raised associated with the implementation of key infrastructure recommended for Option 2. Potential impacts associated with the implementation of the recommended alternative solution were identified as well as available mitigation measures. The socio-cultural implications of this project are directly related to the proximity of the new treatment facility/pumphouse to private residences and the associated short-term construction impacts. Due to the nature of this project and the limited area of the Hillcrest site, some inevitable effects in terms of dust, noise, truck traffic and fuel spills will be felt around the construction areas. Potential effects can be reduced or avoided by implementation of mitigation measures outlined in this report.

Since the existing Hillcrest well and treatment facility is currently not operational, construction complexity is slightly reduced. However, due to the current size constraints of the Hillcrest site, construction staging will need to be carefully coordinated to accommodate the demolition of the existing assets and the construction of the new infrastructure.

The Town will provide site inspection and contract administration throughout the construction phases of the project. The site inspector will ensure that the Contractor is building the works as per the contractual drawings and specifications, as well as maintaining the necessary environmental protection measures. Construction progress meetings will be held regularly to monitor the progress of the project and address any issues that may arise during the construction phases.

It is recommended that the Town proceed with the detailed design and construction of the preferred water supply servicing solution, as outlined in this PFR, subject to receiving the necessary approvals. This PFR is being filed for a 30-day public review period. Provided that no major objections or Part II Orders are received during the review period, the project will proceed through the detailed design and construction phases as outlined in this PFR.

Table of Contents

List of Tables

List of Figures

List of Appendices

1 Introduction

1.1 Background

The Town of New Tecumseth (Town) is located in Southern Ontario, within the County of Simcoe. The Town provides drinking water services to the communities of Alliston, Beeton and Tottenham.

The communities of Alliston and Beeton are serviced primarily by a pipeline from the Town of Collingwood and supplemented by a municipal groundwater system, consisting of several municipal wells scattered across over the Alliston area. The community of Beeton is supplied from a transmission main fed directly from the Alliston distribution system. Tottenham is supplied through a number of municipal groundwater wells located in the Tottenham area.

In September 2016, the Town completed its Water Supply, Distribution and Storage Master Plan (Water Master Plan) which identified the preferred water servicing strategy to provide security of water supply and to accommodate current and long-term growth needs in the Municipality to the horizon year 2031.

The Water Master Plan exercise identified the following key findings:

- The combined supply capacity between the existing Alliston groundwater wells and the anticipated increased supply line capacity from the Town of Collingwood pipeline cannot meet the projected 2031 water demands in Alliston, Belterra and Beeton.
- The existing Tottenham groundwater wells cannot meet the projected water demands in Tottenham. In addition, the Town experiences operational and maintenance challenges with these wells due to sand production. A separate study completed in 2008 – The Tottenham Secondary Plan, Water and Wastewater Servicing Municipal Class Environment Assessment (MacViro, 2008) recommended that Tottenham be connected to the Alliston system and supplied with drinking water from the Town of Collingwood pipeline.

The 2016 Water Master Plan exercise determined an overall water supply deficit of (3,500 m^3/day) for the Town, relative to the long-term growth needs in the Municipality to the horizon year 2031, as well as security concerns with the Collingwood supply pipeline. It concluded that increasing both the groundwater supply and the Collingwood pipeline supply capacity was the preferred servicing approach.

The groundwater supply capacity increase by 3,500 m^3/day was identified as one of the highest priorities of the recommended approach in the Town's 2016 Water Master Plan to address supply security concerns and to accommodate planned growth. A desktop

Preliminary Hydrogeological Study, completed to support the recommendations of the 2016 Water Master Plan study, identified potential test drilling areas for new supply well(s) between Alliston and Tottenham. After completion and approval of the Town's Water Master Plan study and its recommendations, Town Council approved an additional 400 m^3/day supply to the Township of Essa (to be supplied starting 2021), increasing the total water supply deficit to 3,900 m^3/day.

Consistent with the recommendations of the 2016 Water Master Plan study, the Town initiated a Schedule B Class Environmental Assessment (Class EA) study to determine the preferred water supply servicing solution to address the projected supply deficit and the supply security concerns. CIMA+ was retained by the Town to undertake the Class EA study for the New Alliston Production Well.

1.2 Objectives of the Class EA Study

The primary goal of this Class EA Study is to:

- Identify the preferred long-term sustainable and reliable water supply servicing solution to increase the existing groundwater supply capacity in the Town meet the projected water demands for the Municipality to horizon year 2031.

To support the primary goal of the Class EA study, the following objectives have been developed:

- To complete a comprehensive examination of the alternative supply servicing solutions and select the preferred solution with consideration given to a broad range of criteria including natural environmental, socio-cultural, technical and financial considerations;
- To complete a comprehensive groundwater exploration program and hydrogeological investigation to identify potential new groundwater supply sources based on the recommendation of the 2016 Water Master Plan and to further support the decision-making process in the Alliston New Well Class EA study;
- To provide meaningful consultation with all affected and interested parties; and,
- To document the study process in compliance with all phases of the Municipal Class EA planning process.

1.3 Objectives of the Project File Report (PFR)

This PFR describes the planning and decision-making process followed during the Class EA Study for the New Alliston Production Well. The PFR describes the following:

- Problem/Opportunity Statement

- Existing conditions of the study area
- Water Supply Alternative Solutions considered in the study
- Evaluation methodology and evaluation criteria used to assess the different water supply servicing alternatives and implementation options
- The preferred water supply solution and its associated anticipated potential impacts, proposed mitigation measures and proposed implementation plan
- Details of the public and agency consultation process.

The Municipal Class EA process gives members of the public, interest groups and review agencies a chance to review the PFR during a minimum of a 30-day review period. The review period gives individuals an opportunity to address outstanding concerns regarding the project with the Town.

The Project File Report will be placed on the public record and will be available for review by the general public for thirty (30) calendar days. Agencies and the public will be notified through the issuance of a “Notice of Study Completion”. Provided that no significant issues arise during the review period which cannot be resolved in consultation with the Town, and that no Part II Order requests are received, the recommendations of the Class EA study, as outlined in this report, will be approved and may proceed directly to implementation.

In the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Part II Order requests on those matters should be addressed in writing to the Minister of Environment, Conservation and Parks (MECP) and the Director of Environmental Assessment Branch. Interested persons may provide written comments and concerns related to the project. All comments and concerns should be sent directly to the Project Team members at the Town.

1.4 Report Outline

This report was prepared to meet the requirements of the Ontario Municipal Engineer’s Association (MEA) Municipal Class EA Planning Process (October 2000, as amended in 2007, 2011 & 2015). This report combines all phases of the planning process under one cover and includes steps that are considered essential for meeting the requirements of the Environmental Assessment Act (EAA). The report includes the following sections:

- **Section 1: Introduction** – Provides background information leading to the initiation of this study, provides the objectives of both the Class EA Study and the PFR, and describes the format of this report.

- **Section 2: Study Context –** Provides a summary of recommendations of the 2016 Water Master Plan, and a description of work carried out for the Groundwater Exploration Program and findings of the study.
- **Section 3: Municipal Class Environmental Assessment Process** – Provides a summary description of the framework and activities to be completed to meet the Municipal Class EA process requirements related specifically to the New Alliston Production Well Class EA study
- **Section 4: Public and Agency Consultation Process** – Describes the consultation program with the public and agencies, and public engagement activities
- **Section 5: Study Area Overview –** Outlines the study area location and provides a brief overview of the main characteristics of the study area.
- **Section 6: Existing Alliston Water Supply System** – Presents a description of the existing Alliston drinking water supply system.
- **Section 7: Water Servicing Design Criteria** – Presents the design criteria for water servicing.
- **Section 8: Class EA Phase 1 – Problem/ Opportunity Statement -** Presents the problem/opportunity statement for this Class EA Study
- **Section 9: Evaluation Methodology -** Presents the evaluation methodology used for the New Alliston Production Well Class EA study to select the preliminary solution.
- **Section 10: Class EA Phase 2: Identification and Evaluation of Alternative Solutions –** Presents a comprehensive review of water servicing strategies by providing information on a long list of alternatives and identifies a short list of feasible alternatives based on a set of must-meet criteria. Short-listed alternatives are further developed and evaluated based on the detailed evaluation methodology.
- **Section 11: Preferred Water Supply Solution –**. Describes the recommended water supply servicing solution, major components, and advantages of the proposed solution, and provides an implementation schedule of the preferred solution as well as the associated permits and approvals needed prior to start of construction.
- **Section 12: Proposed Mitigation of Potential Impacts and Monitoring -** Summarizes the proposed mitigation measures to be undertaken to minimize potential impacts expected as a result of implementation of proposed works.
- **Section 13: Class EA Phase 4 – Class EA Report Conclusions and Recommendations -** Summarizes the need for the project, the main activities undertaken as part of this Class EA study, the public and agency consultation

project, the recommended solution and the overall implications of the implementation of the preferred alternative solution.

- **Section 14: References** - Lists the key sources of information and reports that were used and consulted during the Class EA study process and in the preparation of the Project File Report.

2 Study Context

This section provides a summary of the relevant findings and key recommendations of the 2016 Water Master Plan as they relate to this Class EA study.

2.1 2016 Town Water Supply, Distribution and Storage Master Plan

In September 2016, the Town completed its Water Supply, Distribution and Storage Master Plan (Water Master Plan) which identified the preferred water servicing strategy to provide security of water supply and to accommodate current and long-term growth needs in the Municipality to the horizon year 2031.

A review of the existing water supply system and projected water supply requirements was completed during the Water Master Plan exercise to determine any necessary supply requirements to meet the future needs. The supply review took into consideration a potential future agreement with the Town of Collingwood for an increase in the pipeline supply capacity of 10,500 m^3/day, from its current 13,000 m^3/day capacity. This would result in a total supply capacity of 23,500 m^3/day from the Town of Collingwood pipeline supply to the Town. Based on the existing firm well capacity in Alliston (11,446 m^3/day), existing Township agreements with the Town of Clearview (250 m^3/day) and Township of Essa (100 m^3/day) and assuming an anticipated increase in the Collingwood pipeline supply (23,500 m^3/day), a supply deficit of approximately 3,500m^3/day was concluded.

The 2016 Water Master Plan concluded that increasing the water supply by 3,500 m^3/day and increasing the Collingwood pipeline supply capacity was the preferred servicing approach, after consideration was given to issues, constraints and opportunities identified within the existing drinking water systems in the Town. The groundwater supply capacity increase was identified as one of the highest priorities of the recommended approach in the Town's 2016 Water Master Plan.

After completion and approval of the Town's Water Master Plan, Town Council approved an additional 400 m^3/day supply to the Township of Essa (starting from the year 2021), increasing the total supply deficit to 3,900 m^3/day.

A preliminary hydrogeological study was completed as a part of the Water Master Plan (2016) to determine the potential to find additional groundwater supplies in the area of Alliston, Beeton and Tottenham. The preliminary hydrogeological study suggested three (3) potential target areas for test drilling to find potential new locations for production wells between Alliston and Tottenham:

- the area south of Alliston Well 7,
- the area west of Alliston Well 1, and
- the area along Tottenham Road between Alliston Well No.4 and Tottenham wells (North of Tottenham community)

A detailed groundwater exploration would be required to confirm the preliminary hydrogeological study undertaken to support the recommendations of the 2016 Water Master Plan.

2.2 Assessment of Potential New Water Supply Sources

A comprehensive groundwater exploration program was included as a key component of the Alliston New Production Well Class EA study, to support the decision-making process.

It was anticipated that the areas for potential new groundwater supply sources suggested in the 2016 Water Master Plan would be confirmed and pinpointed during the program. Geo Kamp Limited was retained by CIMA+ to undertake the groundwater exploration program. The separate reports documenting the activities, key findings and recommendations of the groundwater exploration program and hydrogeological investigation, carried out as part of this Class EA study, are included in Appendix A for further reference.

Based on the three (3) potential target areas, suggested in the 2016 preliminary hydrogeological study, a study area for the groundwater exploration program was defined. The boundaries of the study area (Figure 1) include Highway #89 to the north/east, the community of Alliston to the North, 9th Line to the South, 10th Sideroad to the East, and the Adjala Tecumseth Townline boundary to the West.

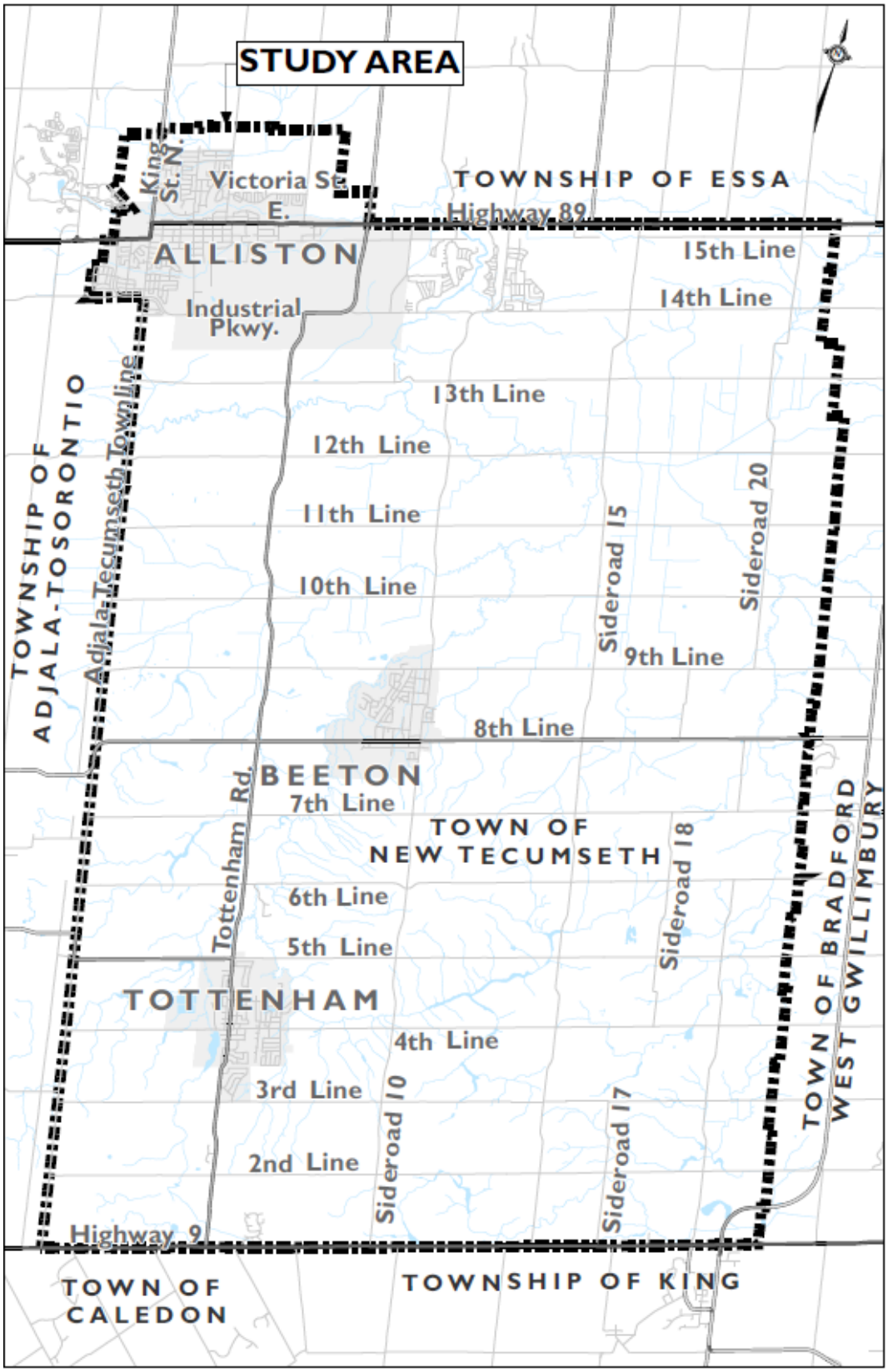

Figure 1: Groundwater Exploration Program – Study Area

Methane and ammonia (naturally occurring) are common within the Town and have resulted in operational challenges during water treatment. In view of the need to avoid supply sources containing methane and ammonia, the groundwater exploration program was planned to proceed as a phased approach. Phase 1 consisted of a test drilling program to explore water quality with small diameter monitoring wells and Phase 2 consisted of an aquifer performance assessment of the best/preferred sites with test wells. Key sequential steps of the program included:

1. Phase 1a – Test drilling program to explore the water quality with small diameter monitoring wells. This phase consisted of five (5) small diameter test holes.
2. Phase 1b – Explore the next five (5) small diameter nested test holes, should Phase 1a would result unsuccessful.
3. Phase 2 – Aquifer performance assessment of the two (2) best/preferred sites with six-inch diameter test wells to confirm water quality and quantity at each location.

Based on the initial hydrogeological study recommendations and further information obtained from the Oak Ridges Moraine Groundwater Program, the test drilling exploration study was focused on:

- Original recommended target areas (area south of Alliston Well 7, area west of Alliston Well 1 and the area along Tottenham Road between Alliston Well No.4 and the community of Tottenham)
- The Side Valley(s) associated with Laurentian River Valley, and
- Laurentian River Valley (at shallower depths)

2.2.1 Site Selection Methodology and Evaluation Criteria

Potential target sites within the study area were identified for further exploration, based on the following key criteria:

- Encountering of more than 5 meters of coarse-grained overburden material at depths greater than 30 meters.
- Nested observation wells (Phase 1) to be established at depths of less than 76 meters since deeper overburden aquifers contain methane and ammonia (also referred to as the Scarborough Formation).
- The depth of the observation wells would depend on the materials encountered and no observation (or test) wells would be constructed if unfavorable conditions were encountered.

- Test drilling locations should be at least 1,000 meters away from existing municipal wells to avoid any interference at the existing municipal wells.

The site selection process included a cursory review of background data within the study area, identification of a long list of potential drilling locations, and a comparative assessment of the locations based on a review of existing available information and professional judgement.

The comparative assessment of the potential sites included two main criteria, technical and non-technical considerations. Technical considerations were assigned a weighing factor of 85 % (or 85 points), while non-technical considerations were assigned a weighing factor of 15 % (or 15 points), for a total score of 100 % (or 100 points) among both the categories. Each of the main category/criterion was further subdivided into specific considerations or sub-criteria, which capture the most representative aspects to this project. For each sub-criterion, the project team compiled enough information to assess the potential net impact and assign a score unique to each option under consideration. Each option (test drilling site) under evaluation was assigned a score from 0 to 5, with the higher scores (5) given to the better performing options. The score represents how well the specific option meets the criterion under consideration; therefore, the options were rated such that the higher the ability to perform or meet the criterion, the higher the score (5) assigned. Individual scores under each category/criterion were totalled and a weighted score obtained, relative to the weighting factor of each category. The final score for each option is calculated as the sum of the score of each category/criterion across both technical and non-technical categories.

The ranking system was developed to identify the priority of drilling sequence for the potential sites; higher the score, higher would be the priority in the drilling sequence. The specific criteria developed for the relative assessment of the potential sites are shown in Table 1.

Table 1: Test Drilling Sites Evaluation Criteria

Category / Criterion	Weight	Criteria Objective
Technical Considerations		
Sustainable Capacity	85	• Maximize water quantity
Water Quality		• Minimize water treatment requirements
Proximity to Sensitive Features		• Minimize interference with existing wetlands, nearby streams, other existing wells, and water users
Accessibility		• Maximize ability to access site
Property Acquisition		• Minimize legal requirements and cost acquisition
Constructability and Integration		• Maximize the ability to use existing infrastructure and maximize Town's capability to integrate technically and financially
Non-Technical Considerations		
Regulatory Compliance	15	• Maximize ability to meet applicable regulatory policies and legislations, including land uses
Protection of Natural Environment		• Minimize potential impacts to source water protection areas, sensitive species and habitats and existing cultural features
Total	**100**	

2.2.2 Ranking of Potential Test Drilling Sites

A long list of 12 potential test drilling sites was initially developed. Each site was identified with alphabetical characters ranging from A to L. The overall location of the 12 test drilling sites is shown in Figure 2. Detailed evaluation of the 12 proposed sites was carried out based on the evaluation criteria shown in Table 1 and scored accordingly. The detailed results of the site evaluation are included in Appendix A, for further reference.

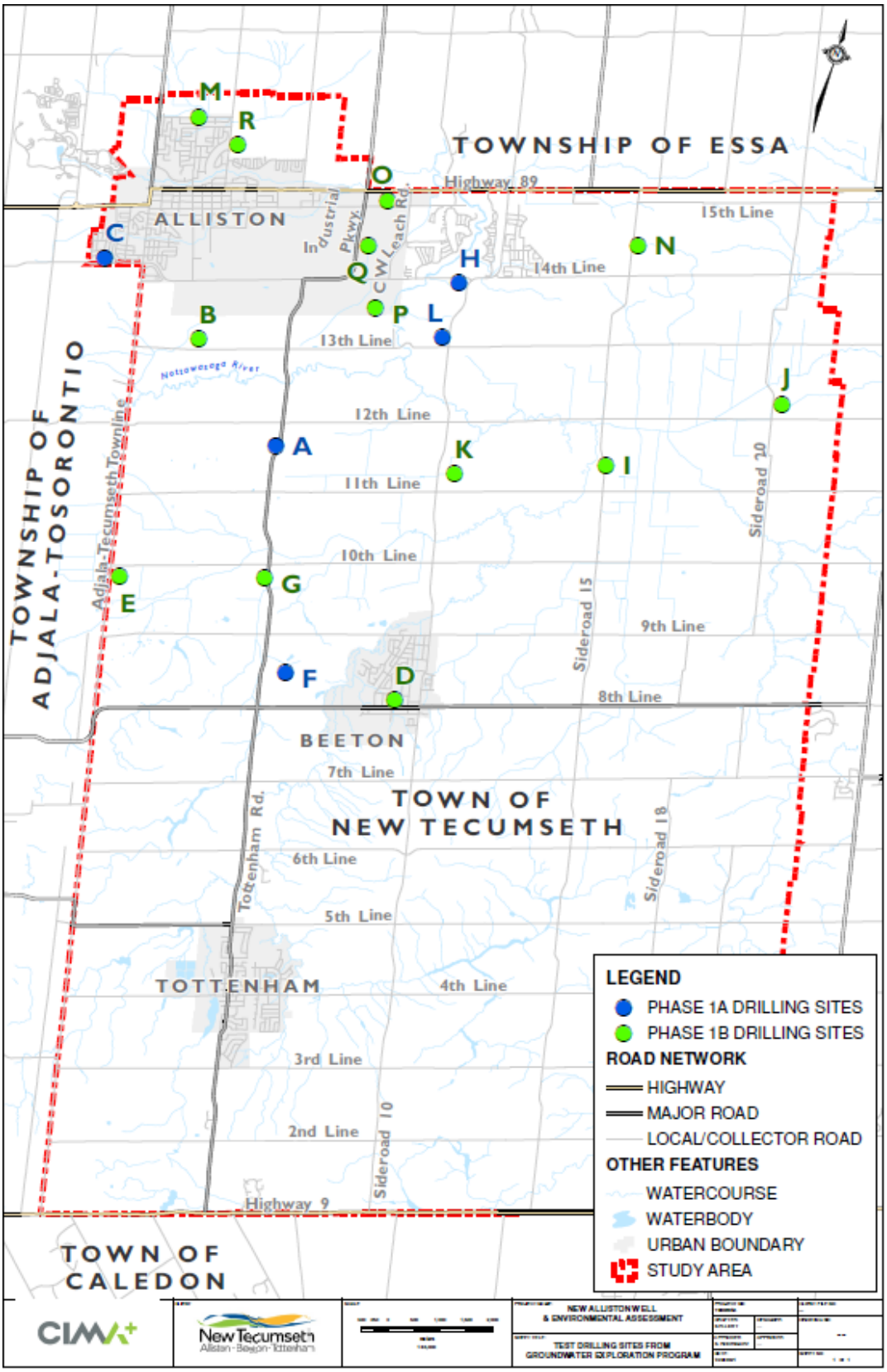

Figure 2: Potential Preliminary Drilling Targets Map

The first five (5) ranked test drilling sites selected for Phase 1a, as shown in Table 2, were:

1. Site L;
2. Site A;
3. Site H;
4. Site C; and,
5. Site F.

Although 12 sites were initially prioritized for testing, it was subsequently determined that two sites (Sites D and G) were not viable, one being too close to Beeton (site D) and the other being inaccessible (Site G). During the process of Phase 1a, the Town indicated interest in exploring the Hillcrest Park area (Site M) and the Earl Rowe Provincial Park, as the Town currently supplies water to this area. Other potential high capacity locations were also identified during the Phase 1a Groundwater Exploration Program.

Table 2: Phase 1a Proposed Drilling Sites – Ranking

Ranking	Site ID	Score (out of 100)	Location Description
1	L	85	SCDCB at 10th Sideroad and 12th Line
2	A	81	Midway Between Tottenham and Alliston (Country Road Allowance)
3	H	78	14th Line and 10th Sideroad – Town Owned Triangles
4	C	74	West of Alliston, New Development
5	F	69	Joint Operations Centre

After the Phase 1a drilling program, seven (7) additional potential test drilling sites were added to the Phase 1b list and the list was re-evaluated, as shown in Table 3. The first five (5) ranked test drilling sites selected for Phase 1b were P, M, Q, N and O.

Table 3: Phase 1b (Re-evaluated) Proposed Drilling Sites – Ranking

Ranking	Site ID	Score (out of 100)	Location Description
1	P	97	Soccer Fields
2	M	96	Hillcrest Park
3	Q	87	Industrial Road and 14th
4	N	79	15th Sideroad Between Highway 89 and 14th Line

Ranking	Site ID	Score (out of 100)	Location Description
5	O	73.1	Storm Pond
6	E	73	Adjala Townline
7	K	68	Allimil
8	B	64	Area south of Well 7
9	J	61	Sideroad 20
10	I	55	South of Randall
11	R	Not scored[1]	Banting Homestead
12	Earl	Not scored[1]	Earl Rowe Provincial Park

Notes:

1. Sites R and Site Earl were additional drilling sites added late in the assessment; however, a further location examination determined that Site Earl was too far outside of the study area and it was eliminated. Site N was given priority by the Project Team over Site R, so Site R was removed from consideration and eliminated.

Test drilling for Phase 1a (Sites L, A, H, C, F) was completed from April to July 2018 and Phase 1b (Sites P, M, Q, N, O) was completed from October to April 2019. Based on the results of the Phase 1 test drilling, the Phase 2 test drilling program exploration included Site M and Site O. Two 6-inch diameter test wells were advanced at Site M – Hillcrest Park (to re-examine the deep formation) and Site O – Storm Pond (which previously exhibited promising conditions in term of yield and water quality. Upon completion of Phase 2 test drilling, well performance tests and the collection of water samples, unfavourable conditions for a new supply source based on insufficient water quantity, low water quality or a combination of both were encountered. The test drilling program was unsuccessful in locating a new site suitable groundwater supply.

2.2.3 Key Findings and Recommendations

In light of the unfavourable results of the extensive groundwater exploration and testing program, a re-evaluation of possible suitable sources for additional groundwater supply was considered necessary. The project team reconsidered an existing municipal site, the Hillcrest well site (currently not in service), as a potential source of supply.

Also, further review of historical information revealed a potential new site, TW #1-93 at 233 Church Street in the community of Alliston, for further exploration. Historical records unveiled that a test well, TW #1-93, had been previously drilled and tested in 1993 by a private developer on lands owned by the Community Living Association (CLASS) in the Town. Well testing related information suggested potential production capacity at the CLASS test well, TW #1-93, subject to confirmatory well testing. Step testing at both the

existing municipal Hillcrest and private TW1-93 well sites was carried out in February and May 2020. Key findings include:

- The existing Hillcrest well has a permitted water taking capacity of 9.5 L/s (821 m^3/day). The well has not been in service since June 2005 due to pressure limitations. The Hillcrest well is 62 years old and is located inside a pump house in a residential neighborhood. Step testing results confirmed that the current well can safely produce its rated capacity of 9.5 L/s (821 m^3/day) and further suggest a maximum production capacity of 12.6 L/s (1,089 m^3/d). In addition, a new production well onsite, with a larger diameter, could potentially produce a maximum rate of approximately 19 L/s (1,640 m^3/d).
- Class Well (TW1-93) was developed privately as a test well in 1993. Step testing results suggest that the existing test well can produce between 7.6 L/s to 12.2 L/s (657 m^3/d to 1,054 m^3/d) of groundwater. A new production well in the immediate vicinity, could potentially produce a maximum rate of approximately 15 L/s (1,295 m^3/day).

Water samples were collected at both Hillcrest and CLASS TW1-93 wells, during the step tests and analyzed for key physical and chemical water quality parameters. The water quality results are summarized below in Table 4. The parameter limits set out in the Ontario Drinking Water Quality (ODWQ) Standards, Objectives and Guidelines are also included in the table, for comparative purposes only. The Ontario standards, objectives and guidelines apply only to treated water and do not apply directly to raw water; however, they provide an indication of treatment requirements.

Table 4: Raw Water Quality at the Hillcrest and CLASS (TW1-93) Well Site

Parameter	Units	Hillcrest Well[1]	TW1-93 Well	ODWQ	AO/OG/MAC Health based Standard[2]
Colour	TCU	4.4	30.2	5	AO
Chloride (Cl)	mg/L	18.3	5.59	250	AO
Turbidity	NTU	**5.29**	**20.6**	**5**	AO
Hardness (as CaCO3)	mg/L	**202**	**190**	**80-100**	OG
Iron	mg/L	0.27	0.557	0.3	AO
Manganese	mg/L	0.0063	0.0174	0.05	AO
pH	-	8.02	8.36	6.5-8.5	OG
Sulfate (SO4)	mg/L	<0.30	<0.30	500	AO
Nitrate and Nitrite as N	mg/L	<0.022	<0.022	10	MAC
Dissolved Organic Carbon	mg/L	1.15	1.75	5	AO
Temperature	ºC	9.4-9.9	9.4-9.9	15	AO

Parameter	Units	Hillcrest Well[1]	TW1-93 Well	ODWQ	AO/OG/MAC Health based Standard[2]
Total Dissolved Solids	mg/L	244	226	500	AO

Notes:

1. Water quality data as per Groundwater Exploration Program Report, Geo Kamp Ltd., October 2020.
2. From O. Reg. 169/03 and Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (June 2003). AO is the Aesthetic Objective, OG is the Operational Guideline.

In comparing the reported raw water data at Hillcrest well with the treated water quality objectives outlined in the ODWQ Standards, the following is concluded:

- Field turbidity measurements were taken during the 2020 step test. Turbidity levels at flows of 9.5 L/s or lower, remained below 1 NTU. Increased turbidity levels were registered at the end of the pump test at the higher pumping rates of 10.1 and 12.6 L/s. The increase in turbidity was likely caused due to agitation of accumulated sediments near the pump intake at the higher pumping rates. Turbidity levels above 5 NTU become visible to the naked eye and may cause consumers objection, from a visual perspective. Therefore, an aesthetic objective of 5 NTU is set for all waters at the point of consumption. Turbidity levels anticipated at the Hillcrest site, based on step test results, are not expected to interfere with treatment efficiency.
- Hardness levels around 200 mg/L are outside the operational guideline range. This specific parameter is not substantially affected by conventional treatment. Hardness in the range of 80-100 mg/L is considered to provide an acceptable balance between corrosion and incrustation. Hardness levels around 200 mg/L are considered acceptable.
- Iron levels are slightly below the aesthetic objective of 0.3 mg/L. Based on the iron levels obtained during the step test, iron removal/control is not anticipated for the Hillcrest site; however, provision for installation of iron sequestration equipment will be made through a larger footprint area in the chemical room.
- Raw water sampling results obtained at the Hillcrest well suggest that conventional disinfection with sodium hypochlorite would be sufficient for meeting the Ontario Drinking Water Standards (ODWS).

In comparing the reported raw water data at CLASS Well TW1-93 with the treated water quality objectives outlined in the ODWQ Standards, the following is concluded:

- Field turbidity measurements taken during the 2020 step test exceeded the 5 NTU aesthetic objective. The raw water data exhibited some sediment resulting in increased turbidity. The turbidity observed was most likely from incomplete well development and would likely improve with continued pumping or well development. A new production well would be developed appropriately, so turbidity levels are expected to be within the limits and not interfere with treatment efficiency.
- Hardness levels of 190 mg/L are outside the operational guideline range. Hardness levels around 200 mg/L are considered acceptable.
- Iron levels were found above the aesthetic objective of 0.3 mg/L. Iron removal/control would be necessary based on the preliminary sampling results. Iron sequestration is currently provided in a few municipal drinking water facilities in the Alliston Water System, so a similar treatment approach is considered.
- Color levels observed in the water samples exceed the aesthetic objective of 5 TCU. The increased level of color could be due to the precipitation (oxidization) of iron by the time the sample reached the laboratory.
- Raw water sampling results obtained at the CLASS Well TW1-93 suggest that conventional disinfection with sodium hypochlorite and iron control/removal would be sufficient for meeting the Ontario Drinking Water Standards (ODWS).

Should development and testing of new production well at the two sites reveal different quality data than that of the existing raw water quality (as shown in Table 4), a review of treatment requirements would be required.

Based on these findings, the municipal Hillcrest well site and the CLASS Well TW1-93 well sites were both selected as potential sites for a new groundwater supply source. Implementation of these recommendations in the decision-making process for this Class EA study are described and discussed in more detail in subsequent sections of this report.

3 Municipal Class Environmental Assessment Process

This section provides an overview of the Municipal Class EA process and the steps involved in bringing a municipal infrastructure project to the design and construction phases.

3.1 Municipal Class Environmental Assessment

This project was completed under the Class EA process developed by the Municipal Engineers Association for Municipal Water and Wastewater Projects. The Municipal Class Environmental Assessment (MEA, October 2000 as amended in 2007, 2011 & 2015) is an approved process that proponents of municipal infrastructure projects must follow in order to meet the requirements of the Environmental Assessment Act (EA Act). All municipal infrastructure and new water supply projects in Ontario are subject to the Municipal Class EA process.

The Municipal Class EA was created to ensure that all aspects of the environment are considered during the planning and construction phases of a project. The Class EA process outlines the steps that must be followed to satisfy the EA requirements for water, wastewater and road projects.

The various phases of the Municipal Class EA process are described in Figure 3. In summary the five phases are:

- Phase 1: Identification of the problem or opportunity
- Phase 2: Identification of alternative solutions to the problem or opportunity and their respective impacts to the environment. Evaluation of alternative solutions and selection of a preferred solution considering public and review agency input
- Phase 3: Identification and evaluation of alternative design approaches for the preferred solution. Selection of the preferred design concept based upon public and review agency input
- Phase 4: Documentation of the planning, rationale, design, and consultation process in a Project File Report (PFR). The PFR must be available to the public and review agencies.
- Phase 5: Implementation of the preferred alternative design concept and monitoring for environmental provisions and mitigation measures.

Public and agency consultation is an important part of the Class EA planning process. Gaining input from individuals and groups can help identify project concerns early, and

to find ways to address concerns wherever possible. Public consultation is carried out at key stages of the Class EA process to allow time to review and provide input related to the project.

Projects subject to the Class EA process are classified into three possible “schedules” (or categories), depending on the degree of expected impacts:

- Schedule A projects represent minor operational and maintenance activities and are approved without the need of further assessment.
- Schedule A+ projects also represent minor activities and are pre-approved but require public notification prior to project implementation.
- Schedule B projects require screening of alternatives for their environmental impacts and Phases 1 and 2 of the planning process must be completed. A Class EA report, also referred to as a Project File Report, consistent with Phase 4 of the Class EA process must be completed subsequent to completion of Phase 2 and filed for public review.
- Schedule C projects must satisfy all five phases of the Class EA planning process. These projects have the potential for greater environmental impacts. Phase 3 involves the assessment of alternative methods of carrying out the project, as well as public consultation on the preferred design concept. Phase 4 includes the preparation of a Project File Report (PFR) that is filed for public review.

As indicated before, this Class EA study was carried out as a Schedule B Class EA undertaking with completion of Phases 1 and 2. Preparation of this report completes Phase 4 of the Class EA process

3.1.1 The New Alliston Production Well Class Environmental Assessment Study

This Class EA study has been carried out as a Schedule B Class EA undertaking. As part of the study, a comprehensive review of background information, data and planning projections and an assessment of the capacity of the existing water supply system in Alliston was conducted to confirm and formulate the need for the project and the opportunity being addressed (Phase 1), and to develop the basis for the identification and evaluation of potential water supply servicing alternative solutions (Phase 2).

This document summarizes Phases 1 and 2 of the Class EA process and fulfills the requirements of Phase 4. This Project File Report (PFR) will be placed on the public record and will be available for review by the general public for thirty (30) calendar days. Agencies and the public will be notified through the issuance of a “Notice of Study Completion”. The Notice of Completion will advise that interested persons may provide

written comments to the project team within the review period and all comments and concerns should be sent directly to the Proponent. In addition, if there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Part II Order requests on those matters should be addressed in writing to the Minister of Environment, Conservation and Parks (MECP) and the Director of Environmental Assessment Branch. The Town cannot proceed with the project until at least 30 days after the end of the comment period provided for in the Notice of Completion.

If no significant issues arise during the review period which cannot be resolved in consultation with the Town, and also that no Part II Order requests are received, the project will be considered approved and may proceed implementation. Detailed design and necessary testing and approvals will be completed prior to construction.

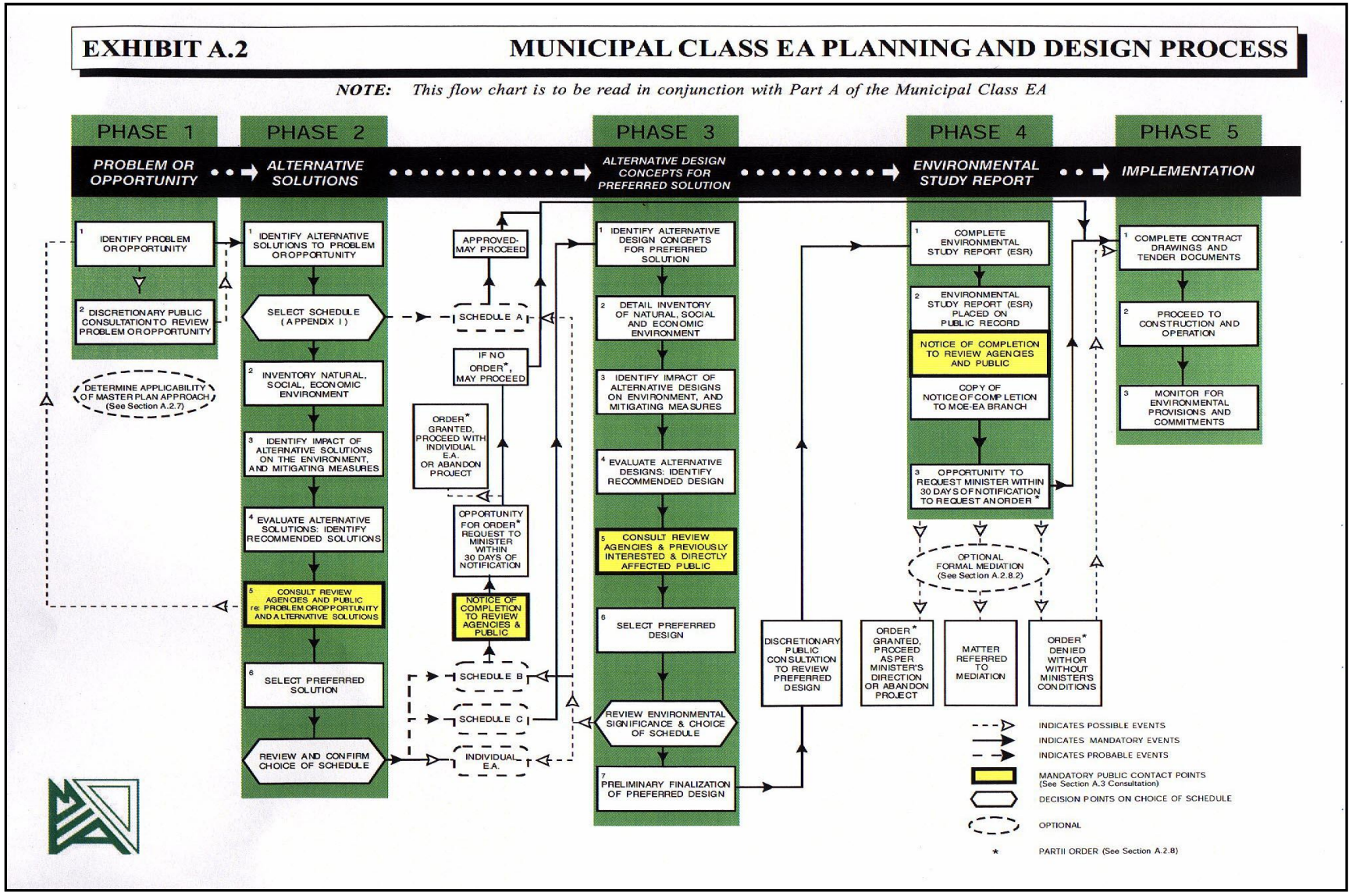

Figure 3: Municipal Class Environmental Assessment (EA) Planning and Design Process

3.2 Information on Part II Order Requests

Under the Class EA planning process, there is an opportunity for the Minister or delegate to review the status of a project. Members of the public, stakeholders and review agencies may request the Minister or delegate to ask a proponent to comply with Part II of the Environmental Assessment Act (which addresses individual EAs), before proceeding with construction of a proposed project. This is known as a Part II Order.

Interested persons may provide written comments to the project team. All comments and concerns should be sent directly to the Proponent.

In addition, a request may be made to the MECP for an order requiring a higher level of study (i.e. requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name for the ministry.

Requests should specify what kind of order is being requested (request for additional conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy those potential adverse impacts, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request. The requests should also be sent to the Proponent by mail or email.

The request should be sent in writing or by email to:

Minister of the Environment, Conservation and Parks

Ministry of Environment, Conservation and Parks

777 Bay Street, 5th Floor

Toronto ON M7A 2J3

minister.mecp@ontario.ca, and,

Director, Environmental Assessment Branch

Ministry of Environment, Conservation and Parks

135 St. Clair Ave. W, 1st Floor

Toronto ON, M4V 1P5

EABDirector@ontario.ca

4 Public and Agency Consultation Process

Public consultation is an important part of the Class EA process. Successful public consultation programs build and maintain community trust and credibility, improve project decision-making, and identify community concerns and issues early in the process.

This section provides a description of the communication and consultation activities undertaken at key stages of this Class EA Study. Appendices B to E provide additional details regarding public and agency consultation activities and events.

4.1 Public Consultation and Communication Program

A Communication and Consultation Program was implemented to manage public relations between the community and the Project Team and to establish opportunities to gather feedback from the public. Key objectives of this program were to:

- Inform the interested public and stakeholders about the project and provide factual information
- Facilitate and communicate opportunities for public input
- Promote a public consultation strategy that includes stakeholders as valued participants
- Tailor the consultation and communication program to the specific needs of the interested members of the public and stakeholder groups, while meeting and exceeding all legislated requirements
- Involve stakeholders by identifying appropriate mitigation measures and to assure them that these measures will be implemented.

4.1.1 Stakeholders

Various groups of stakeholders which were considered to have an interest in the New Alliston Production Well Class EA Study were identified. Key stakeholder groups are outlined below:

- Residents: this included residents that live within the immediate vicinity of the preferred site for development. Residents who live closest to the study area may have greater concerns about the project. The project team used specific public consultation and communication efforts to reach immediate neighboring residents of the site including direct mailing of letters and invitations to the public meeting.
- Environmental stakeholders and conservation authorities

- Review agencies: Provincial ministries and agencies, Federal Government departments and agencies, local area municipalities, district and planning boards, emergency services (fire, police, ambulance), school boards, utilities.
- Aboriginal groups: Provincial and Federal agencies such as the Aboriginal Affairs and Northern Development, Metis Nation of Ontario, and the Ministry of Aboriginal Affairs. In addition, first nations groups such as Chippewas of Georgina Island, Chippewas of Rama, Beausoleil First Nation, Six Nations of the Grand River Territory, Mississaugas of the Credit First Nation, Chippewas of Nawash Unceded First Nation, Saugeen First Nation, Saugeen Ojibway Nation Environment Office, and MNO Georgian Bay Metis Council, were also contacted.

A comprehensive Project Contact List was developed at the beginning of the Class EA Study to include all stakeholders considered to have an interest in the project. A copy of the Project Contact List is included in Appendix B for further reference.

4.1.2 Public Consultation, Communication Strategies and Tactics

The public consultation and communication program included a number of strategies to ensure that local residents and interested parties were informed about the project activities. The Municipal Engineers Association Class EA document outlines mandatory and discretionary consultation contact points with the public and agencies. In order to communicate the project progress and goals and to solicit proper feedback and insight throughout the process, CIMA+ undertook the following communication and consultation activities:

- **Project Contact List:** A master project contact list was created at the onset of the project to include representatives from government and regulatory agencies, residents, local agencies and interest groups, utilities, First Nations Groups, conservation authorities Interested members of the public were added to the project mailing list if requested, and individuals and groups on the list were kept informed about project developments using direct mail outs. All individuals on the project list were contacted at appropriate stages of the study to inform them about meetings and events. A copy of the Project Contact List is included in Appendix B for further reference.
- **Notice of Study Commencement:** A “Notice of Study Commencement” advising of the start of the project was placed on the Town’s website and advertised in the Herald and the New Tecumseth Times on two (2) consecutive publications being March 8 and March 15, 2018. Copies of the notice were mailed out to all individuals and groups on the project mailing list. A copy of the Notice of Study Commencement is provided in Appendix C.

- **Online Public Information Centre (PIC):** A “Notice of online PIC”, advising of the public meeting was advertised in the Herald and the New Tecumseth Times on two consecutive publications being September 17 and September 24, 2020. Copies of the notice were mailed out to all individuals and groups on the project contact list on September 17, 2020 and hand delivered to the immediate neighbors on September 28, 2020, in advance of the meeting. A copy of the notice was also posted on the Town’s project webpage: www.newtecumseth.ca/newproductionwell. A copy of the Notice of PIC is provided in Appendix C.
- An Online PIC was held from September 30, 2020 until October 23, 2020. Public comments related to the online PIC were received until November 15, 2020 via email. PIC related material was posted on the Town’s project webpage for the duration of the PIC and after the comment period. The purpose of the PIC was to present the project to the public, the results of the activities completed for the EA study, the preliminary preferred recommended water supply solution and gather public feedback on the information presented. The PIC also identified potential impacts and mitigation measures resulting from the preliminary preferred solution. The comments received after the PIC are summarized in Section 4.2 of this report. A log summarizing the PIC comments/questions along with the responses provided by the Project Team has been included in Appendix D. The information presented for the online PIC is also included in Appendix D.
- **Notice of Study Completion:** A “Notice of Study Completion” notifying the public and agencies that the PFR has been placed on the public record for review will be issued. The Notice will advise the general public about where to find the PFR, as well as their ability to provide written comments to the project team and also place a Part II Order request with the Minister of the environment, on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. The Notice of Study Completion will be advertised in the same local newspaper as the previous project notices. The notice will be posted on the Town’s project webpage and mailed out to all in the project mailing list. A copy of the Notice of Study Completion is included in Appendix C.

4.2 Public Information Centre Format

Due to the current COVID-19 Pandemic restrictions for gatherings and social distancing requirements, an online Public Information Centre (PIC) was held between on Wednesday, September 30th, 2020 to Friday, October 23, 2020. The format of an online PIC has been considered an acceptable practice for Municipal Class EA studies,

in response to the ongoing pandemic circumstances. The purpose of the PIC was to provide information about the project, the results of the activities completed to-date, the preliminary preferred recommended solution for the Alliston Drinking Water System and obtain feedback/comments from public.

The digital version of the PIC presentation boards, recorded video and narration of the PIC boards were posted on the Town's project webpage. All relevant agencies, Aboriginal Groups and members of the general public were notified by mail and email of the online PIC. Comments were received beyond the commenting period, until November 15, 2020 via email.

The link to the Town's project webpage is www.newtecumseth.ca/newproductionwell.

4.3 Summary of Public Issues, Comments and Concerns

Members of the public were encouraged to review the PIC material and provide feedback/ comments, enabling project team members to explain the main activities and findings up to this point.

Questions and comments were received from three (3) different stakeholders in response to the online PIC. Comments from the public were received through email to the project team. The questions/comments received were mainly related to concerns regarding the sources for additional supply capacity, including the Collingwood pipeline, the Tottenham wells, the new Hillcrest well site, as well as other supplementing sources to achieve the total projected demands in the system. Other concerns raised by an adjacent resident were related to the footprint of the new building, proximity to his residence and potential ways to mitigate visual disturbances.

A summary of the main concerns expressed through the three (3) separate submissions are summarized below in Table 5. A log detailed individual questions/concerns and team's responses is also included in Appendix D.

Table 5: Summary of Public Concerns

Concerns	Project Team Response
Concerns related to footprint of the proposed infrastructure and proximity to the nearby residents	The new pump house and treatment building will have an approximate footprint of 10m x 11m, and the generator pad will be approximately 3m x 7m. Watermain connections and chlorine contact chamber will be built underground. The proposed layout is a preliminary concept and the exact dimensions of the required infrastructure will be confirmed during detailed design. Opportunities to reduce the footprint requirements will be evaluated during that stage. The proposed infrastructure will be

Concerns	Project Team Response
	confined within existing property limits abiding the minimum setbacks from property lines as assigned by the Town's Zoning By-Law. Fencing along with landscaping opportunities will be incorporated during the detailed design stage.
Questions on the project timelines	Detailed design of the new facility is anticipated to be completed by Q4 2021 and construction is then anticipated to start in 2022. Timelines of construction is not certain at this stage as it can only be determined once the design has been completed.
Concerns regarding the evaluation process, key criteria and weighing factors assigned to the evaluation criteria	As defined in the EA Act, "Environment" encompasses natural, socio-cultural, technical, and economic considerations, as well as any combination or interrelationship between any two or more of them. All these components were considered and incorporated in the Class EA Study for the selection of preferred water supply solution with consideration to potential impacts to the overall "Environment", and not just a single component. Public health and safety is a priority to the Town, but other components need to be considered to ensure water is safely sourced and delivered to consumers.
Concerns about the Supply Capacity provided by the Town of Collingwood	The original agreement (1999) between the Town and the Collingwood Public Utilities Commission allows an increase to the Collingwood supply capacity to the Town up to 23,500 m^3/day in 2030. The Town of Collingwood acknowledges that an increase to 23,500 m3/day water supply from the plant to the Town is needed sooner (2032) than identified in the Collingwood's Water and Wastewater MSP (2044), and will accommodate the earlier provision of the additional capacity, subject to the finalization of the Water Supply Agreement between the two Towns.
Concerns about other sources to supplement the remainder water supply deficit to the Town	The Town will also be looking at a combination of alternative solutions, in conjunction with the preliminary preferred solution (Option 2: Use Existing Hillcrest Well, New Treatment Building and Additional New Production Well onsite), to close the gap between available and required water supply in the system. Other short-listed alternatives, such as water conservation measures, optimizing existing groundwater systems and increasing Collingwood pipeline supply would be considered along with the preferred water supply solution,

The Project Team responded to each of the comments on November 24, 2020 in the form of email. A copy of the CIMA+'s response is included in Appendix D.

4.3.1 Agency Consultation

Consultation with government review agencies and the public is a necessary and important component of the Class EA process. In conformance with the consultation for

this Class EA Study, the Town ensured that similarly to the public, appropriate review agencies were informed and given a chance to contribute during the study. This section outlines the agency consultation component of the study.

A list of agencies was prepared at the start of the project that included all relevant Town departments, Federal Government departments and agencies, Provincial ministries and agencies, local municipalities and agencies, as well as local associations and utilities. The opportunity for these agencies to participate in the project was provided through the distribution of the Notice of Study Commencement and PIC via direct letter mailing or through email if specified, which also served as a direct invitation to participate in the formal PIC. The complete list of all agencies contacted is included in Appendix B of this report.

4.3.2 Ministry of Environment, Conservation and Parks (MECP)

Consultation with the Ontario Ministry of the Environment, Conservation and Parks (MECP) was undertaken as part of the New Alliston Production Well Class EA Study. Email correspondence was received from the MECP on November 15, 2018 in response to the Notice of Study Commencement, with the following major comments:

- Proponent to identify and address the areas of interest which may be applicable to the project based on an attached MECP “Areas of Interest” document that provides guidance regarding the ministry’s interests with respect to the Class EA process.
- Requirements regarding a Part II Order Request Form.
- Delegated the procedural aspects of rights-based consultation of Aboriginal communities to the proponent, listed the communities who have been identified as potentially affected by the proposed project, identified sources of information related to Aboriginal consultation and the Ontario Environmental Assessment Act, and attached a document “A Proponent’s Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities” for further information.
- Provided instruction for when the proponent must contact the Director of Environmental Assessment and Permissions Branch.
- Noted that a draft copy of the Project File should be sent to the MECP prior to the filing of the final report, and for the Notice of Completion and final Project File to be sent to the MECP upon completion.

A copy of the letter received from the MECP is included in Appendix E.

4.3.3 Nottawasaga Valley Conservation Authority (NVCA)

An email was received from the Nottawasaga Valley Conservation Authority (NVCA) on October 30, 2020 in response to the Notice of PIC. The email was sent after NVCA reviewed the PIC materials that were made available online at the Town's webpage on September 30, 2020. A copy of the email is included in Appendix E. Based on their review, comments related to the source water protection, engineering and ecology included:

- Requirements under O. Reg. 205/18 as related to the Section 34 work to be completed for new municipal wells (or wells with an increase in PTTW amounts) under the Clean Water Act to ensure alignment with the Safe Drinking Water Act.
- The CLASS site which is being considered for a new well is within the flood hazard. If this option were to be become a 'preferred option' during the EA process, consideration will need to be given as to how safe access to the facility as outlined in the NVCA Natural Hazards Technical Guide is achievable during flood events.
- Proposal for a new municipal well, and the preferred solution in particular, appear to have no potential impacts on natural heritage features.

As per comments and recommendations from the NVCA, an assessment of the vulnerability of the new proposed production well, recommended as part of the preferred solution (Option 2), and an update of the existing Source Water Protection Plan will need to be completed. A similar assessment and safe access to the facility during flood events would need to be considered if the CLASS (TW1-93) site is considered for further development.

4.3.4 Aboriginal Groups

A comprehensive list of Aboriginal Groups was originally included in the mailing contact list developed for this project. Copies of the Notice of Study Commencement were mailed out on March 08, 2018 to each of the communities. The Aboriginal Groups were directly contacted on March 09, 2018 through means of a phone call following the issue of the Notice. The first direct form of contact was meant to confirm the groups' project awareness regarding the project notice, project information, and method of contact, if additional information or consultation related to the project was required.

Copies of the PIC notice were mailed out on September 17, 2020 to each of the communities. The Aboriginal Groups were contacted again on September 25, 2020 through means of a phone call following the issue of the Notice of PIC, to inform the groups of the online PIC being held on September 30, 2020 and the method of contact if

the need for a hard copy of the presentation or one-on-one consultation arose. A second follow-up phone call was made to the groups on September 28, 2020.

An email was received from the Chippewas of Rama First Nation on April 03, 2018 confirming the receipt of the Notice of Commencement. No other letters or follow-up phone calls were received from the Aboriginal Groups in response to the Notice of Study Commencement and Notice of PIC. The complete list of all Aboriginal Agencies and First Nation Bands contacted during this Class EA study is included in Appendix B and E of this report. A record of the Aboriginal Groups Communication and Consultation log is also included in Appendix E.

5 Study Area Overview

This section provides an overview of the main features, characteristics and existing conditions of the study area delineated for the New Alliston Production Well Class EA study.

5.1 Study Area Location and Site Features

The study area was delineated to incorporate the potential well site areas in the vicinity of Alliston and Beeton, identified during the Groundwater Exploration Program as discussed in Section 2.2. These potential well site areas were identified based on the three potential target areas recommended for test drilling, by the preliminary hydrogeological study completed as a part of the Water Master Plan (2016). The boundaries of the study area include Highway #89 to the north/east, the Community of Alliston to the North, Highway 9 to the South, 10th Sideroad to the East, and the Ajdala Tecumseth Townline boundary to the West. A general map indicating the study area limits is shown in Figure 4.

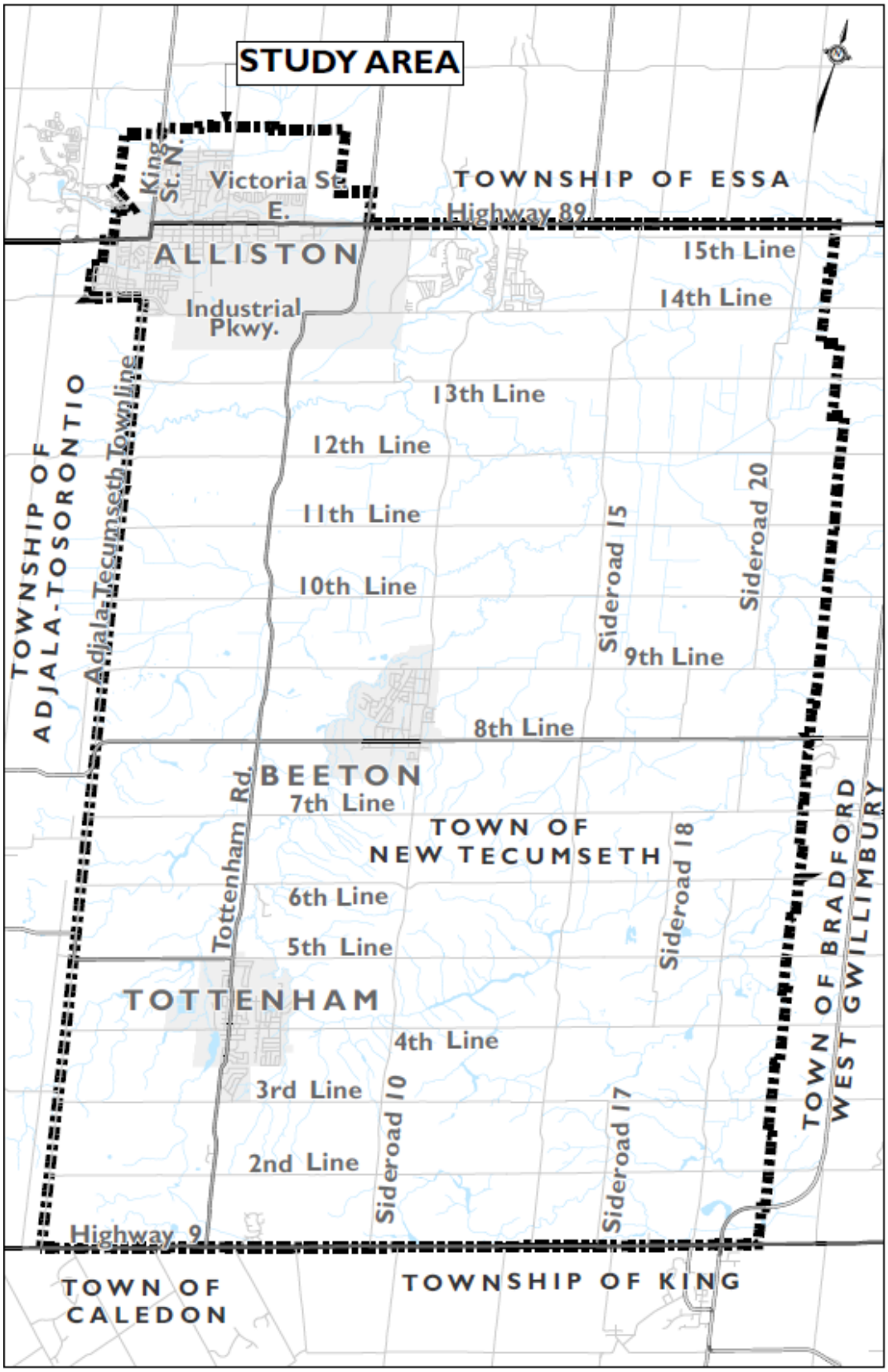

Figure 4: Study Area Map

5.2 Existing Natural Environment

Background information about the existing natural heritage features in the Town has been gathered and documented in many sources, including:

- The Town of New Tecumseth Official Plan (2010),
- Available reports at the Nottawasaga Valley Conservation Authority (NVCA), and
- Available mapping at the Ministry of Natural Resources and Forestry (MNRF).

The following sections provide a description of the major natural heritage features found within the study area.

5.2.1 Watersheds and Surface Water

Portions of four (4) watersheds are found within the limits of the study area. There are several designated significant natural areas and features within the study area and vicinity, including Significant Woodlands, Wetlands, Valleys and Stream Corridors, Environmental Protection Areas, as well as Provincially Significant Areas of Natural & Scientific Interest. The overall location of the watersheds and main features, also in Figure 5, and described in the following paragraphs.

5.2.1.1 Boyne River Watershed

The Boyne River, which is part of the Great Lakes Basin, is a tributary of the Nottawasaga River and runs through Alliston. The Boyne River arises as a series of tributaries from headwater wetlands northwest of Shelburne. These tributaries flow eastward through a gently rolling headwater landscape, joining to form the main branch of the Boyne River northeast of Shelburne. Downstream to Earl Rowe Provincial Park, just west of Alliston, the river flows through a rolling agricultural/rural/aggregate pit landscape before entering the large reservoir at the park. From Earl Rowe Provincial Park downstream to the Nottawasaga River (at Nicolson), the Boyne River flows eastward through a narrow, variably forested valley that bisects Alliston.

Spring Creek is a small, spring-fed creek that flows eastward along the southern boundary of urban Alliston. It flows through the sandy loams of the Simcoe Lowlands, entering the Boyne River near Nicolston. Unevaluated wetland complexes are present within the study area in the Boyne headwaters. These wetland groupings are important landscape features in the headwaters area.

Surface water quality and stream habitat in the Boyne River sub-watershed is variable. The main branch of the Boyne River supports productive trout habitat upstream of the Ear Rowe Reservoir (west of Alliston) to Shelburne.

Figure 5: General Location of Environmental Features

5.2.1.2 Innisfil Creek Watershed

The Innisfil Creek sub-watershed consists of 4 main creek systems – Innisfil Creek, Bailey Creek, Beeton Creek and Penville Creek – that drain to the southeast portion of the Nottawasaga River watershed. Out for the 4 main creek systems, the Bailey Creek River appears in the southern limits of the project study area, where it follows an intensive agricultural area within the Simcoe Lowlands as it flows eastward toward Beeton Creek. Trout habitat is limited to the cool headwaters of the Innisfil, Bailey and Beeton Creek systems.

Historically, large areas of wetlands in the Innisfil Creek sub-watershed were cleared and drained in the Simcoe Lowlands to provide farmland. As a result, wetland conditions within this sub-watershed are fair to poor compared to the rest of the Nottawasaga River watershed.

5.2.1.3 Upper Nottawasaga River Watershed

The northeast area of the Upper Nottawasaga Watershed is found within the west limits of the project study area. The provincially significant Beattie Pinery, south of Alliston, is present within this watershed. A narrow-fragmented valley corridor extends northeast to the Middle Nottawasaga sub-watershed, in the south limits of Alliston. A series of wetlands extends along base of the valley systems through the Escarpment and Simcoe Lowlands.

Sheldon Creek is a major stream entering the Nottawasaga River. It flows eastward through a well-forested valley system through the Hamlet of Sheldon and then enters an agricultural landscape that extends to the main river east of County Road 50, to the west of Alliston.

5.2.1.4 Middle Nottawasaga River Watershed

A very small portion of the Middle Nottawasaga River Watershed appears on the northeast limits of the study area. The sub-watershed extends from the river confluence with Innisfil Creek (southeast of Alliston) downstream to Angus. Middle Nottawasaga tributaries that originate in agricultural landscapes, exhibit impaired stream health. As the tributaries approach the main river, they cut into deep valley systems and their health improves as they enter these forested areas and pick up groundwater flow (springs).

5.2.2 Significant Wetlands

According to the County Official Plan, there are no, locally or provincially significant wetlands within the limits of the study area. As per interactive mapping available at the

Simcoe County, there are multiple wetland complexes throughout the study area, classified as Unevaluated Wetlands as per the Ontario Ministry of Natural Resources and Forests (MNRF).

5.2.3 Greenlands

A number of Greenlands complexes can be found within the study area. The Greenlands systems are generally associated with the major watercourses traversing the study area such as the tributaries of the Nottawasaga River, Bailey Creek and Boyne River. The systems are designated as Greenlands as per the Simcoe County Official Plan 2007.

5.2.4 Areas of Natural and Scientific Interest

There is one (1) Provincial Areas of Natural and Scientific Interest (ANSI) within the study area. The provincially significant Beattie Pinery (south of Alliston) is one of the last remnants of pine forest that once covered well-drained portions of the Simcoe Lowlands. This ANSI area is located outside of Alliston, south of 13th Line and west of the Canadian Pacific Railway.

5.2.5 Aquatic Habitat and Water Resources

According to information provided in the Nottawasaga Valley Source Protection Area Report, streams and watercourses within the study area are classified as cold or warm watercourses based on the fish communities supported. Coldwater fisheries habitats support brook, rainbow or brown trout and may exhibit coldwater, coolwater or warm water temperature regimes. Many streams exhibiting a warmwater temperature regimes support brook trout population which use groundwater discharge sites as temperature refuges during the hot summer months. Cool-water fisheries habitats do not contain trout species but support indicator organisms such as mottled sculpin and burbot or exhibit a cool-water or cold-water temperature regime.

Warmwater watercourses are more predominant in the study area. Warmwater fish species are more tolerant to higher temperatures, with most being able to tolerate temperatures up to 30 degrees C. Naturally occurring habitats are present along the middle and lower portions of the Nottawasaga River. The main part of the Nottawasaga River also provides spawning habitat and a migratory corridor for Lake Sturgeon (NVCA, 2007). Creeks that have been impacted by agricultural usage tend to have less diversity of species and contain fewer sensitive species.

5.3 Source Water Protection

The location of the study area is within the Nottawasaga Source Protection Area, that falls within the South Georgian Bay-Lake Simcoe (SGBLS) Source Protection Region. Chapter 14 of the Nottawasaga Valley Source Water Protection Area Approved Assessment Report presents the Vulnerability Assessment and Issues & Threats evaluation of the groundwater and surface water systems in the Town of New Tecumseth.

Mapping data from the Lake Simcoe Region Conservation Area confirms the presence of Wellhead Protection Areas, Significant Groundwater Recharge Areas and Highly Vulnerable Areas, scattered throughout the project study area. These areas are associated with existing well fields or water wells supplying a municipal residential system or other designated systems, as well as areas where an aquifer is significantly replenished from natural processes. It was confirmed that there are no Significant Groundwater Recharge Areas and Highly Vulnerable Areas within the Hillcrest site that was considered as a potential site in the EA study.

5.3.1 Wellhead Protection Areas

The Wellhead Protection Area (WHPA) is considered the primary vulnerable area and is therefore outlined to ensure the protection of the municipal water supply wells against any contamination. The limits of the WHPAs for the Alliston Supply System are shown in Figure 6. The WHPAs for the Alliston Water Works reflect groundwater flow mostly from west to east, consistent with the regional surface water drainage pattern. There is more of a south to north component to groundwater flow to Wells 4 and 6.

As per the *South Simcoe Groundwater Study WHPA Report – Town of New Tecumseth, Appendix J*, dated August 2004 by Golder Associates, the WHPA's for Wells 1, 5 8 and the Hillcrest Well are in developed residential/municipal areas and are within close proximity to a number of industrial, commercial and fuel related operations. The WHPA's for Wells 4, 6 and 7 are within an area of largely agricultural operations, which are irrigated. Water quality data reviewed as part of the assessment completed at the time indicated that the water supply is protected from impacts by those sources.

The groundwater vulnerability for the municipal water supply aquifer within the WHPA is considered to be low, except for a small area of medium vulnerability near the western extent of WHPA-D to the west of Well 7. Detailed information regarding the vulnerability assessment, issues and threats evaluation of the Alliston Supply System can be found in the *Nottawasaga Valley Source Protection Area Approved Assessment Report*, Chapter 14: Town of New Tecumseth, 2014.

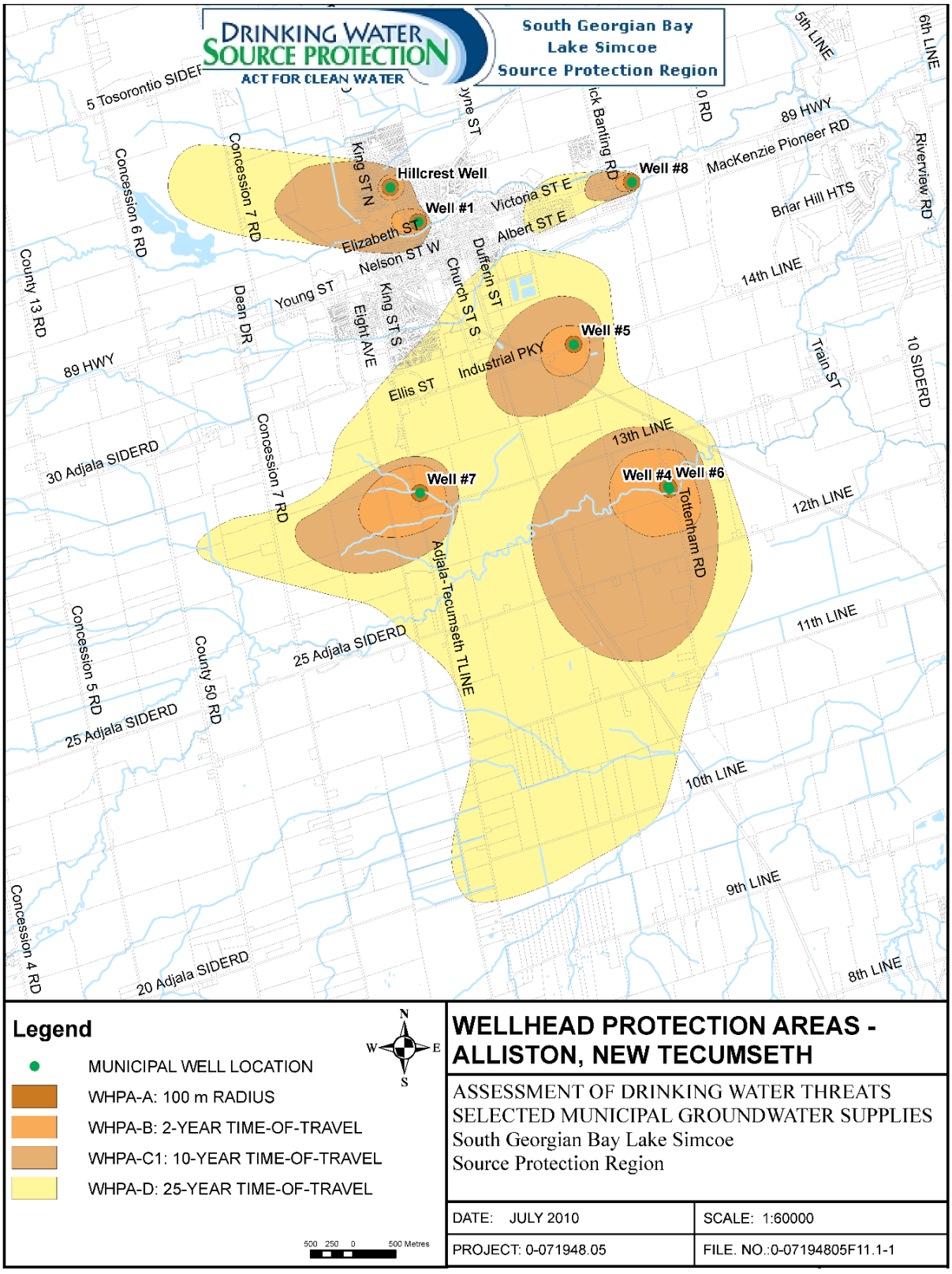

Figure 6: Wellhead Protection Areas (Source: Nottawasaga Valley Source Protection Area Approved Assessment Report)

5.3.2 Significant Drinking Water Threats for Alliston Supply System

A drinking water threat is an activity or condition that adversely affects or has the potential to adversely affect, the quality and quantity of any water that is or may be used as a source of drinking water. Number of significant drinking water threats, including verified existing threats and potential threats that require further verification, for the Alliston Water Works that have been identified in the *Nottawasaga Valley Source Protection Area Approved Assessment Report*, 2014 and summarized in Table 6.

Table 6: Number of Significant Drinking Water Threats per Parcel for Alliston Water Works

	Threat	Well 1	Well 4	Well 5	Well 6	Well 7	Well 8	Hillcrest Well
2	The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage.	1	2	2	2	1	11	1
3	The application of agricultural source material to land.		4	1	4	1		
4	The storage of agricultural source material.					2		
8	The application of commercial fertilizer to land.					2		
9	The handling and storage of commercial fertilizer.		4	1	4			
10	The application of pesticide to land.			1		2		
11	The handling and storage of pesticide.			1				
15	The handling and storage of fuel.	1	2	1	2	1	3	1
16	The handling and storage of a dense non-aqueous phase liquid.	2		2			2	2
21	The use of land as livestock grazing or pasturing land, an outdoor confinement area, or a farm-animal yard.					2		
	Total Number of Significant Threats:	**4[1]**	**12[2]**	**9[3]**	**12[2]**	**11[4]**	**16[5]**	**4[1]**
	Total Parcels with Significant Threats:	**4**	**4**	**3**	**4**	**2**	**13**	**4**

Notes:

The serial number of the type of significant threat is noted as provided in the Nottawasaga Valley Source Protection Area Approved Assessment Report, 2014.

The number of parcels identified will typically be fewer than the number of significant threats as multiple threats can be observed per parcel.

1. One (1) verified existing Threats and 3 potential Threats that require further verification by Nottawasaga Valley Conservation Authority (NVCA) - Well 1 & Hillcrest Well
2. 12 potential Threats that require further verification by NVCA - Wells 4 &6
3. Nine (9) potential Threats that require further verification by NVCA - Well 5
4. Three (3) verified existing Threats and 8 potential Threats that require further verification by NVCA - Well 7
5. Nine (9) verified existing Threats and 7 potential Threats that require further verification by NVCA - Well 8

5.4 Existing Socio-Cultural Environment

5.4.1 Land Uses

The dominant land uses within the study area, outside of the settlement area of Alliston, are agricultural and natural features.

The 2010 County's Official Plan (OP) has designated the lands within the Alliston settlement area for various types of land uses. Alliston is mostly designated as "Urban Residential" and "Employment Areas" with access to Town's municipal services with a land supply that can accommodate additional development. Other land uses within Alliston are designated commercial and institutional, as well as some corridors designated as environmental protection areas.

5.4.2 Cultural Heritage Features

The Town has a register of designated historical properties as well as historically significant properties within the Town. There are two designated historical properties and three historically significant properties within the limits of the study area, which include:

- McDonald Log House, located at Fletcher Crescent and King Street near Riverdale Park, and,
- Alliston Monument Works located in downtown Alliston on Victoria Street East.

- Three (3) homes designated as historically significant properties on Fletcher Crescent in Alliston.

These designated historical properties are far away from both the potential sites (Hillcrest well and CLASS well sites) that were recommended by the groundwater exploration program as potential sites for further consideration in this EA Study.

5.4.3 Archaeological Features

The Town's Official Plan (2010) recognizes that there are archaeological remnants of prehistoric and early historic habitation as well as areas of archaeological potential within the Town. Archaeological sites and resources contained within these areas can be adversely affected by any future development. As per interactive mapping available at the Simcoe County, the Town has significant archaeological potential sites scattered throughout the study area, mainly in the undisturbed agricultural lands, woodlands, provincial parks and conservation areas. The developed residential and commercial areas have been extensively disturbed and therefore no longer have archaeological potential. Based on the recommendations of the groundwater exploration program, if the Hillcrest site is developed further, no impact to the archaeological features is expected due to previous construction and disturbance on existing Hillcrest site. However, the CLASS site for development of new production well might have some archaeological potential and therefore might require an archaeological assessment to be completed.

5.4.4 Existing Geological and Hydrogeological Conditions

Available hydrogeological information of the study area, including the preliminary hydrogeological study carried out as part of the Water Master Plan, the MECP well records and hydrogeological reports were reviewed and compiled by Geo Kamp Ltd. during a phased groundwater exploration program completed between 2018 and 2019, in support of the New Alliston Production Well Class EA Study.

The following sections provide a summary of the geological and hydrogeological characteristics of the study area, based on the information documented in the past.

5.4.4.1 Geology

The majority of the study area is relatively flat at an elevation of 220 to 225 metres Above Mean Sea Level (m AMSL) and is referred to as the Essa Flats. Alliston is surrounded with sandy soils known as the Essa Flats and the lowland area between the Nottawasaga River and Beeton Creek is known as the Schomberg Clay plains. Both of these surficial deposits are derived from proglacial lakes (Lake Algonquin) that formed in front of retreating ice at the end of the Late-Wisconsin glaciation approximately

14,000 years ago. The sand of the Essa Flats was deposited in shallow water and the silt and clay of the Schomberg Clay Plains slowly settled out of deep water. The Simcoe Lowlands and Schomberg Clay Pains make up most of the study area.

Underlying the surficial deposits is an older silt and clay confining layer that is more or less laterally continuous across the study area and across Simcoe County and York Region. This layer is the main confining layer over deep confined aquifers and is generally responsible for the good quality water in the County. Below the confining layer, granular deposits are present in many areas. These granular deposits, known as the Thorncliffe Formation, are thought to represent the remnants of a river system that flowed along the east side of the Niagara Escarpment from Georgian Bay to Lake Ontario.

The Thorncliffe Formation is referred to as Aquifer A3 in the Simcoe County area (Golder, 2004) and is present in an elevation range of 135 metres above sea level (masl) and 180 masl. All of the groundwater wells in the Town are constructed in Aquifer A3. Aquifer A3 is a regionally significant aquifer that is often present in boreholes drilled deep enough. The coarseness and thickness of Aquifer A3 varies and therefore, even though it is ubiquitous it may not support water taking suitable for municipal water supply needs.

5.4.4.2 Hydrogeology

The Town of New Tecumseth study area is underlain by bedrock belonging to the Blue Mountain and Lindsay formations in order of increasing geological age (Ordovician age). The Lindsay Formation consists of a grey limestone whereas the Blue Mountain Formation is a black shale. All of the existing Town of New Tecumseth production wells obtain water from overburden formations (sand and gravel) except for the Hillcrest Well.

According to the MECP records, there are not as many drilled bedrock wells in the vicinity of the study area as compared to the overburden drilled wells. Although bedrock wells are distributed throughout the study area, they are not as common because the overburden is relatively thick.

6 Existing Alliston Water Supply System

This section provides an overview of the existing Alliston Drinking Water Supply System and describes in detail the key components such as pipeline supply servicing the Town, existing water supply capacity, groundwater supply wells, pumping facilities, treatment requirements, and the existing distribution system in Alliston.

6.1 System Overview

The Alliston Water Supply System distributes treated water to the communities of Alliston and Beeton, which includes approximately 22,700 consumers (based on 2016 Census from Statistics Canada). There are 6,250 service connections, comprising residential, institutional, commercial and industrial consumers. In addition, there are approximately 130 kilometers of watermain and 830 hydrants.

The Alliston Water Supply System is primarily supplied by a transmission main from Collingwood and is supplemented by the groundwater production wells located in Alliston, during times of peak demand.

The Collingwood pipeline conveys water through 57 km of 600 mm diameter watermain from the Raymond A. Baker Ultrafiltration Plant in Collingwood to the Town's Parson Road Reservoir and pumping station facility in Alliston. The current water supply agreement between the Town and the Collingwood Public Utilities Commission (PUC) allows a maximum pipeline supply of 13,000 m^3/day, with an allowance for future increases in water supply to the Town.

The Town is responsible for the operation and maintenance of the pipeline. As permitted in the existing water supply agreement, the Town currently supplies water – through separate Township agreements – to the community of New Lowell in the Township of Clearview, up to a total of 250 m^3/d, and to the Communities of Baxter and Angus in the Township of Essa, up to a total of 100 m^3/d. The communities of Angus and Baxter within the Township of Essa and the community of New Lowell within the Township of Clearview are connected to the Collingwood pipeline. Upon completion of the Town's Water Master Plan, the Town Council approved an additional 400 m^3/day supply to the Township of Essa (starting from 2021), increasing the total supply of 500 m^3/day to the Township of Essa.

The community of Hillcrest, located in the northeast section of Alliston, used to be supplied separately through the Hillcrest well, but is now connected to and serviced by the Alliston zone. The Hillcrest well has remained non-operational ever since. In addition, the Town has enacted the "Municipal Sewers Discharge and Water Supply (Honda) By-Law" (No. 2003-103) which allocates 6,000 m^3/d to Honda of Canada Mfg.

The Alliston water supply system also supplies to the community of Beeton in the Town. A 10 km, 300 mm diameter transmission main transports treated water from the Parsons Road Pumping Station in Alliston to the McKelvey Reservoir. This reservoir then supplies the Beeton Springs Reservoir, which distributes water by gravity. The existing wells in Beeton are no longer used due to poor water quality.

The Alliston Water System consists of the following key components:

- Seven (7) groundwater supply wells: Well No.1, No.4, No.5, No.6, No.7, No.8 and Hillcrest well (Note: Hillcrest well is currently offline).
- Four (4) in-ground reservoirs and pumping stations:
  - Parsons Road Reservoir and Booster Pumping Station (Alliston)
  - Mowder Boulevard Reservoir and Booster Pumping Station (Mowder Area)
  - McKelvey Reservoir and Booster Pumping Station (Beeton)
  - Springs Reservoir (Beeton)
- One (1) elevated tank:
  - Alliston Elevated Water Storage Tank
- One (1) re-chlorination facility – the Earl Rowe Park Re-chlorination Facility.

A general schematic showing the key components of the Alliston Drinking Water System and its serviced areas is shown in Figure 7. The rated capacity of the supply pipelines and municipal wells, and the corresponding license number, is presented in Table 7.

Table 7: Alliston Water Supply System – Permitted Rated Capacities

Source	Rated Capacity		Permit / License Number	Renewal Date
	(m^3/d)	(L/s)		
Pipeline Supply	13,000	150.5	1999 Agreement between Town and Collingwood PUC	2020
Well No.1[1]	1,642	19.0	DWWP 123-201 Issue No.2	N/A
Well No.4	2,938	34.0		
Well No.5	2,938	34.0		
Well No.6	2,938	34.0		
Well No.7	1,964	22.7		
Well No.8	1,964	22.7		
Hillcrest Well[2]	753	8.7		

Notes:

1. As per PTTW 7725-9MKGF2, the maximum taking capacity for Well No.1 is 1,642 m^3/d. Existing DWWP 123-201 Issue No.2 indicates that the well is equipped with a pump rated at 900 m^3/d and a flow control valve that restricts the flow to 896 m^3/d in order to meet chlorine contact time (CT) requirements. Well

#1 was upgraded in November 2019 and its capacity has been restored to the permitted rate of 1,642 m^3/d.

2. As per PTTW 7725-9MKGF2, the max. taking capacity for Hillcrest Well is 821 m^3/d. Existing DWWP 123-201 Issue No.2 indicates that the well is equipped with a pump rated at 753 m^3/d. Hillcrest well is currently offline.

As per the current Permit to Take Water #7725-9MKGF2, the maximum water taking capacity for the existing municipal production wells in Alliston is 15,205 m^3/day, All wells are non-GUDI (Groundwater Under the Direct Influence of surface water) and located on separate sites throughout Alliston.

Some of the wells (Wells No.1, No.7 and No.8) discharge directly to the distribution system while other wells (Wells No.4, No.5 and No.6), along with the supply pipeline from the Town of Collingwood, discharge to the Parsons Road Reservoir. Connections to the distribution system from the wells discharging to the reservoir exist but are closed off.

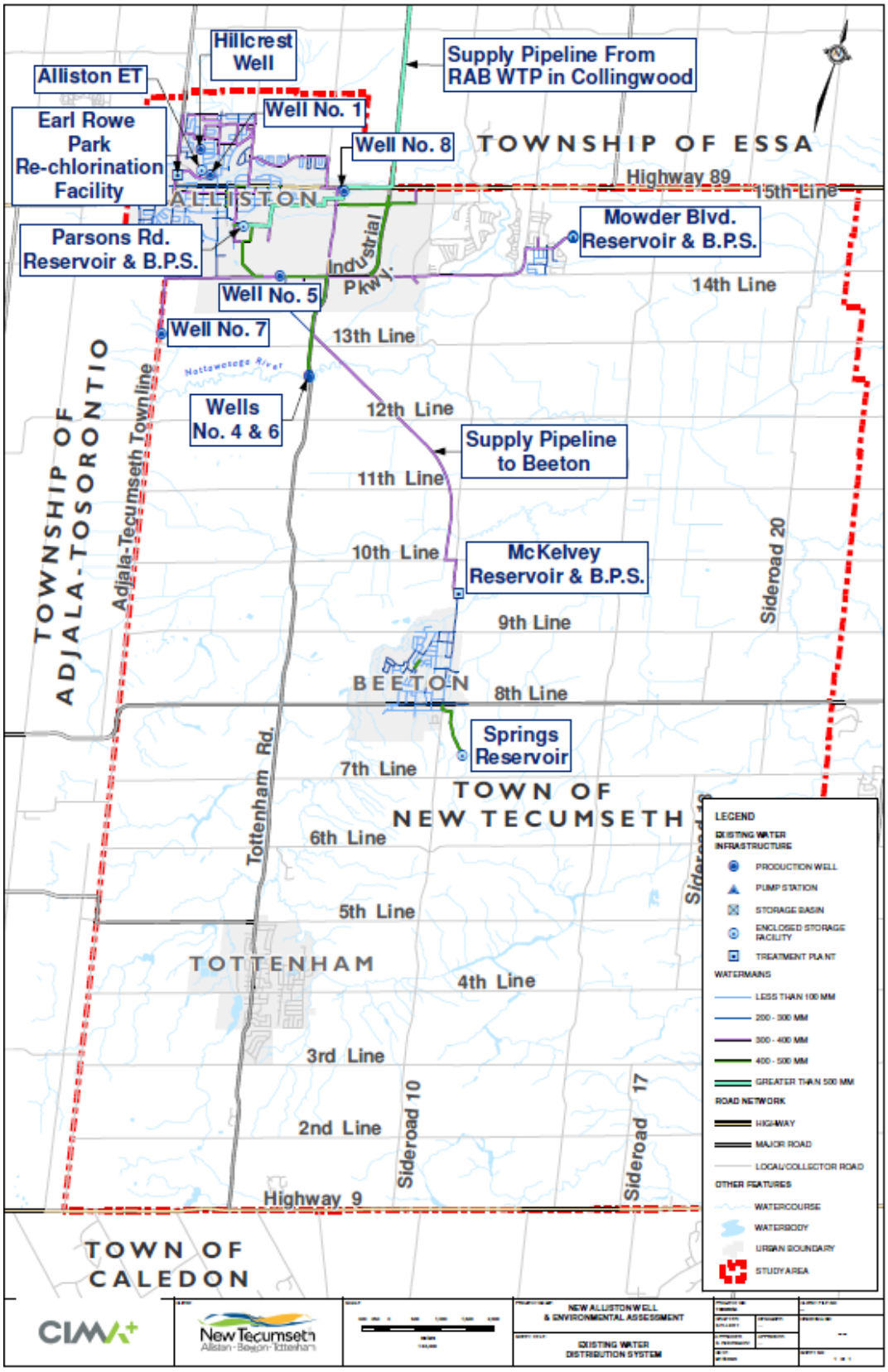

Figure 7: General Schematic – Alliston Drinking Water System Components

The wells that discharge directly into the distribution system are equipped with chlorination disinfection systems, iron sequestration systems (excluding Well No. 8 and Hillcrest Well), as well as a chlorine contact pipe to provide the required disinfection. Wells that discharge to the reservoir are equipped with chlorination and iron sequestration systems. The Hillcrest well (currently out of service) used to operate as a self-contained system, equipped with a well pump, chlorination system, in-ground reservoir and high lift pumps. The Hillcrest system is currently serviced by the Alliston Water System through a connecting watermain and a Pressure Sustaining Valve (PSV).

The Alliston distribution system is divided into four (4) separate pressure zones – Alliston, Honda, Mowder Boulevard Reservoir Area and Boosted Belterra. Static pressures in Alliston are governed by the water level in the Alliston Elevated Water Storage Tank. Key components of the distribution system are as follows:

- The Parsons Road Pumping Station pumps water from the reservoir into the Alliston Zone.
- Three (3) separate Honda pumps, located inside the Parsons Road Pumping Station, pump water from the reservoir into the Honda Zone. A connection exists between the Honda and Alliston Zones on Industrial Parkway that allows water to flow from the Alliston Zone into the Honda Zone when the Honda pumps are shut down.
- The Hillcrest Zone, a separate pressure zone in the Northern section of Alliston, is currently serviced by the Alliston zone, since the Hillcrest well is currently offline.
- The Mowder Boulevard Reservoir Area, a recent development located on the east side of Alliston, is serviced by the Mowder Reservoir, which is filled by the pressures from the main Alliston Zone. The Mowder Reservoir and Pumping Station also contain three booster pumps to boost pressure to the elevated portion of the Belterra Estates Development.
- The Briar Hill development is located between Alliston and Belterra. This private development has its own groundwater well supply and distribution system. Connections between the Briar Hill system and Alliston are not been considered at this time and are not within the scope of this Class EA study.
- The Earl Rowe Park Re-Chlorination Facility is used to top up the chlorine residual of the water supply before it enters the Earl Rowe Provincial Park.

As indicated previously, the Alliston system also supplies all of the water in Beeton through a single 300 mm diameter transmission main. The Beeton distribution system consist of a single pressure zone. The Alliston pressure zone fills the in-ground

McKelvey Reservoir and is pumped into Beeton using three pumps located in the McKelvey Pumping Station. Static pressure in Beeton is governed by the water level in the in-ground Beeton Springs Reservoir that allows automatic operation of the McKelvey high lift pumps based on the water level in the storage reservoir.

6.2 Existing Collingwood Supply Agreement

Water supply from the Town of Collingwood is based on an agreement executed in 1999 between the Town and the Collingwood Public Utilities Commission (CPUC). The 1999 Agreement outlines the minimum and maximum volume of water that the Town has agreed to purchase from the CPUC.

The current water supply agreement between the Town and the CPUC allows a maximum pipeline supply of 13,000 m^3/day, with an allowance for future increases in water supply to the Town, subject to additional infrastructure requirements. However, the current RAB WTP can only provide the Town up to a maximum of 10,000 m^3/day.

The agreement also allows the Town to sell water to other communities located along the pipeline. Currently the Town has agreements to supply water to two (2) Townships:

- Township of Clearview: supply connection to the community of New Lowell for a total of 250 m^3/day. Future connections may be made to the community of Stayner.
- Township of Essa: supply connection to the communities of Baxter and Angus for 100 m^3/day. Additional supply requests by the Township of Essa for another 400 m^3/d have been approved by Town Council in 2017 and 2019, for a total supply to the Township of 500 m^3/d, starting from 2021.

Minimum and maximum flows contemplated in the agreement, as well as the pertinent required infrastructure expansions, are summarized in Table 8.

Table 8: Existing Collingwood Agreement – Minimum and Maximum Demands

Years	Minimum Average Day Demand (m^3/day)	Maximum Average Day Demand (m^3/day)	Required Infrastructure Expansions
2010-2017	10,100	13,000	None
2018-2024	11,400	16,000	Upgrade pumps in existing RAB WTP PS New BPS near Sta. 22+050 (Required for flows >13,440 m^3/d)
2025-2029	12,700	20,000	RAB WTP Expansion (anticipated in 2026)
2030	13,440	23,500	None
		>23,500	New BPS required for flows >23,500 m^3/d

6.3 Detailed System Components

Specific details on individual system components are provided in this section.

6.3.1 Supply

The seven production wells referred to as Wells No.1, No.4, No.5, No.6, No.7, No.8 and the Hillcrest Well all operate under the same Permit to Take Water (PTTW) Number 7725-9MKGF2.

A stratified multi-aquifer system, consisting of interbedded layers of sand and silt/clay till material are observed beneath the Community of Alliston Area. The sand aquifer materials are relatively continuous throughout the Alliston area, except in areas of bedrock highs, or thick till deposits. The overburden ranges between 50 and 100 m thick, thins toward the Niagara Escarpment to the west and is underlain by shale and limestone bedrock. There are three (3) aquifers present. The upper aquifer is discontinuous and unconfined. The two (2) lower aquifers are confined by overlying aquitards and are the source of water for the Alliston municipal wells. The Hillcrest Well is drilled into a confined limestone bedrock aquifer.

Well characteristics of each well are summarized in Table 9. The overall location for all wells is shown in Figure 6 (Section 5.3.1).

Table 9: Alliston Municipal Supply Well Characteristics[1]

Well	Construction Date	Pump Type	Pump TDH (m)	Stand-by Power	Well Depth (m)	Well Casing Diameter (mm)
Well No.1	1951	Submersible	116	None	80	305
Well No.4	1968	Vertical Turbine	130	None	75	508
Well No.5	~1986	Vertical Turbine	109	150 kW	78	508
Well No.6	1991	Vertical Turbine	125.5	100 kW [2]	72	610
Well No.7	1993	Vertical Turbine	102	60 kW	51	610
Well No.8	1996	Vertical Turbine	119	None	68	500
Hillcrest Well	1958	Submersible	84	None	96	150

Notes:

1. Well characteristics as noted in DWWP Number is 123-201 Issue No. 2, dated July 18, 2016.
2. The generator at Well # 6 is 40 years old. The generator at Well # 4 is sized such that it can power Well #6.

As shown in Figure 6 (Section 5.3.1), Well No.1 and Hillcrest Well are located in the northwest part of the community. Wells No.4 and No.6 are located south of Alliston on County Road 10, on the north side of the Nottawasaga River. Well No.5 is located on the north side of Concession Road 13/14 (Industrial Parkway), adjacent to the Honda Plant on the 14th Line. Well No.7 is located southwest of Alliston on the east side of the Road Allowance between New Tecumseth and Adjala. Well No.8 is located on the east side of the Community of Alliston, just off Highway 89.

According to the Town, the Hillcrest well has not run continuously since June 2005. From operational data provided by the Town for the period between 2014 and 2016, it was confirmed that the Hillcrest well was only operational during the month of February 2014 but remained offline during the balance of the reporting period. Actual water takings from the Alliston municipal supply system are summarized in Table 10. Maximum water takings per PTTW conditions are also included in Table 10 for comparative purposes.

Table 10: Alliston Well Field – Water Takings

Source	Maximum Permitted Taking (m^3/day)	Actual 2014-2016 Maximum Water Taking[2] (m^3/day)	% of Maximum/ Permitted Taking	Actual 2014-2016 Average Water Taking[2] (m^3/day)	% Average/ Permitted Taking
Well No.1	1,642[1]	342.3	38%	17.8	2%
Well No.4	2,938	2580.5	88%	394.8	13%
Well No.5	2,938	2425.3	83%	388.7	13%
Well No.6	2,938	2720.7	93%	321.4	11%
Well No.7	1,964	1056.8	54%	175.4	9%
Well No.8	1,964	885.1	45%	103.6	5%
Hillcrest Well	753	576.5[3]	77%	10.3[4]	1%
Maximum Total Taking	15,205				

Notes:

1. As per PTTW 7725-9MKGF2, the maximum taking capacity for Well No.1 is 1,642 m^3/d. The existing DWWP 123-201 Issue No.2 indicates that the well is

equipped with a pump rated at 900 m^3/d and a flow control valve that restricts the flow to 896 m^3/d in order to meet chlorine contact time (CT) requirements. Well #1 was upgraded in November 2019 and its capacity is expected to be restored to the permitted rate of 1,642 m^3/d.

2. Maximum and average water takings based on actual 2014-2016 pumping data provided by the Town.
3. Maximum water taking for Hillcrest as reported for February 2014 only. The well remained completely off-line during 2015 and 2016, as per pumping data.
4. Average water taking for Hillcrest as reported for February 2014 only. The well remain completely off-line during 2015 and 2016, as per pumping data.

Based on actual water taking data obtained for the operating period between 2014 and 2016, and as shown in Table 10, the actual maximum water taking from the Alliston wells ranges approximately between 40% to 95% of the maximum PTTW taking. Similarly, the actual average water taking from the Alliston wells ranged approximately between 2% to 15% of the maximum taking permitted in the PTTW.

6.3.2 Existing Water Supply Capacity

The MECP (previously known as MOE) Design Guidelines recommend that system supply capacity be capable of meeting the system's Maximum Day Demands.

Groundwater supply systems are recommended to be designed to meet the anticipated maximum day demands through firm capacity as opposed through the total installed capacity. Firm capacity is typically calculated as the maximum capacity that can be achieved when the largest component of the system is out of service. The objective of providing firm capacity is to increase the system's reliability to meet the system's maximum day demands in the event that any of the production wells is offline for service, maintenance or rehabilitation, which is common for groundwater wells.

Table 11: Existing Alliston Water Supply Capacity – Total and Firm

Well Source	Rated Capacity[1] (m^3/day)	Comments
Alliston Well 1	1,642	Well 1 was upgraded in November 2019. Well capacity was restored to its PTTW capacity of 1,642 m^3/d.
Alliston Well 4	2,938	
Alliston Well 5	2,938	
Alliston Well 6	2,938	
Alliston Well 7	1,964	

Well Source	Rated Capacity[1] (m^3/day)	Comments
Alliston Well 8	1,964	
Hillcrest	753	Hillcrest well rated for 821 m^3/day; however, existing DWWP Number: 123-201 Issue Number 2, indicates that the well pump has a capacity of 753 m^3/day. The Hillcrest well has not run continuously since June 2005.
Total Installed Capacity =	**15,137**	Installed capacity calculated to include all Alliston wells, including Hillcrest well.
Firm Capacity =	**11,446**	Firm capacity assumes one of the largest well pumps out of service, and without the Hillcrest well pump, which has been offline since June 2005.

Notes:

1. Rated capacities as per Permit to Take Water Number 7725-9MKGF2, unless indicated otherwise.

As summarized in Table 11, the total installed capacity in the Alliston well system is approximately 15,137 m^3/d, which includes the rated capacity of all seven (7) groundwater production wells in the system. The existing firm capacity of the Alliston well system, also shown in Table 11, is approximately 11,446 m^3/day. As the existing Hillcrest well has not run continuously since June 2005, its capacity has not been accounted for in the system's firm capacity calculation.

6.3.3 Treatment

Treatment for the Alliston groundwater wells generally consists of a combination of chlorine disinfection and iron sequestration. Well No.8 and Hillcrest Well are the only wells that do not provide iron sequestration as part of their treatment.

Sodium hypochlorite is used at the treatment facilities and reservoirs for disinfection. Sodium silicate is used for iron control through sequestration. Addition of sodium silicate takes place downstream of the sodium hypochlorite application point. As indicated previously, Wells No.1, No.7 and No.8 discharge directly to the Alliston Distribution System, while Wells No.4, No.5 and No.6 discharge to the Parsons Road Reservoir. Connections to the distribution system from the latter wells is available but closed off during normal operating conditions.

In addition:

- Well No. 8 is equipped with two top-up sodium hypochlorite chemical feed pumps with feed lines connected to the supply line from Collingwood.

- Wells No. 4, No. 5 and No. 6 have the chlorine disinfection system connected to a 400 mm diameter transmission main to Parsons Road Reservoir and Booster Pumping Station. Well No. 5 has currently no active service connections for the entire length of the transmission main.
- The Earl Rowe Park – Re-chlorination Facility is a re-chlorination (top-up) facility that uses sodium hypochlorite. The disinfection system includes a chemical tank and chemical feeding pumps connected to the dedicated 150 mm diameter water supply pipe to Earl Rowe Provincial Park.

Treatment available at each of the wells is summarized in Table 12.

Table 12: Municipal Groundwater Treatment – Summary[1]

Well	Chlorine Disinfection	Iron Sequestration	Chlorine Contact Pipe	Contact Pipe Description	Discharge Location
Well 1	Yes	Yes	Yes	16 m long, 1,200 mm diameter	Distribution system
Well 4	Yes	Yes	No	N/A	Parsons Road Reservoir
Well 5	Yes	Yes	No	N/A	Parsons Road Reservoir
Well 6	Yes	Yes	No	N/A	Parsons Road Reservoir
Well 7	Yes	Yes	Yes	23.8 m long, 600 mm diameter	Distribution system
Well 8	Yes	No	Yes	41.5 m long, 750 mm diameter	Distribution system
Hillcrest Well[2]	Yes	No	Yes	Underground reservoir acts as a contact chamber	Well is off-line

Notes:

1. Treatment description as per DWWP Number 123-101 Issue No. 2, dated July 18, 2016
2. As per 2016 Alliston Drinking Water System Annual Report, the Hillcrest well was not in service in 2016 except for regulatory sampling and no water was directed to the distribution system

6.3.4 Pumping

The existing pumping facilities in the Alliston Drinking Water System include the Parsons Road Pumping Station, Mowder Reservoir Pumping Station, the McKelvey Booster Pumping Station and the Hillcrest Pumping Station. Key characteristics of the pumping facilities are summarized in Table 13.

Table 13: Pumping Facilities – Summary[1]

Facility	Number of Pumps	Pump Capacity (L/s)	Pump TDH (m)	Firm Capacity (L/s)	Serviced Area
Parsons Road Pumping Station	6 3 Pumps for Alliston & 3 HLPs for Honda (2 duty, 1 standby)	Pump 1: 282 Pump 2: 282 Pump 3: 143	70.8 70.8 88	425	Alliston
		HLP 1: 42 HLP 2: 42 HLP 3: 42	62 62 62	84	Honda
McKelvey Booster Station	3 (2 duty, 1 standby)	HLP 1: 33.3 HLP 2: 33.3 HLP 3: 33.3	74 74 74	67	Beeton
Hillcrest Pumping Station	2 (1 duty, 1 standby)	HLP 1: 8.3 HLP 2: 8.3	56 56	8.3	Alliston
Mowder Pumping Station	3 (1 duty, 1 standby, 1 Fire)	Pump 1: 16.4 Pump 2: 16.4 Pump 3: 116.4	20.4 20.4 30.6	16.4	Belterra Estates Sub-Division

Notes:

1. Pumping characteristics as per DWWP Number 123-101 Issue No. 2, dated July 18, 2016

6.3.5 Storage

The existing water storage facilities in the Alliston Drinking Water System include the Parsons Road Reservoir, the Alliston Elevated Water Tower, the Mowder Reservoir, the Springs Reservoir and the McKelvey Reservoir. Key characteristics of the storage facilities are summarized in Table 14.

In addition:

- The Springs Reservoir allows automatic operation of the McKelvey high lift pumps based on water level in the storage reservoir.

- The Parsons Road Reservoir has separate lines for surface and groundwater inflows.
- The Alliston Elevated Tank is used to maintain treated water storage and sustain hydraulic pressure within the Alliston distribution system.

Table 14: Storage Facilities – Summary[1]

Storage Facility	Type	Capacity (m^3)	Serviced Area
Parsons Road Reservoir	In-ground	9,948	Alliston
Alliston Elevated Tank	Elevated	4,540	Alliston
Mowder Reservoir	In-ground	5,760	Belterra Estates Sub-Division
Springs Reservoir	Grade-level	1,360	Beeton
McKelvey Reservoir	In-ground	1,600	Beeton

Notes:

1. Storage characteristics as per DWWP Number 123-101 Issue No. 2, dated July 18, 2016

6.3.6 Distribution

Currently, the Alliston distribution system is divided into four separate pressure zones – Alliston, Mowder Boulevard Reservoir Area, Boosted Belterra and Honda. A figure showing the major components and connections of the Alliston Water Distribution system is shown in Figure 8.

A connection exists between the Honda and Alliston zones on Industrial Parkway that allows water to flow from the Alliston zone into the Honda zone when the Honda pumps are shut down. Hillcrest, another pressure zone, exists in the Northern section of Alliston, however, it has since been connected to and is currently serviced by the Alliston zone.

The Mowder Boulevard Reservoir Area is a separate development located in the east side of Alliston. The Mowder Reservoir is currently filled by the pressures from the main Alliston zone, however, as demands increase and development continues, a new Water Booster Pumping Station #1 will be constructed on 14th Line to boost the flow into the Mowder Boulevard Reservoir Area from Alliston. A small section of the Belterra development is at a higher elevation and is serviced by booster pumps in the Mowder Pumping Station.

The Briar Hill development is located in between Alliston and Belterra. This development has its own groundwater well supply and distribution system. Provisions have not been made to connect the Briar Hill system to Alliston at this time.

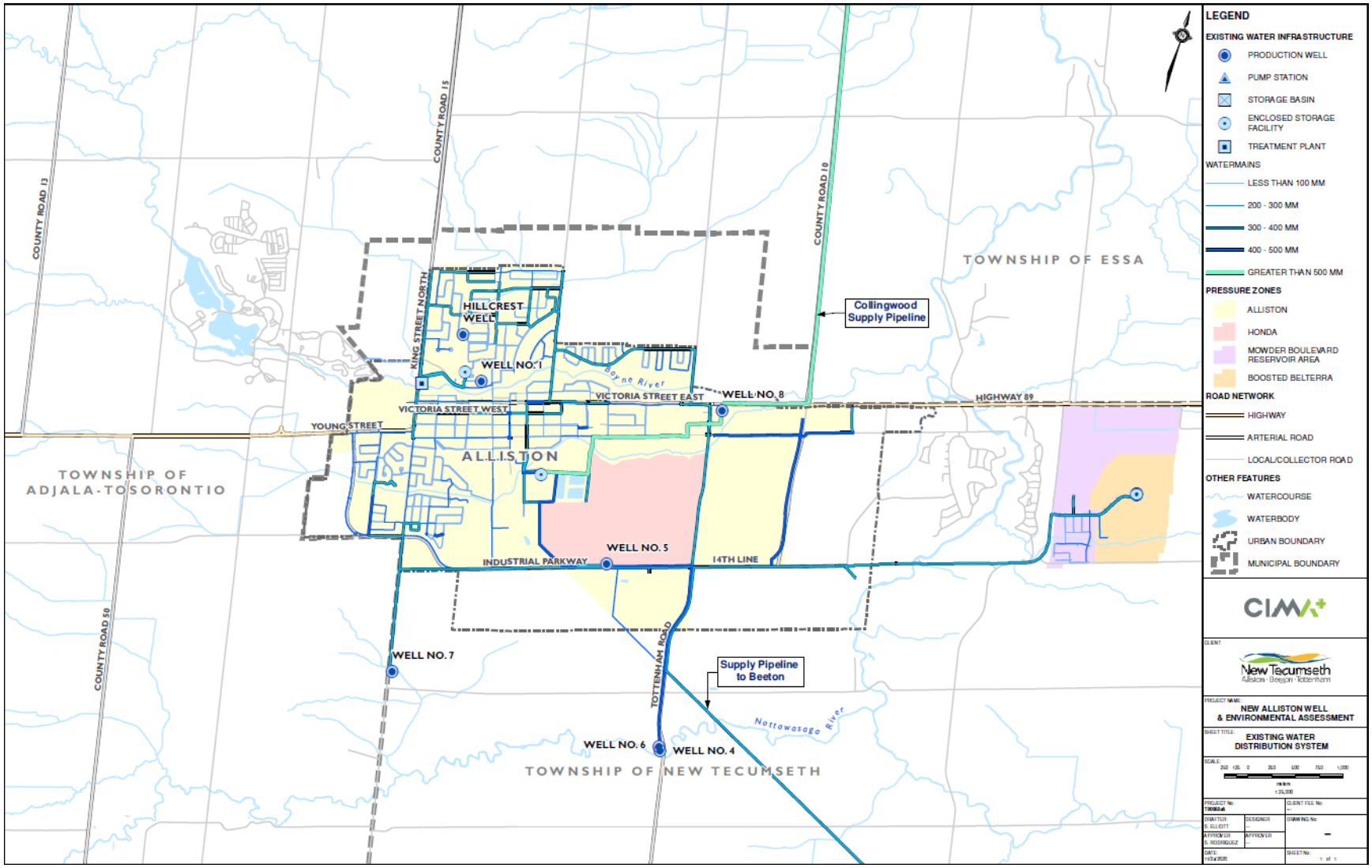

Figure 8: Existing Alliston Water Distribution System

6.4 Water Quality Data Review

Available water quality data was limited to that contained in the 2018 Alliston Drinking Water System Annual Report. Selected relevant parameters are briefly discussed in the following sections.

6.4.1 Raw Water Quality

As shown in Table 15, there is some variation in raw water quality in terms of turbidity from all the wells. However, with the exception of a maximum value of 2.43 NTU recorded for Well No.1, all other wells had turbidity levels below 1.0 NTU. Groundwater raw water supplies are inherently stable water sources; however, significant variations in turbidity are recommended to be investigated to ensure that turbidity is not being caused by the presence of organic particles, which could potentially affect the disinfection process. As per the Canadian drinking water guidelines, it is recommended that the turbidity levels in water entering the distribution system should not exceed 1.0 NTU.

Table 15: Raw Water – Turbidity[1]

Sampling Location	Number of Samples[2]	Turbidity (NTU) Min.	Turbidity (NTU) Max.
Well No. 1	12	0.33	2.43
Well No. 4	12	0.13	0.69
Well No. 5	12	0.12	0.50
Well No. 6	12	0.11	0.48
Well No. 7	10	0.17	0.51
Well No. 8	12	0.19	0.54
Hillcrest Well[2]	0	0	0

Notes:

1. Data as per the Town of New Tecumseth, 2018 Alliston Drinking Water System Annual Report, dated February 1, 2018.
2. The Hillcrest Well was not in service in 2016 except for regulatory sampling and no water was directed to the distribution system.

6.4.2 Treated Water Quality

Treated water quality data for selected physical and chemical parameters are summarized in Table 16 and Table 17. As per Table 16, treated water for physical and

chemical parameters is in compliance with the Ontario Drinking Water Quality Standards, Objectives and Guidelines.

Table 16: Treated Water – Selected Parameters[1]

Sampling Location	Arsenic (µg/L)		Nitrate (mg/L)		Sodium (mg/L)		Fluoride (mg/L)	
	MAC[2]	Result Value	MAC	Result Value[4]	AO	Result Value[6]	MAC	Result Value[6]
Well No. 1	10	0.5	10	0.0135	200[5]	31.8	1.5	0.19
Well No. 4	10	0.3		0.0075		37.6		0.17
Well No. 5	10	0.7		0.0075		23.4		0.18
Well No. 6	10	0.2		0.0075		32.1		0.17
Well No. 7	10	0.2 < MDL[3]		0.0065		7.1		0.10
Well No. 8	10	2.7		0.0125		30.8		0.22
Hillcrest Well	10	0.2 <MDL		0.2085		26.3		0.08
Parsons Road Reservoir		0.4		0.24875		6.3		0.24

Notes:

1. Data as per the Town of New Tecumseth, 2018 Alliston Drinking Water System Annual Report, dated February 1, 2018.
2. Maximum Acceptable Concentration (MAC) Limit for arsenic has been reduced from 25 µg/L to 10 µg/L in 2017. Implementation date for new limit effective on January 2018.
3. MDL is the Maximum Detection Limit.
4. Nitrate Result Values shown in Table 16 represent an average of 4 sample results recorded in 2018.
5. The Aesthetic Objective (AO) for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentration exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

Data as per Town of New Tecumseth, 2018 Alliston Drinking Water System Annual Report. As per 2018 annual report, result values for Fluoride and Sodium appeared to be sampled in 2017, with the exception of the Hillcrest well (2016).

Table 17: Treated Water – Free Chlorine[1]

Sampling Location	Number of Samples[2]	Free Chlorine (mg/L) Min.	Free Chlorine (mg/L) Max.
Well No. 1	8,760	0.00[3]	2.20
Well No. 4	8,760	0.00[3]	2.20
Well No. 5	8,760	0.00[3]	2.20
Well No. 6	8,760	0.03[3]	2.20
Well No. 7	8,760	0.00[3]	2.20
Well No. 8	8,760	0.60	2.20
Parsons Road Reservoir	8,760	1.17	2.20
Mowder Boulevard Reservoir	8,760	0.97	2.20
McKelvey Reservoir	8,760	1.13	2.20
Springs Reservoir	8,760	0.76	2.20

Notes:

1. Data as per the Town of New Tecumseth, 2018 Alliston Drinking Water System Annual Report, dated February 1, 2018.
2. Number of samples represents Continuous Monitoring, unless otherwise indicated.
3. The 2018 Annual report indicates that low chlorine residuals that are recorded by continuous monitoring equipment during equipment malfunctions / well not running or power outages are not considered to be an adverse event. These incidents are responded to by operations staff for resolution. Also, the valve of 0.00 recorded by the continuous chlorine analyzer could be a result of equipment abnormality / SCADA issues / maintenance work or calibration.

The Procedure for Disinfection of Drinking Water in Ontario, 2008, indicates that where provision of secondary disinfection is required, a drinking-water system's distribution system must be operated such that at all times and at all locations within the distribution system, there is at least a free chlorine residual of 0.05 mg/L. In addition, the maximum chlorine residual at any time and at any location within the distribution system should not exceed 4.0 mg/L when measured as free chlorine. As shown in Table 17, the minimum free chlorine residual recorded for Wells No.1, No.4, No.5, No.6 and No.7 have levels lower than the minimum 0.05 mg/L recommended limit. The 2018 annual report indicates that low chlorine residuals that are recorded by continuous monitoring equipment during equipment malfunctions / well not running or power outages are not considered to be an adverse event. All other data reported for points within the distribution system is consistently within the recommended range.

7 Water Servicing Design Criteria

7.1 Population Projections

Population and water demand projections for the Town were examined in detail during the 2016 Water Master Planning process exercise. Water demands projections were updated based on best planning estimates available at the time, census data, operational data and the Town's Water Distribution and Storage Master Plan. Updated population projections to 2031, as estimated in the Town's 2016 Water Supply, Storage and Distribution Master Plan are summarized in Table 18.

Table 18: Water Master Plan Population Projections – Breakdown[1]

Serviced Area	Existing Serviced Population (2013)	Projected Growth (2013-2031)	2031 Projected Population
Alliston	17,760	4,679	22,439
Belterra States Sub-Division	-	4,911	4,911
Beeton	3,810	4,038	7,848
Tottenham	4,740	5,312	10,052
Total =	**26,310**	**18,940**	**45,250**

Notes:

1. Population projections as established in 2016 Town's Water Supply, Storage and Distribution Master Plan

The 2016 Water Master Plan used a unit consumption rate of 300 L/cap/day when calculating the water demands for the increased population in the year 2031. This demand was selected based on a review of historical demands for Alliston and Beeton from 2008 to 2015 and the assumption of increased water efficiency and a continued reduction in per capita water demands. Since the unit consumption rate value is a key influential factor in the accurate estimation of projected water demands, a confirmatory exercise was judged appropriate, given that the estimates were prepared back in 2016. The review of average day demands (2014-2016) and up-to-date results of the unit consumption rate calculation for the Alliston systems are shown in Table 19 and Table 20, and for the Tottenham systems, are shown in Table 21 and Table 22, respectively.

Table 19: Alliston Average Day Demands Review (2014 – 2016)

Criteria	Alliston Average Day Demands (m^3/d)[1]	Alliston Average Day Demands (m^3/d)[1]	Alliston Average Day Demands (m^3/d)[1]	Alliston Average Day Demands (m^3/d)[1]
	2014	2015	2016	3-Year Average
Ave. Day Demands including Honda	8,167	8,445	9,097	8,570
Ave. Day Demands excluding Honda	6,411	6,578	6,966	6,652
Honda Ave. Day Demands	1,755	1,867	2,132	1,918

Notes:

1. Average Day Demands as per Operational Data provided by the Town for Alliston system for 2014 to 2016.

Table 20: Calculation of Unit Consumption Rate for Alliston System

Average Day Demands excluding Honda (m^3/d)[1]	2016 Population[2]	Calculated Unit Consumption Rate (m^3/cap/day)
6,652	22,700	0.293

Notes:

1. Average Day Demands excluding Honda as per Operational Data provided by the Town for Alliston system for 2014 to 2016.
2. 2016 Population as per 2016 Census data obtained for Alliston (18,809 people) and Beeton (3,891 people).

Table 21: Tottenham Average Day Demands Review (2014 – 2016)

Criteria	Tottenham Average Day Demands (m^3/d)[1]	Tottenham Average Day Demands (m^3/d)[1]	Tottenham Average Day Demands (m^3/d)[1]	Tottenham Average Day Demands (m^3/d)[1]
	2014	2015	2016	3-Year Average
Ave. Day Demands	1,370	1,588	1,735	1,564

Notes:

1. Average Day Demands as per Operational Data provided by the Town for Tottenham system for 2014 to 2016.

Table 22: Calculation of Unit Consumption Rate for Tottenham System

Average Day Demands (m^3/d)[1]	2016 Population[2]	Calculated Unit Consumption Rate (m^3/cap/day)
1,564	5,143	0.304

Notes:

1. Average Day Demands as per Operational Data provided by the Town for Tottenham system for 2014 to 2016.
2. 2016 Population as per 2016 Census data obtained for Tottenham (5,143 people).

Based on the 2014 to 2016 operational data and actual census data reported for 2016, a unit consumption rate of 293 L/cap/day and 304 L/cap/day was obtained for the Alliston and Tottenham systems, respectively. These numbers validate the Water Master Plan assumption of 300 L/cap/day consumption rate for increased population projections.

7.2 Projected Water Demands

Projected water demands in the 2016 MP were calculated on the basis that existing demands are according to available operational data at the time, and projected water demands are calculated with consideration to projected growth, recommended unit consumption rate and max. day factors. Projected average and maximum day demands for the Town for 2031 are summarized in Table 23.

As shown in Table 23, the maximum day demands for the Town are expected to increase to 43,124 m^3/day by 2031. The MECP Design Guidelines recommend that the system supply capacity be capable of meeting the Maximum Day Demands. As such, the Town's total firm supply capacity should be able to meet 43,124 m^3/day by 2031. The firm capacity of the supply system is calculated under the assumption that the largest well is out of service.

Table 23: Water Master Plan Water Demands Projections – Breakdown[1]

Serviced Area	Existing Demands (2013) (m3/d)	Existing Demands (2013) (m3/d)	Projected Growth Demands (2013-2031) (m3/d)	Projected Growth Demands (2013-2031) (m3/d)	Projected 2031 Demands (m3/d)	Projected 2031 Demands (m3/d)
	Ave. Day	Max. Day	Ave. Day	Max. Day	Ave. Day	Max. Day
Alliston	5,442	8,924	1,404	2,302	6,846	11,226
Belterra States Sub-Division	-	-	1,473	2,416	1,473	2,416
Beeton	1,167	1,914	1,211	1,987	2,379	3,901
Honda[2]	2,000	4,000	3,000	6,000	3,000	6,000
Industrial Development	-	-	8,694	14,259	8,694	14,259
Tottenham	1,465	2,549	1,594	2,773	3,059	5,322
Total =	**10,074**	**17,387**	**17,376**	**29,737**	**25,451**	**43,124**

Notes:

1. Water demand projections as established in 2016 Town's Water Supply, Storage and Distribution Master Plan
2. Existing Honda Average Day Demands and Maximum Day Demands are approximately 1,400 to 2,000 m^3/d, and 4,000 m^3/day, respectively, as per 2014 - 2016 operating records. Projected demands calculations accounted for provision of an average day demand and maximum day demand of 3,000 m^3/day and 6,000 m^3/day, respectively, from the Alliston system to the Honda plant.

7.3 Water Supply Requirements

A review of the existing water supply system and projected water supply requirements was completed during the Water Master Plan exercise to determine any necessary supply requirements to meet the future needs. The review assumed a potential future agreement with the Town of Collingwood for an increase in the pipeline supply capacity of 10,500 m^3/day, from its current 13,000 m^3/day capacity. This would result in a total supply capacity of 23,500 m^3/day from the Town of Collingwood pipeline to the Town and the need to expand the Raymond A. Baker WTP and associated pumping station in the Town of Collingwood. The results of the water supply system demand and water supply deficit analysis is summarized in Table 24 and Table 25, respectively.

Table 24: Water Supply System Demands Analysis

Serviced Area	2031 Projected Max. Day Demands (m^3/d)	Existing Firm Well Capacity (m^3/d)	Pipeline Supply Capacity[1] (m^3/d)	Township Capacity Allocation[2] (m^3/d)
Alliston	11,226	11,446	23,500	750
Belterra States Sub-Division	2,416			
Beeton	3,901			
Honda	6,000			
Industrial Development	14,259			
Tottenham	5,322	5,030		
Total (m^3/d) =	**43,124**	**16,476**	**23,500**	**750**

Notes:

1. Pipeline capacity assumes an anticipated increase in the pipeline supply line from 10,000 m^3/day (currently provided) to 23,500 m^3/day.
2. There are existing Township agreements in place with the Town of Clearview for a supply of 250 m^3/d and with the Township of Essa for a supply of 500 m^3/d.

Table 25: Water Supply Deficit Analysis

Total 2031 Projected Max. Day Demands (m^3/d)	Total Supply Capacity (m^3/d)[1]	Total Supply Deficit (m^3/d)[2]
43,124	39,226	3,898

Notes:

1. Total supply capacity calculated by adding total firm well capacity in Alliston and Tottenham, plus pipeline supply capacity from the Town of, minus the agreed supply capacity allocation to the Townships of Clearview and Essa, as (11,446 + 5,030 + 23,500 – 750 = 39,226 m3/d)
2. Total supply deficit calculated by subtracting the total supply capacity from the total projected max. day demands, as (43,124 – 39,226 = 3,898 m^3/d)

As per Table 25, there will be a supply deficit of approximately 3,900 m^3/day in the Town to meet the projected water demands of approved growth to 2031. This supply deficit assumes the firm capacity of the existing wells is maintained and the anticipated increase supply capacity from the Town of Collingwood supply pipeline to 23,500 m^3/day. As such, an additional 3,900 m^3/day of water supply will be required to satisfy the projected supply deficit.

8 Class EA Phase 1 – Problem / Opportunity Statement

Phase of the Municipal Class EA planning process requires the proponent of an undertaking to first document factors leading to the conclusion that the improvement is needed, and to develop a clear statement of the problem/opportunity to be investigated.

The problem/opportunity statement for the New Alliston Production Well Class EA study has been defined as follows:

The 2016 Town of New Tecumseth Water Supply, Distribution and Storage Master Plan identified the preferred water servicing strategy to accommodate the current and long-term growth needs in Alliston, Beeton and Tottenham to 2031 and beyond. Increasing the existing groundwater supply capacity was identified as one of the highest priorities of the servicing approach recommended in the 2016 Water Master Plan. Increased groundwater supply capacity will address:

- *Security of water supply, since the primary source of supply to the Alliston Drinking Water System is a single transmission watermain from the Town of Collingwood.*
- *Projected supply deficit capacity as a result of planned growth in the Town to 2031.*

This Class EA study will identify the preferred water supply servicing solution to meet the projected water demands for the Municipality to horizon year 2031, in a way that is reliable, sustainable and environmentally and financially responsible.

9 Evaluation Methodology

9.1 Overview of Evaluation Methodology

Experience with similar projects in other communities has shown that the development of a systematic, stepwise method for making decisions at the start of the project helps to focus and clarify decision-making. A comprehensive evaluation methodology provides the basis of a decision making that is sound, defensible, traceable and consistent with the specific objectives of the project.

The evaluation process for this Class EA study consists of the following major steps:

1. Identification and Evaluation of the Alternative Solutions – This first step allows the project team to identify a long list of all potential alternative solutions and select only those that are considered feasible and eliminate the alternatives that are not. This first step leads to the preliminary identification (screening) of short-

listed feasible alternatives and avoids the need to carry unrealistic alternatives through the detailed evaluation step.

2. Development and Evaluation of Feasible Alternative Solutions – The short-listed alternatives identified from the preliminary screening process are considered feasible alternatives and are further developed and evaluated in detail against a comprehensive set of criteria that include natural environmental, technical and operational, socio-cultural and economic considerations.
3. Selection and Recommendation of the Preliminary Preferred Solution – The outcome of the detailed evaluation is the selection of the preliminary preferred recommended solution. The preliminary preferred recommended solution is subject to review by the public and review agencies before any final decisions or recommendations are made.

The major steps of the evaluation process are depicted in Figure 9. The decision-making model was presented to the public for feedback and input during the virtual PIC. The preliminary screening and detailed evaluation criteria are described in the following sections.

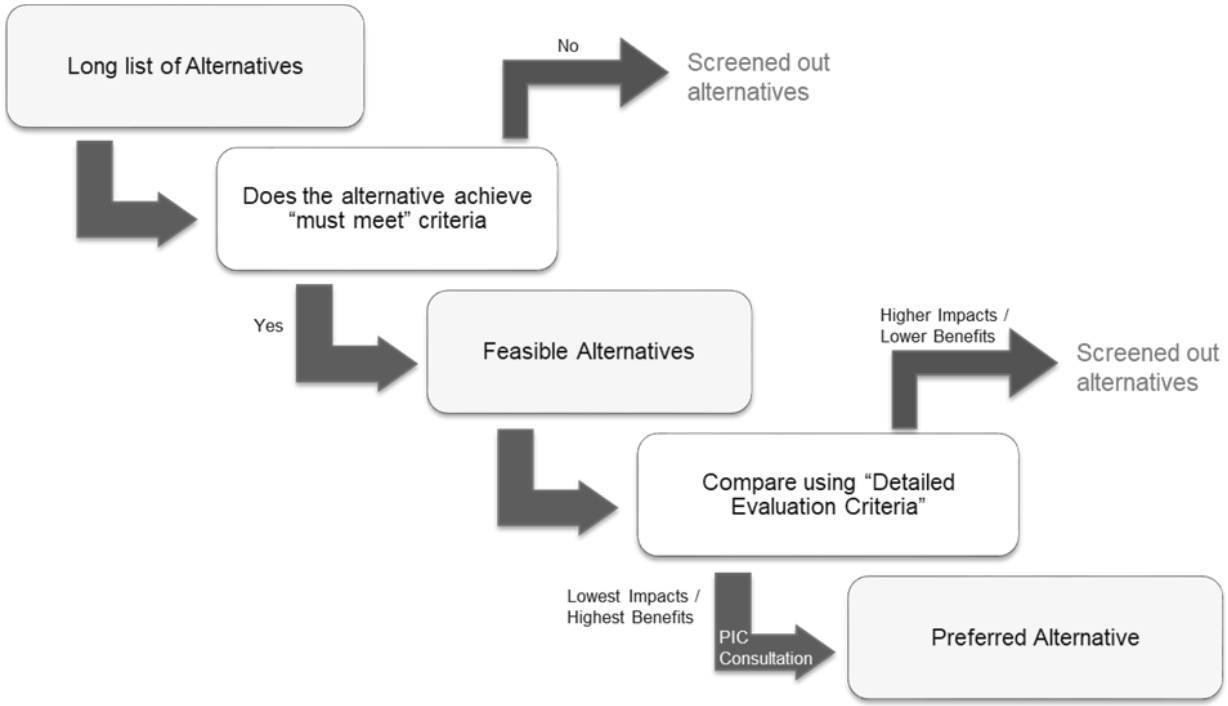

Figure 9: Overview of Evaluation Methodology

9.2 Preliminary Screening

In accordance with Phase 2 of the Municipal Class EA process, alternatives that could potentially address the problem/opportunity of this Class EA study and provide the groundwater supply capacity to meet the projected water demands were identified. Once a long list of alternative solutions was developed, each alternative solution was subjected to a preliminary screening that aimed to identify only those alternatives that were considered feasible for this project. Alternative solutions that were not considered viable for implementation were not recommended for further evaluation in the process and were eliminated. The alternative solutions that were considered viable were further subjected to further development and a more detailed comparative evaluation in the next phase of the Class EA study.

Preliminary screening has been accomplished by applying the “must meet” criteria, shown in Table 26, to the alternative solutions under consideration. The “must meet” criteria were developed by the project team based on professional judgment and past experience with projects of similar nature.

Table 26: Preliminary “Must Meet” Screening Criteria

Must-Meet Criteria	Description
Capacity Requirements	• Can the water supply alternative solution support the Town’s ability to meet the projected supply servicing needs of the Town to the planning horizon year of 2031?
Technical Feasibility	• Can the water supply alternative help to address the current concerns with the security of supply? • Can the water supply alternative solution be implemented in a manner that minimizes the constructability complexity, relative to the other alternative solutions?
Financial	• Does the water supply alternative solution have significant economic implications compared to the other alternative solutions?

The criteria listed in Table 26 are considered on a “pass” or “fail” basis. If an alternative solution under consideration fails against any or all of the criteria, it is not carried forward to detailed evaluation. Only those alternatives that meet all of the “must meet” criteria are short-listed and considered feasible for a more detailed evaluation.

9.3 Detailed Evaluation

9.3.1 Detailed Evaluation Methodology

The short-listed alternative solutions are further evaluated against a set of evaluation categories. Four primary evaluation categories, representing the most relevant short-term and long-term considerations for this project, were identified to include the following:

- Natural Environment Considerations
- Technical and Operational Considerations
- Socio-cultural Considerations
- Economic Considerations.

For the purpose of this project, weighting factors intending to represent the degree of importance within the overall evaluation scheme were assigned to each of the evaluation categories in consultation with the Town. The natural environmental and technical and operational categories were assigned a weighing factor of 30% (or 30 points) each, while the socio-cultural and economic categories were assigned a weighing factor of 20% (or 20 points) each, for a total score of 100% or 100 points amongst all categories.

Each of the primary evaluation categories is further subdivided into specific considerations or criteria, which capture the most representative aspects to this project. For each criterion or consideration, the project team compiles enough information to assess the potential net impact and assign a score unique to each option under consideration. Consistent with the scoring methodology used in the 2016 Water Master Plan, each option under evaluation is assigned a score from 1 to 5, with the higher scores (5) given to the better performing options. The score represents how well the specific option meets the criterion under consideration; therefore, the options are rated such that the higher the ability to perform or meet the criterion, the higher the score (5) assigned. The final score for each option is calculated as the sum of the score of each criterion across all categories.

The detailed evaluation criteria are confirmed with input from the Town, the public and review agencies in the next steps of the Class EA study.

9.3.2 Detailed Evaluation Criteria

Detailed evaluation criteria grouped by main categories, as well as the description of the information that was used to assign relative scores, is shown in Table 27.

Table 27: Detailed Evaluation Criteria

Criteria (Weighting Factor %)	Sub-criteria/ Description
Natural Environment (30%)	**Water Quality/ Quantity** – Potential for water source to meet the required capacity requirements while minimizing the need for treatment requirements or interference with other production wells in the system.
	Water Resources – Potential effect on vulnerable areas (e.g., groundwater recharge areas, highly vulnerable aquifer areas, existing flowing wells, etc.) during construction and operation of proposed facilities, as well as dewatering requirements for construction.
	Natural Environmental Features and Regulated Areas – Potential impacts to existing natural environment, including terrestrial and aquatic habitats, wildlife and wildlife habitats, vegetation communities, sensitive features, areas of natural and scientific interest, etc.
	Archaeological and Cultural Heritage Resources – Potential impact from construction to existing archaeological and cultural heritage features
	Climate Change – Potential impact on greenhouse gas emissions from proposed infrastructure (primarily due to truck traffic, increased pumping energy), carbon footprint (removal of significant vegetation) and project vulnerability to changing climatic conditions.
	Source Water Protection – Potential impact on source water protection areas and compliance with source water protection policies.
Technical and Operational (30%)	**Long Term Servicing** – Potential for option to support projected growth in the area.
	System Security – Potential for safety and security of the water supply system through system redundancy, emergency preparedness and protection of water assets.
	Ease of Implementation – Potential level of complexity during construction, including potential interference with the continuous supply of water, conflict with existing local uses.

Criteria (Weighting Factor %)	Sub-criteria/ Description
	Operational Complexity – Relative added complexity to existing practices resulting from construction and operation of proposed facilities/infrastructure.
	System Redundancy and Flexibility – Potential risk to cease service during emergency situations.
	Regulatory Approvals – Number of permits/approvals needed for implementation of proposed works and complexity of such permits/approvals.
Socio-Cultural (20%)	**Public Health and Safety** – Reliability of supply, treatment, storage and distribution systems to meet regulatory standards for treated drinking water
	Public Perception – Potential for public support and acceptance.
	Construction Impacts – Potential short-term impacts on adjacent residents, road users and local users resulting from noise, dust, vibration, property access, water service and traffic interruptions during construction.
	Aesthetics and Operational Impacts – Potential long-term visual and noise impact on adjacent residents and local users from new infrastructure and activities related to operation of facilities.
	Land Use – Compatibility of proposed works with existing or proposed land uses.
	Property Acquisition – Need for land acquisition and availability of property.
Economic (20%)	**Life Cycle Cost** – 20-year LCC; Cost of per m^3 of treated water based on pumping capacity

10 Class EA Phase 2 – Identification and Evaluation of Alternative Solutions

This section provides a description of each alternative solution and the results of preliminary screening, as well as identification of feasible alternative solutions that were carried forward for further development and detailed evaluation.

10.1 Identification of Alternative Water Supply Solutions

In accordance with Phase 2 of the Municipal Class EA process, alternative solutions were identified to address existing concerns associated with the security of the Alliston Water Supply System and the need to provide additional groundwater supply capacity.

The following general alternative solutions were identified and evaluated:

1. Do Nothing
2. Limit Community Growth
3. Reduce Water Demands through Conservation Measures
4. Obtain Water from Another Source
    a) Construct New Groundwater Production Well(s) at a New site
    b) Construct New Groundwater Production Well(s) at an Existing site
    c) Connect to an Existing Water System (i.e., City of Barrie, Town of Innisfil/Town of Bradford West Gwillimbury, Town of Caledon)
5. Increase Town of Collingwood pipeline supply capacity
6. Expand, Upgrade, Optimize Existing Groundwater System
7. Construct a New Surface Water Treatment System

Considering that the New Alliston Production Well Class EA study was undertaken on a project specific level, general available alternative solutions were identified, which included few alternatives originally evaluated in the Water Master Plan exercise.

A description of each alternative solution and their sub-alternatives, and results of the preliminary screening step, is provided in the following sections.

10.1.1 Alternative 1 – Do Nothing

The “Do Nothing” alternative assumes that the Alliston Water Supply System will maintain its existing configuration, and no improvements or changes would be made to address the existing concerns with the security of supply or potential growth in the Municipality.

The Town will continue to rely primarily on the existing Collingwood Pipeline capacity and supplemented by the municipal groundwater system (comprising of seven wells, out of which six is operating and Hillcrest well is out of operation).

10.1.2 Alternative 2 – Limit Community Growth

The Limit Community Growth alternative assumes that growth in the Town will be limited, so that the total water servicing demands will not exceed the existing supply capacity of the Town (firm well capacity, pipeline capacity and Township capacity allocation) of 39,226 m^3/day. Anticipated growth in the community could potentially be phased or scheduled until the demands approach the existing available system’s production capacity.

The Town will continue to rely primarily on the existing Collingwood Pipeline capacity and supplemented by the municipal groundwater system (comprising of seven wells, out of which six is operating and Hillcrest well is out of operation).

10.1.3 Alternative 3 – Reduce Water Demands through Conservation measures

This would include a reduction in water demands through mandatory/voluntary conservation measures. The Town has an incentive program in effect that provides a rebate for low flush toilets and rain barrels and disseminates water conservation facts and information. In addition, the Town has by-laws to enforce water conservation measures by restricting the use of water for lawn care and car washing. Additional water conservation initiatives may include programs to educate both the general public and industrial users of ways to reduce water usage.

10.1.4 Alternative 4 – Obtain Water from Another Source

This alternative involves obtaining the additional water supply capacity from another source such as through development of new groundwater production well(s) at a new or existing site in the Town or by connecting the existing Alliston Water Supply System to an existing water system from another municipality.

This alternative has been divided into three (3) different sub-alternatives as discussed in the following sections.

10.1.4.1 Alternative 4a. Construct New Groundwater Production Well(s) at a New Site

This sub-alternative involves construction of new groundwater production well(s) at a new site within the Town that would provide additional water supply capacity to the existing drinking water system.

The existing municipal groundwater systems will continue to contribute the existing water supply and treatment capacities, so they will continue to operate at their existing capacities. The new groundwater supply well(s) will supplement the existing water supply.

A comprehensive groundwater exploration program was conducted in 2017/2018 to find potential sites for the new production well(s). The hydrogeological investigation revealed unfavorable aquifer conditions in all test wells through well performance tests and water sample analysis. However, further review of historical information revealed a potential

new site, TW #1-93, worth of further exploration. As such, the TW#1-93 well site is considered a potential site under this sub-alternative.

10.1.4.2 Alternative 4b. Construct New Groundwater Production Well(s) at an Existing Site

This sub-alternative involves construction of new groundwater production well(s) at an existing well site in the Town. The additional well(s) would provide, in combination with the existing production wells, additional water supply capacity. An increase in water supply capacity at the existing sites would most likely result in upgrades/expansion requirements of the existing treatment facilities. In addition, hydrogeological investigations would be needed to confirm the capacity of existing aquifers and the number of additional wells to be developed.

The existing municipal groundwater systems will continue to contribute the existing water supply and treatment capacities. The new groundwater supply well(s) will supplement the existing water supply. Although the existing Hillcrest well is currently not operation, the well is still functional and has a valid permit to take water. As such, the Hillcrest well site was considered a potential site under this sub-alternative.

10.1.4.3 Alternative 4c. Connect to an Existing Water System

This sub-alternative involves the extension of watermains from another municipality into the Town to provide for the additional water supply requirements. Based on the Town's geographical location, adjacent municipalities with existing drinking water systems for consideration include; the City of Barrie, the Town of Innisfil/Town of Bradford West Gwillimbury, the Region of York and the Town of Caledon.

This option was evaluated in detailed as part of the water master planning exercise and not recommended for implementation. The option was revisited as part of this Class EA study and it was concluded that the original details identified in the 2016 Water Master Plan, which resulted in elimination of this option, remain valid. Key constraints of this alternative solution include; major infrastructure requirements and significant capital expenditures associated with needed lengthy pipeline interconnections, expansion of existing water treatment plants and pumping stations in the other communities, as well as limitations with spare capacity from the potential supply systems.

10.1.5 Alternative 5 – Increase Town of Collingwood Pipeline Supply capacity

The original agreement for the pipeline supply from Collingwood includes provisions for the expansion of the RAB WTP to supply the Town's maximum day increased flows

from the existing allocated supply capacity of 13,000 m3/day to 23,500 m3/day in the year 2030. The projected water supply deficit for the Town to the planning horizon of 2031, established in the Water Master Plan, accounted for an increase in the supply capacity from the Collingwood pipeline to the 23,500 m3/day, in addition to the associated pumping station and RAB WTP expansion. As such, this alternative would involve an additional increase in the Collingwood pipeline supply capacity, beyond the 23,500 m3/day, to meet the additional supply capacity requirements of 3,900 m3/day.

This alternative would therefore require the Town to re-negotiate the existing agreement to increase the 2030 maximum pipeline supply beyond 23,500 m^3/d. The Town is in discussions with the Town of Collingwood; however, the RAB WTP is currently constrained at meeting their own demands. The supply of additional capacity to the existing agreement is subject to negotiation but timing is a more critical concern to the Town. Since an agreement between with the CPUC and the other end users has not been reached yet, the expansion cost to be borne by the Town has not been confirmed yet.

10.1.6 Alternative 6 – Expand, Upgrade, Optimize Existing Groundwater System

This alternative involves potential expansion, upgrades or modifications to the existing municipal groundwater systems to satisfy the projected water supply deficit. This would include a staging approach comprising initial optimization studies to confirm the increase potential in well production or aquifer production at the existing well sites, followed by the corresponding upgrades or expansions to the existing treatment facilities and/or distribution systems to match any well supply capacity increases.

The Town has initiated implementation of a few separate projects in an effort to optimize existing operational procedures and systems. To this effect, Well #1 was recently upgraded to restore the well's rated capacity of 1,642 m^3/day; however, the increase in supply capacity for Well #1 has been accounted for in the calculation of the existing water supply capacity (as described in Section 7.3.2 of this report) and thus, reflected in the projected water supply deficit.

The scope of the optimization study will need to be developed in consultation with Town's operations staff and with consideration to possible priority wells the Town may have identified based on existing operating practices, limitations and deficiencies within existing wells and/or treatment equipment (e.g., reduced specific capacity on existing wells, or variations in raw water quality, observed declined well yields, etc.).

The Town may consider optimization of wells #4, #6, #7 (if issues with landowners have been resolved), #5 and #8. Should operators express any existing concerns or issues with any of the existing pumps not being able to operate at maximum capacity or any other limiting factor for optimal well performance, then that specific well should take priority in the optimization study. The scope of the optimization study may include:

- Review of system hydraulics and plant performance
- Capacity assessments
- Review of well's inspection and services reports
- Well and pump inspection
- Well performance and aquifer tests

The scope of the optimization study needs to be determined in consultation with operations staff and available well and system information. Approximate cost of the optimization study is estimated to be in the order of $45K to $60K per well. However, the costs will vary depending on the characteristics, depth and information available for each well. A high-level estimate for an optimization study to include the five (5) wells mentioned above would be in the range of $225K to $300K.

10.1.7 Alternative 7 – Construct a New Surface Water Treatment System

This alternative involves construction of a new surface water treatment system, including all supply, treatment and distribution systems in the Town. The new system, to be owned and operated by the Town, would satisfy the supply capacity requirements of 3,900 m^3/day. A potential water supply source for the system would be either Georgian Bay or Lake Simcoe.

The Town will continue to rely on the existing Collingwood Pipeline capacity and supplemented by the municipal groundwater system (comprising of seven wells, out of which six is operating and Hillcrest well is out of operation).

This option was evaluated in detailed as part of the water master planning exercise and not recommended for implementation. The option was revisited as part of this Class EA study and it was concluded that the original details identified in the 2016 Water Master Plan, which resulted in elimination of this option, remain valid. Key constraints of this alternative solution include; the major capital expenditure, environmental, source water protection, and technical constraints.

10.2 Preliminary Screening of Alternative Water Supply Solutions

Available water supply alternative solutions have been screened with respect to their ability to meet the projected water supply capacity requirements, any major technical or financial considerations that would affect the project implementation, and their ability to meet the Problem / Opportunity Statement. The results of the preliminary screening are summarized in Table 28.

Table 28: Preliminary Screening Results

Alternative Solutions	Preliminary Screening/Observations	Recommendation to Carry Forward
1. Do Nothing	Does not meet the projected water demands of approved planned growth.	No. Eliminated from further consideration
2. Limit Community Growth	Does not meet the projected water demands of approved planned growth.	No. Eliminated from further consideration
3. Reduce Water Demands through Conservation Measures	Does not meet the projected demands of approved planned growth but may be a measure to accommodate limited interim growth until additional water supply becomes available. The Town has by-laws to enforce water conservation measures by restricting the use of water for Lawn Care and Car Washing.	For consideration in combination with preferred recommended solution
4. Obtain Water from Another Source		
4.a. Construct a New Groundwater Production Well at a New site	Past and recent step-testing completed on CLASS Test Well TW #1-93 indicate that the well can potentially be considered as an alternate groundwater supply source.	Yes. Short-listed and carry forward.
4.b. Construct a New Groundwater Production Well at an Existing site	The existing Hillcrest well site currently has a production well. Site has been offline but well and well site can be explored further.	Yes. Short-listed and carry forward.
4.c. Connect to an Existing Water System (i.e., City of Barrie, Town of	Reliance on a third party for provision of water. An agreement with external system's owner would need to be negotiated. Inconsistent with Town's	No. Eliminated from further consideration

Alternative Solutions	Preliminary Screening/Observations	Recommendation to Carry Forward
Innisfil/Town of Bradford West Gwillimbury, Town of Caledon)	objective of reducing system security and reliability from external sources. Option investigated in the 2016 Water Master Plan and eliminated due to costs, operational complexity and land requirements.	
5. Increase Town of Collingwood pipeline supply capacity	The Town is in discussion with the Town of Collingwood; however, the RAB Water Treatment Plant is currently constrained at meeting their own demands and signed agreements. Supply additional capacity to the existing agreement are subject to negotiation but timing is a more critical concern to the Town.	For consideration in combination with preferred recommended solution
6. Expand, Upgrade, Optimize Existing Groundwater System	Potential to upgrade other wells can be determined through an independent optimization study.	For consideration in combination with preferred recommended solution
7. Construct a New Surface Water Treatment System	Need for the Town to build and operate its own surface water system with supply source from Georgian Bay or Lake Simcoe. The associated capital expenditure, environmental, source water protection, and technical constraints would render this option financially prohibited, compared to other alternative solutions.	No. Eliminated from further consideration

10.2.1 Preliminary Screening Results

Based on the rationale described in Table 26, the following alternative water supply solutions are considered feasible:

- Alternative 4a: Construct a New Groundwater Production Well at a New Site (i.e., TW #1-93 test well, previously built by a private developer on the grounds of the Community Living Association, referred herein as the CLASS site)
- Alternative 4b: Construct a New Groundwater Production Well at an Existing Site (i.e., the Hillcrest well site).

Other short-listed alternative solutions recommended to be considered in combination with the preferred option, to close the gap between available and required water supply in the system, include:

- Alternative 3 - Reduce Water Demands through Conservation Measures
- Alternative 5 - Increase Town of Collingwood Pipeline Supply Capacity
- Alternative 6 - Expand, Upgrade, Optimize Existing Groundwater System

Additional well testing was undertaken at the CLASS TW #1-93 test well and at the existing Hillcrest production well to support further development of the recommended Alternatives 4a and 4b, respectively. Implementation scenarios for the short-listed alternative solutions Alternatives 4a and 4b were developed, with consideration given to the findings and recommendations of the groundwater exploration program and hydrogeological testing results.

10.3 Development of Feasible Water Supply Alternative Solutions

The short-listed alternatives resulting from preliminary screening were further developed into sub-options representing potential implementation scenarios taking into consideration possible locations for the new groundwater supply source(s), and associated treatment and distribution components, as well as hydrogeological testing results.

The short-listed water supply servicing solutions and their sub-options are summarized in the following sections. Also, to facilitate the reader's understanding of this section, a re-cap of the key findings and recommendations of the groundwater exploration program and testing results is briefly provided as follows:

10.3.1 Re-cap of Groundwater Exploration and Preliminary Testing Results

A groundwater exploration and testing program was undertaken, in a phased approach, as part of this Class EA study to identify suitable locations for new production supply well(s). Key tasks and findings are as follows:

- CLASS TW1-93 well is 27 years old and was developed as a test well. Testing confirmed well yield and acceptable water quality. A new production well in the vicinity could potentially produce a maximum of approximately 1,295 m^3/day (15 L/s). Analyses of raw water quality collected during the step test indicate a groundwater

source of relatively high quality, necessitating treatment for disinfection and iron removal/control.

- Hillcrest well is 62 years old and has not been supplying to the Alliston Drinking Water system due to pressure constraints. Well has a valid Permit to Take Water for 821 m3/day. Testing confirmed well yield and water quality. A new production well on site could potentially produce a maximum of approximately 1,640 m3/day (19 L/s). Analyses of raw water quality collected during the step test indicate a groundwater source of relatively high quality, necessitating treatment for disinfection only.

A figure indicating both Hillcrest site and CLASS TW1-93 site is shown below in Figure 10.

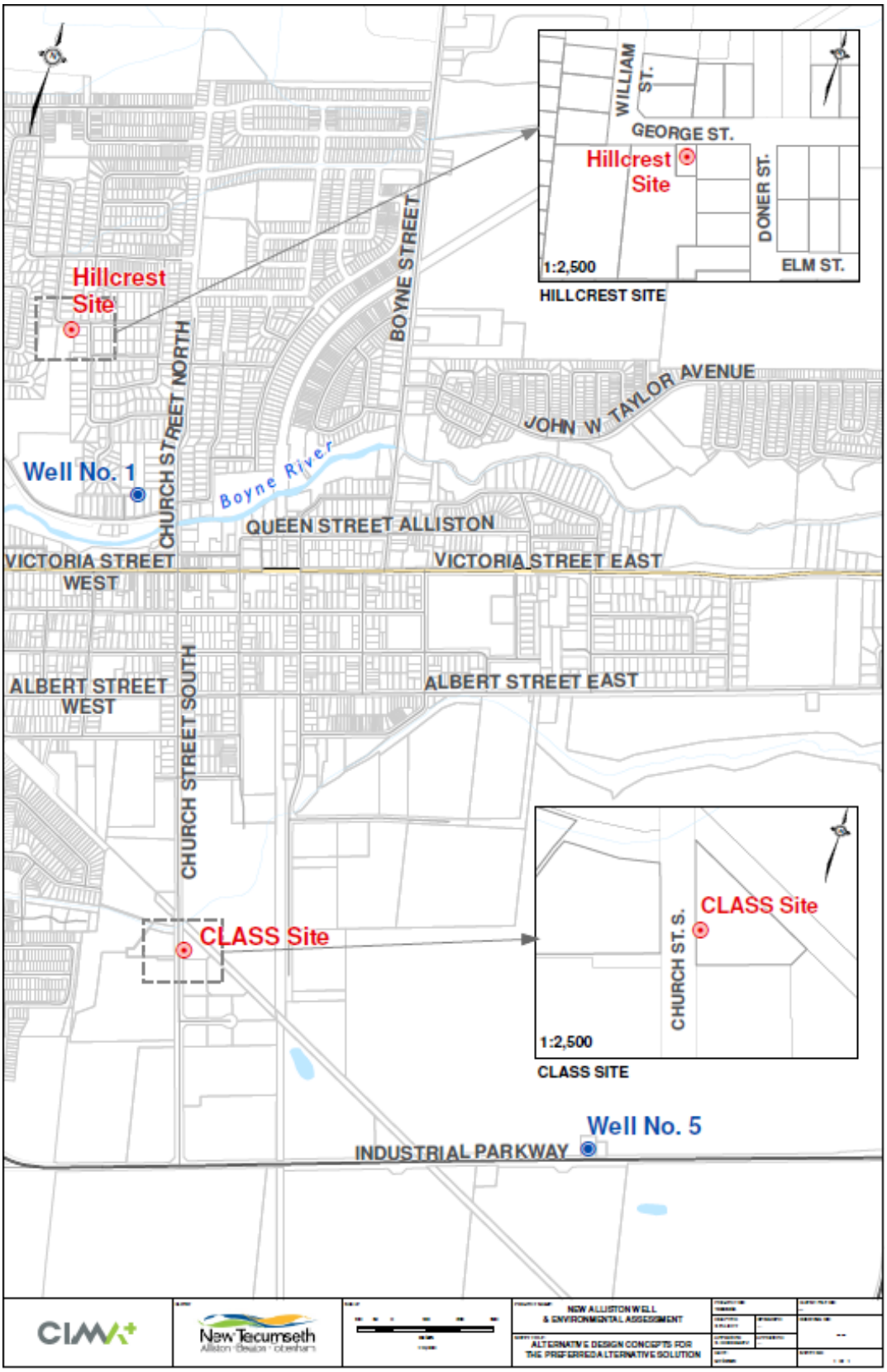

Figure 10: Short-listed Alternative Supply Locations

10.4 Implementation Options

Implementation options or sub-options were developed for the feasible alternative solutions that involved construction of production wells at new or existing sites:

- Obtain water from another Source – Construct a New Groundwater Production Well at New Site (TW #1-93 well site); and,
- Obtain water from another Source – Construct a New Groundwater Production Well at an Existing Site (Hillcrest well site).

Key criteria in developing potential implementation options included opportunities to use municipally owned lands to reduce the need for property acquisition and maximize the use of and compatibility with existing infrastructure.

Based on the two (2) possible groundwater supply sites, Hillcrest well site and Class TA1-93 test well site, four (4) potential implementation options were further identified, developed and evaluated in detail:

- Option 1a: Use existing Hillcrest well and Retrofit Existing Building
- Option 1b: Use existing Hillcrest well and New Treatment Building
- Option 2: Use Existing Hillcrest Well, New Treatment Building and Additional New Production Well onsite
- Option 3: New Well (adjacent to TW1-93 on CLASS Site) and New Treatment Building

Each option, and the respective major infrastructure and process requirements are described in detailed in the sections below.

10.4.1 Option 1a. Use Existing Hillcrest Well and Retrofit Existing Building

10.4.1.1 General Description

The existing Hillcrest well is currently rated for a maximum water taking capacity of 9.5 L/s (821 m^3/d). The Hillcrest site has been out of service for the last 4-5 years due to pressure limitations and its capacity is not considered part of the firm capacity of the Alliston Drinking water System.

A condition assessment of the existing Hillcrest treatment facility was completed by R.V. Andersons in November 2017 to visually assess the condition of the site, the operating equipment, electrical, mechanical, structural and architectural components and to

assess general compliance with applicable codes and standards for this type of facility. Some of the major recommendations included electrical upgrades from 240V to 600V, well pump upgrades and remove high lift pumps, install chlorine contact chamber and abandon existing reservoir, replace existing pressure control valve with an isolation valve, and install new outdoor diesel generator.

Recent step-testing confirmed that the performance of existing Hillcrest well is adequate and the well can safely produce, subject to pump and treatment upgrades, its maximum permitted taking capacity of 9.5 L/s. Water quality testing results also indicate a groundwater source of relatively high quality, necessitating only disinfection and potentially iron removal/control.

Option 1a would involve using the existing Hillcrest well and completing the required upgrades and modifications to the existing pump house and treatment facility to address the deficiencies identified through the condition assessment exercise (completed previously as a separate assignment), and to meet new disinfection requirements which include 4-log virus inactivation. The existing Hillcrest well would continue to be used up to its existing permitted taking capacity, so no amendments to the existing Permit to Take Water would be required.

Key upgrades and modifications proposed at the existing Hillcrest facility for Option 1a involve:

Process Works:

- Keep existing Hillcrest well and replace existing well pump with new pump. New pump to be sized with enough head to pump directly to the distribution system.
- Install variable frequency drive (VFD) on new pump.
- Remove existing high lift pumps.
- Provision for potential installation of iron sequestration system.
- Install underground Concrete Pressure Pipe (CPP) contact chamber to meet the new 4-log virus inactivation requirement.
- Minor upgrades to process piping, valves and fittings inside the existing pump house and treatment facility
- Replace existing pressure reducing valve with an isolation valve in the distribution system.

Structural and Civil Works:

- Expand existing treatment building to the north to accommodate the new electrical panels. Approximate footprint for the building expansion is 3.5m x 6m.
- Address structural and architectural deficiencies previously identified thorough an independent condition assessment of the existing facility including; spalling of parging/paint on the exterior of foundation walls, rust along the floor near the drain and drainage channel, lack of roof insulation, minor deterioration of roof shingles (balding, breakage and cracking) and repairs to the wood staircase.
- Decommission and remove existing underground reservoir.
- Miscellaneous site works including site grading, excavation, trenching and backfilling.

Electrical and Mechanical Works:

- Upgrade electrical power supply from 208V to 600V 3 phase including 3 new pole mounted transformers and replace the existing 208VAC utility service wiring to the pumping station with new 600VAC, 3 phase service wiring.
- Install new 600V electrical service entrance and MCC including service entrance breaker, automatic transfer switch, and well pump motor starter.
- Install new outdoor 100 kW diesel generator on a weatherproof enclosure. The genset will sit on a concrete pad to the east of the existing treatment building
- Upgrade general electrical power distribution, lighting, heating, and ventilation along with new automation system, instrumentation/SCADA integration.

A simplified schematic and conceptual layout for Option 1a is provided in Figure 11 and Figure 12, respectively.

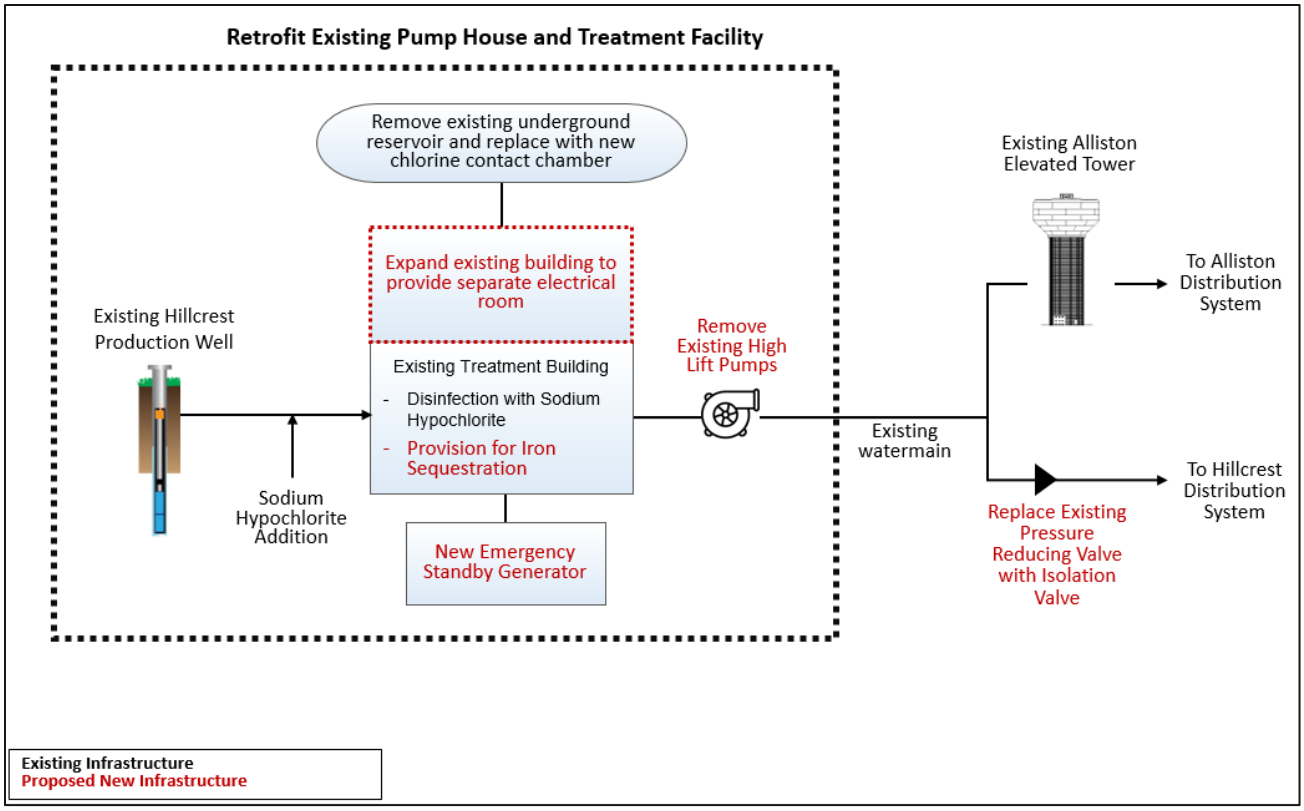

Figure 11: Option 1a – Process Schematic

Figure 12: Option 1a – Conceptual Layout

10.4.1.2 Infrastructure / Process Requirements

Key infrastructure and process requirements associated with Option 1a are outlined in Table 29.

Table 29: Option 1a – Infrastructure and Process Requirements

Key Components	Option 1a - Use existing Hillcrest well and Retrofit Existing Treatment Facility at Hillcrest site
Supply	• Use the existing Hillcrest Well. Install new submersible well pump and VFD
Treatment and Pumping	• Remove existing high lift pumps • Install new chlorine contact chamber • Provision for iron sequestration • Decommission existing underground reservoir • Expand existing building to accommodate new electrical panels • Install new outdoor emergency standby diesel generator with weatherproof enclosure
Distribution	• Replace existing PRV with isolation valve

10.4.2 Option 1b. Use Existing Hillcrest Well and New Treatment Building

10.4.2.1 General Description

Option 1b also involves using the existing Hillcrest well; however, a new pump house and treatment facility is proposed as part of this Option. Construction of the new treatment facility can be provided by either traditional construction methods or by installation of a prefabricated facility. Removal of all existing infrastructure onsite except for the production well will be required to allow new construction.

The existing Hillcrest well will continue to be used up to its existing permitted taking capacity of 9.5 L/s (821 m^3/d), so no amendments to the existing Permit to Take Water will be required. The treatment process at the new facility will include disinfection to meet the required 4-log virus inactivation and provision for iron control/removal.

Key upgrades and modifications proposed at the existing Hillcrest facility for Option 1b involve:

Process Works:

- Keep existing Hillcrest well and replace existing well pump with new pump. New pump to be sized with enough head to pump directly to the distribution system.
- Install pitless adapter on existing well to allow connection to new treatment building
- Install variable frequency drive (VFD) on new pump on new pump house
- Install of chemical system for disinfection (assumes disinfection through sodium hypochlorite addition.

- Provision for potential installation of iron sequestration system.
- Install underground Concrete Pressure Pipe (CPP) contact chamber to meet the new 4-log virus inactivation requirement.
- Replace existing pressure reducing valve with an isolation valve in the distribution system.

Structural and Civil Works:

- Decommission and demolish existing pump house, treatment facility and underground reservoir. Remove and dispose of all existing treatment and pumping equipment including high lift pumps and chemical system for disinfection (assumes disinfection through sodium hypochlorite addition).
- Build new pump house and treatment building towards the back of the property. Approximate footprint for the new building 6m x 8m. New pump house will be at grade, one building with a separate chemical room.
- Install a new feedline connecting the existing Hillcrest well to the new pump house and treatment building
- Install a new watermain connection between new treatment facility and distribution system on George Street
- Miscellaneous site works including site grading, excavation, trenching and backfilling.

Electrical and Mechanical Works:

- Upgrade electrical power supply from 208V to 600V 3 phase including 3 new pole mounted transformers and replace the existing 208VAC utility service wiring to the pumping station with new 600VAC, 3 phase service wiring.
- Install new 600V electrical service entrance and MCC including service entrance breaker, automatic transfer switch, and well pump motor starter
- Install new outdoor 100 kW diesel generator on a weatherproof enclosure. The genset will sit on a concrete pad to the east of the existing treatment building
- Install new electrical power distribution, lighting, heating, and ventilation along with new automation system, instrumentation/SCADA integration.

A simplified schematic and conceptual layout for Option 1b is provided in Figure 13 and Figure 14, respectively.

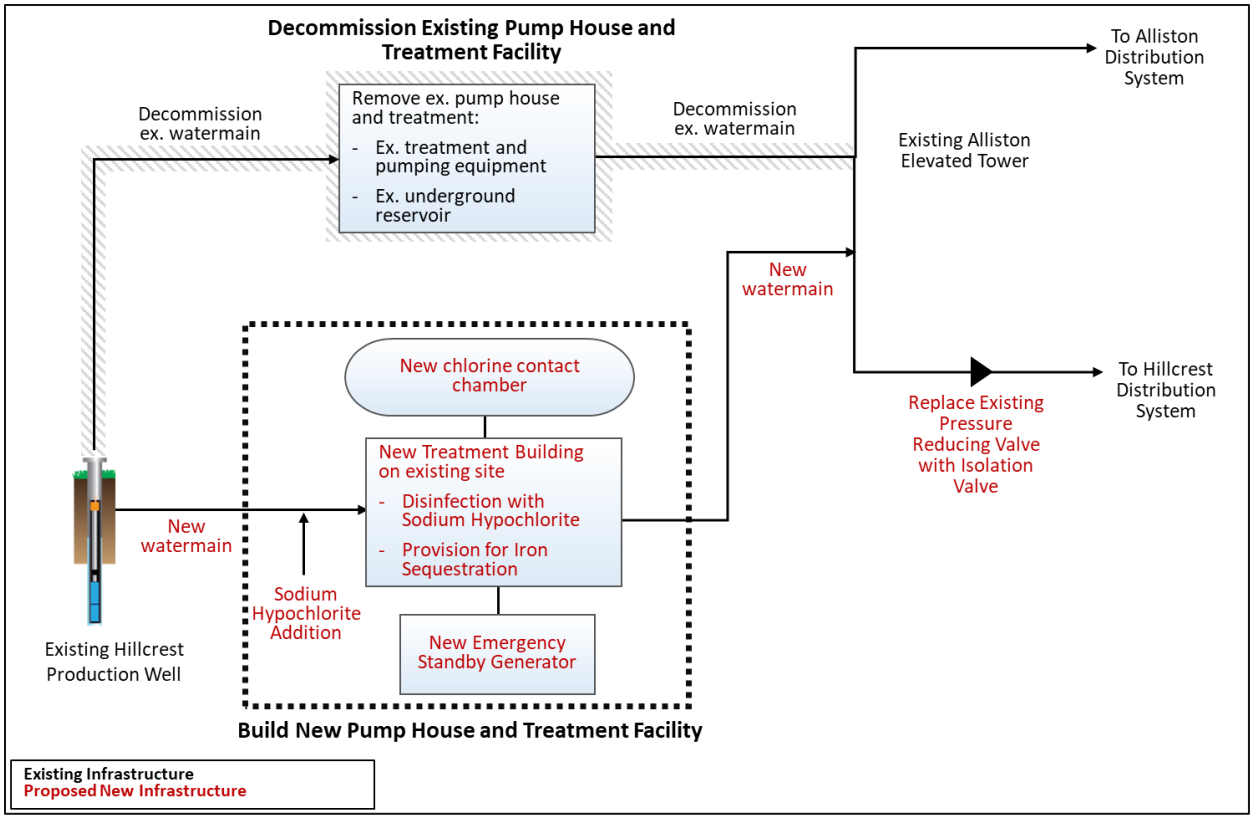

Figure 13: Option 1b – Process Schematic

Figure 14: Option 1b – Conceptual Layout

10.4.2.2 Infrastructure / Process Requirements

Detailed infrastructure and process requirements associated with Option 1b are outlined in Table 30.

Table 30: Option 1b – Infrastructure and Process Requirements

Key Components	Option 1b - Use existing Hillcrest well and Build New Treatment Facility at Hillcrest site
Supply	• Use the existing Hillcrest Well. Install new submersible well pump, pitless adapter and VFD

Key Components	Option 1b - Use existing Hillcrest well and Build New Treatment Facility at Hillcrest site
Treatment and Pumping	• Decommission and remove existing pump house, underground reservoir. Remove and dispose of all pumping and treatment equipment, including high lift pumps • Construct a new pump house and treatment facility above grade. • Install disinfection system and provision for iron sequestration • Install new chlorine contact chamber
Distribution	• Decommission existing watermain connections • Install new watermain connections from well to pump house and from treatment building to distribution system on George Street • Replace existing PRV with isolation valve

10.4.3 Option 2. Use Existing Hillcrest Well, New Treatment Building and Additional New Production Well onsite

10.4.3.1 General Description

The results of the step testing conducted at the Hillcrest site, indicated that a new production well (10 in. dia.) onsite could potentially yield a maximum production capacity of 19.0 L/s (1,642 m^3/d).

Option 2 involves using the existing Hillcrest well, as well as developing and installing a new production well onsite. A new pump house and treatment facility is proposed as part of this Option 2. Construction of the new treatment facility can be provided by either traditional construction methods or by installation of a prefabricated facility. Removal of all existing infrastructure onsite except for the production well will be required to allow new construction. The existing well will be connected to the new facility immediately after construction of the new treatment building and will be back in service Provision for a connection of a future production well will be made in the new building, once a secondary production well is fully developed. The site will ultimately comprise two (2) wells, which either can be used as a backup to the other. Alternatively, the existing Hillcrest well can be converted to a monitoring well after a new production well is developed and connected to the new treatment system.

The existing Hillcrest well will continue to be used up to its existing permitted taking capacity of 9.5 L/s (821 m^3/d). The new production well is expected to potentially yield a maximum production capacity of 19.0 L/s (1,642 m^3/d). An amendment to the existing Permit to Take Water will be required to reflect the new production well in the system. In addition, updates to the existing source water protection plan will need to be completed, reflecting new wellhead protection area delineations, before the existing system permits and licenses can be amended. The treatment process at the new facility will include

disinfection to meet the required 4-log (99.99%) virus inactivation and provision for iron control/removal.

Key upgrades and modifications proposed at the existing Hillcrest facility for Option 2 involve:

Process Works:

- Keep existing Hillcrest well and replace existing well pump with new pump. New pump to be sized with enough head to pump directly to the distribution system.
- Develop, test, and install new production well (10 in. dia.) within existing site limits. Install new pump to be sized with enough head to pump directly to the distribution system.
- Install pitless adapter on existing and new production wells to allow connection to new treatment building
- Install variable frequency drive (VFD) on new pumps on new pump house
- Install of chemical system for disinfection (assumes disinfection through sodium hypochlorite addition)
- Provision for potential installation of iron sequestration system
- Install underground Concrete Pressure Pipe (CPP) contact chamber to meet the new 4-log virus inactivation requirement.
- Replace existing pressure reducing valve with an isolation valve in the distribution system.

Structural and Civil Works:

- Decommission and demolish existing pump house, treatment facility and underground reservoir. Remove and disposed of all existing treatment and pumping equipment including high lift pumps and chemical system for disinfection (assumes disinfection through sodium hypochlorite addition).
- Build new pump house and treatment building towards the back of the property. Approximate footprint for the new building 6m x 8m. New pump house will be at grade, one building with a separate chemical room.
- Install new feedline connecting the existing Hillcrest well and new production well to the new pump house and treatment building
- Install a new watermain connection between new treatment facility and distribution system on George Street

- Miscellaneous site works including site grading, excavation, trenching and backfilling.

Electrical and Mechanical Works:

- Upgrade electrical power supply from 208V to 600V 3 phase including 3 new pole mounted transformers and replace the existing 208VAC utility service wiring to the pumping station with new 600VAC, 3 phase service wiring.
- Install new 600V electrical service entrance and MCC including service entrance breaker, automatic transfer switch, and well pump motor starter
- Install new outdoor 100 kW diesel generator on a weatherproof enclosure. The genset will sit on a concrete pad to the east of the existing treatment building
- Install new electrical power distribution, lighting, heating, and ventilation along with new automation system, instrumentation/SCADA integration.

A simplified schematic and conceptual layout for Option 2 is provided in Figure 15 and Figure 16, respectively.

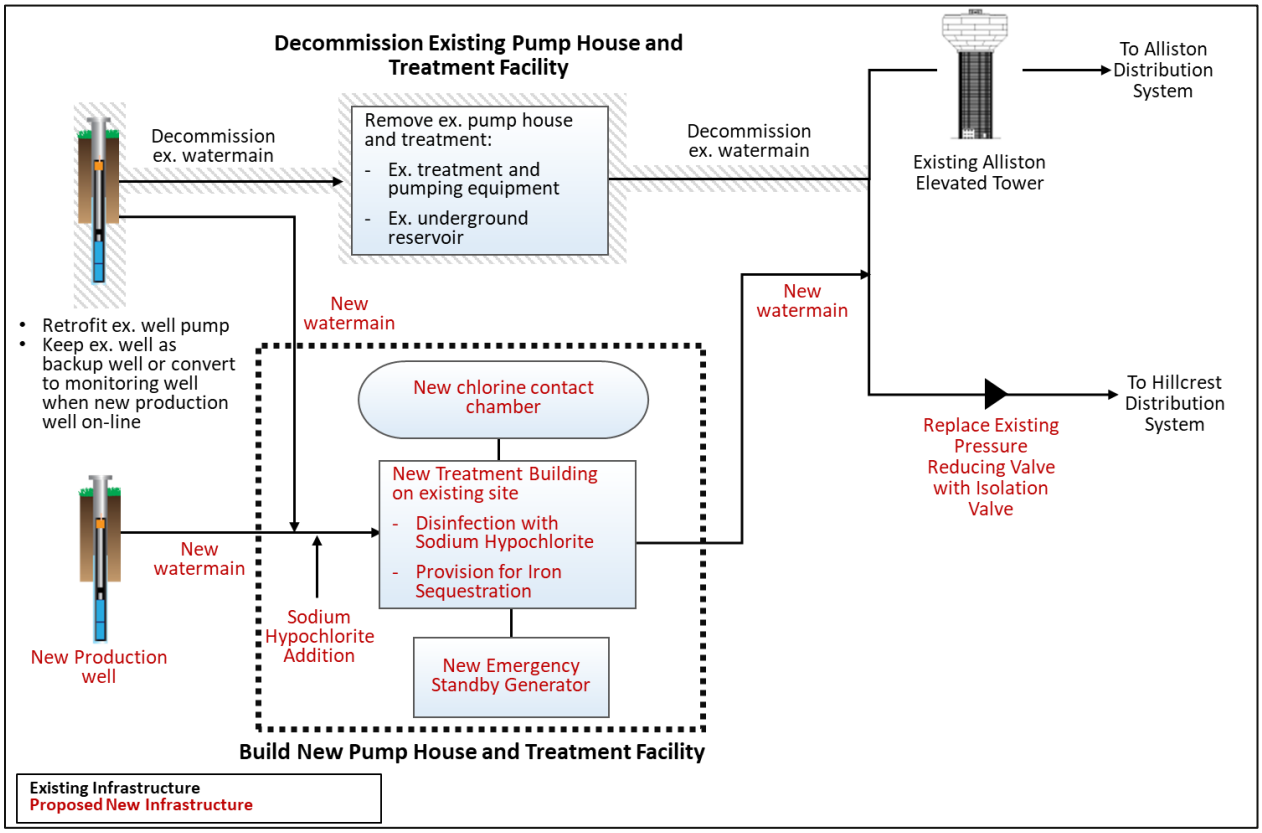

Figure 15: Option 2 – Process Schematic

Figure 16: **Option 2 – Conceptual Layout**

10.4.3.2 Infrastructure / Process Requirements

Detailed infrastructure and process requirements associated with Option 2 are outlined in Table 31.

Table 31: Option 2 – Infrastructure and Process Requirements

Key Components	Option 2 - Build New well and New Treatment Facility at Hillcrest site
Supply	• Use the existing Hillcrest Well. Install new submersible well pump, pitless adapter and VFD • Develop new production well onsite. Install new submersible well pump, pitless adapter and VFD

Key Components	Option 2 - Build New well and New Treatment Facility at Hillcrest site
	• Existing well can be kept and used as a back well or can be converted to a monitoring well when new production well is connected to the system
Treatment and Pumping	• Decommission and remove existing pump house, underground reservoir. Remove and dispose of all pumping and treatment equipment, including high lift pumps • Construct a new pump house and treatment facility above grade • Install disinfection system and provision for iron sequestration • Install new chlorine contact chamber • Treatment equipment to be sized to provide for the higher flows (12.6 L/s) anticipated in the new production well
Distribution	• Install new watermain connections from well to pump house and from treatment building to distribution system on George Street • Replace existing PRV with isolation valve

10.4.4 Option 3. New Well (adjacent to TW1-93 on CLASS Site) and New Treatment Building

10.4.4.1 General Description

Recent step-testing revealed that a new production well in the vicinity of the CLASS test well TW #1-93 could potentially yield a maximum production capacity of approximately 15 L/s (1,296 m^3/d). Water quality testing results also indicated a groundwater source of relatively high quality, necessitating only disinfection.

Option 3 was conceptualized under the assumption that a new production well would be developed in the vicinity of the existing CLASS TW #1-93 test well. There is municipal owned land on the north side of the CLASS building which can be potentially used to build a Production Well. Due to accessibility concerns on a continuous basis on the potential site for the new well, a separate site was selected to build the new pump house and treatment facility. The new treatment facility can either be constructed on-site or a pre-built building can be installed that is built off-site. The type of construction/ installation will be evaluated in the design phase. Groundwater would be conveyed to its own treatment facility for treatment prior to connecting to the existing distribution system on Church Street South. A watermain crossing of Church Street South road would be required for the installation of the feed line connecting the well to the pump house. The new pump house and treatment facility would be located at an existing municipal site at 206 Church Street South, currently housing a municipal sewage pumping station.

Since a single municipal address can only be provided with a single hydro service, it will be necessary to install a new hydro service at the new pump house and treatment facility and back feed 600V power to the existing sewage pumping station. Alternatively, the Town can apply to obtain a separate municipal address for the portion of the land to be occupied by the water treatment facility. For the purposes of estimating opinion of probable costs, it has been assumed that a single municipal address will be maintained.

The new production well is expected to potentially yield a maximum production capacity of approximately 15 L/s (1,296 m^3/d). An amendment to the existing Permit to Take Water will be required to reflect the addition of a new production well in the system. In addition, updates to the existing source water protection plan will need to be completed, reflecting new wellhead protection area delineations, before the existing system permits and licenses can be amended. The treatment process at the new facility will include disinfection to meet the required 4-log (99.99%) virus inactivation.

Key infrastructure for Option 3 involves:

Process Works:

- Develop, test and install new production well within new site.
- Install pitless adapter on new production well to allow connection to new treatment building across from well site
- Install variable frequency drive (VFD) on new pump on new pump house
- Install of chemical system for disinfection (assumes disinfection through sodium hypochlorite addition)
- Install iron removal/control system (assumes iron sequestration)
- Install underground Concrete Pressure Pipe (CPP) contact chamber to meet the new 4-log (99.99%) virus inactivation requirement.

Structural and Civil Works:

- Build new pump house and treatment building towards the north of the existing municipal property. Approximate footprint for the new building 9m x 7m. New pump house will be above grade, one building with a separate chemical room.
- Install new feedline connecting the new production well to the new pump house and treatment building. Crossing of an existing watercourse and Church Street South would be required. Watercourse crossing is assumed to be completed through horizontal directional drilling.
- Install a new watermain connection between new treatment facility and distribution system on Church Street South

- Miscellaneous site works including site grading, excavation, trenching and backfilling.

Electrical and Mechanical Works:

- Install new pad mounted utility service transformer, sized to accommodate the new water treatment plant and existing sewage pumping station
- Install new 600V electrical service entrance
- Install new 600V MCC, including service entrance breaker, automatic transfer switch, and well pump motor starter
- Install new outdoor 100 kW outdoor diesel generator dedicated to the water treatment plant only.
- Install new electrical power distribution, lighting, heating and ventilation along with new automation system, instrumentation/SCADA integration.
- Install new 600V underground power distribution feed to the existing sewage pumping station and remote well pump

A simplified schematic and conceptual layout for Option 3 is provided in Figure 17 and Figure 18, respectively.

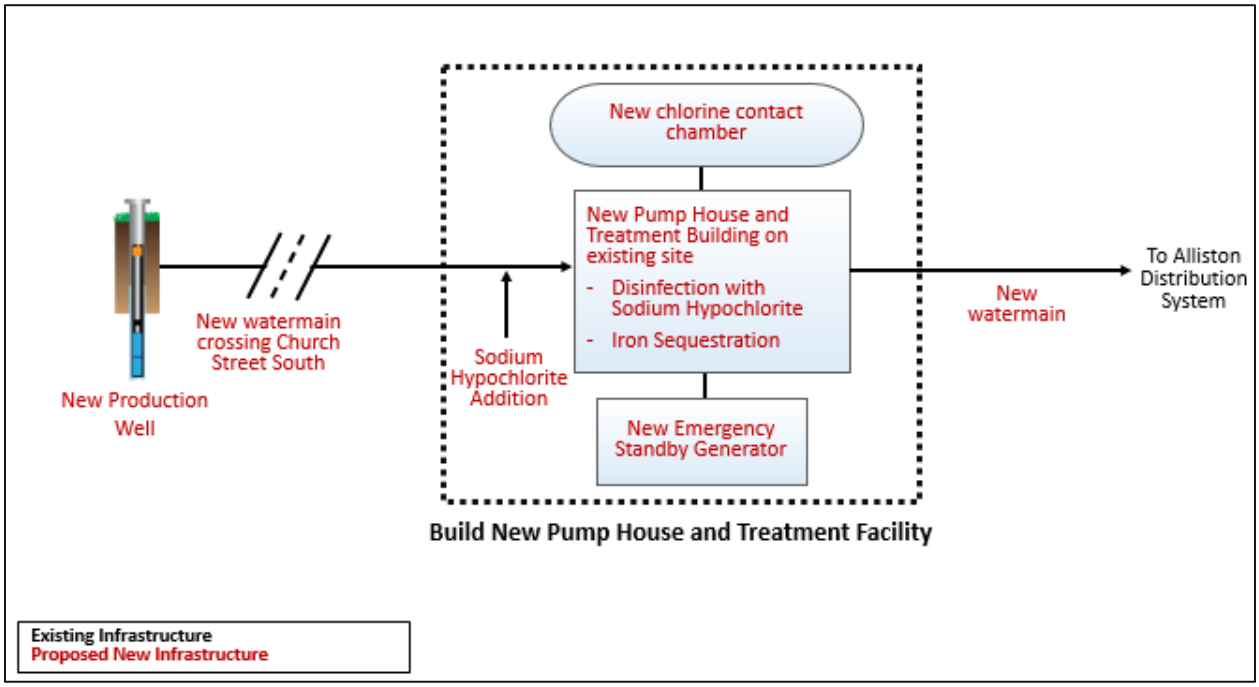

Figure 17: Option 3 – Process Schematic

Figure 18: Option 3 – Conceptual Layout

10.4.5 Infrastructure / Process Requirements

Detailed infrastructure and process requirements associated with Option 3 are outlined in Table 32.

Table 32: Option 3 – Infrastructure and Process Requirements

Key Components	Option 3 - Build New well (adjacent to CLASS site) and New Treatment Facility at Existing municipal site
Supply	• Construct new production well on existing municipal site, east of CLASS TW #1-93 • Install new submersible well pump, pitiless adapter and VFD

Key Components	Option 3 - Build New well (adjacent to CLASS site) and New Treatment Facility at Existing municipal site
Treatment and Pumping	• Construct a new pump house and treatment facility with a sodium hypochlorite disinfection system and iron sequestration system (separate chemical room) • Install new chlorine contact chamber • New emergency standby diesel generator will be provided on site. A stand-alone unit with a weatherproof enclosure will be provided
Distribution	• Installation of new • Feed line connection from the new well to the treatment site located on the opposite side of the Church Street South. Watermain installation requires watercourse and road crossing • Installation of new watermain connection from the existing treatment building to the existing distribution system on Church Street South

10.4.6 Opinion of Probable Cost

Opinion of probable capital, operating and maintenance costs and life cycle costs were developed for each implementation option. Detailed life cycle cost estimates are provided in Appendix F.

10.4.6.1 Capital Costs

Capital costs generally included the following:

- Costs of upgrades / rehabilitation to the existing well and treatment facility, specific to the requirement of each implementation option developed under this study;
- Costs of new infrastructure, such as construction of new building, installation of new watermains, installation of new standby generator, new chlorine contact chamber;
- Costs of major process equipment such as pumps, chemical systems and instrumentation equipment;
- Costs of modification of existing water distribution system, such as watermain replacement;
- Demolition costs of existing facilities, specific to the requirement of each short-listed alternative;

The following general assumptions were made when developing the capital costs for the four (4) different implementation options:

- Cost estimates are based on 2020 construction costs. Inflation and escalation for the actual expected prices at the time of construction cannot be accounted for at this time.

- Estimates of probable capital costs provided by CIMA+ have been developed on a conceptual design level and based on prices and data in CIMA's possession, as well as previous experience from projects of similar nature and scope;
- In accordance with ASTM E 2516-06 (Standard Classification for Cost Estimate Classification System) the preliminary opinion of total project costs is anticipated to be within a range of -30% and +50%, based on a Class 5 level of accuracy.
- All taxes (including the 13% HST) have been excluded.
- Any costs associated with necessary updates to the source water protection plan and pertinent hydraulic modeling have been excluded. Operating and Maintenance Costs

The operating and maintenance costs accounted for include electricity, chemical usage, and other general operating and maintenance costs.

10.4.6.2 Life Cycle Costs

Life cycle costs (LCCs) were calculated based on a 20-year life expectancy. Life cycle costs have been estimated based on:

- A 20-year amortization period
- An inflation rate of 2% and an interest rate of 6% to give a market/discount rate of 4%.

Estimates for the probable capital costs, operation and maintenance costs, 20-year life cycle costs and life cycle cost per cubic meter of water produced for the four (4) different implementation options are summarized in Table 33. The LCC per cubic meter of water produced was calculated based on the Calculated 20-year LCC and the total amount of water produced annually. Detailed cost calculations are included in Appendix F.

Table 33: Opinion of Probable Costs

Implementation Options	Capital Cost Year 2020 $MM	O&M Costs Year 2020 $	Calculated Life Cycle Costs 20-years $MM	LCC per m^3 water produced ($/$m^{3)}$)
Option 1A - Use existing Hillcrest well and Retrofit Existing Treatment Facility	$1.5	$29,200	$2.0	76
Option 1B - Use existing Hillcrest well and New Treatment Facility	$2.0	$29,200	$2.4	72

Implementation Options	Capital Cost Year 2020 $MM	O&M Costs Year 2020 $	Calculated Life Cycle Costs 20-years $MM	LCC per m^3 water produced ($/$m^{3)}$)
Option 2 - Use Ex. Hillcrest well, New Treatment Facility on-site and Develop New PW onsite	$2.8	$36,400	$3.3	62
Option 3 - Build New well (adjacent to CLASS site) and New Treatment Facility at Ex. Municipal site	$2.9	$29,900	$3.4	81

10.5 Detailed Evaluation of Implementation Options

A detailed comparative evaluation of the potential implementation options was completed based on the evaluation methodology described in Section 8.3 of this report. Each option was assessed relative to the others and assigned a preliminary score relating to the potential net impact, intended to reflect the impact that remains, or is predicted to remain, after mitigation measures are in place.

The scoring and results of the evaluation process were confirmed in consultation with the Project Team. The results of the evaluation process were formally presented to the public and agencies at the Online Public Information Centre (PIC). A summary of the overall scores obtained for each implementation option, and the ranking based on such scores are summarized in Table 34. A summary of the detailed evaluation is provided in Table 35. The complete evaluation matrix, documenting the scoring rationale and individual scores has been included in Appendix G for further reference.

Table 34: Summary of Evaluation Scoring and Ranking

Implementation Options	Overall Score Out of 100	Overall Ranking
Option 1A - Use existing Hillcrest well and Retrofit Existing Treatment Facility	79	3
Option 1B - Use existing Hillcrest well and New Treatment Facility	81	2
Option 2 - Use Ex. Hillcrest well, New Treatment Facility on-site and Develop New PW onsite	89	1
Option 3 - Build New well (adjacent to CLASS site) and New Treatment Facility at Ex. Municipal site	78	4

As shown in Table 34 and Table 35, the results of detailed evaluation indicate that Option 2 - Use Existing Hillcrest well, New Treatment Facility on-site and Develop New Production Well onsite, is the highest scoring option and therefore ranked in first. Consistently, Option 2 has been selected as the preliminary preferred water supply solution from the four implementation options subjected to the evaluation.

Table 35: Detailed Evaluation of Implementation Options for Short-listed Alternative Solutions

Category	Option 1A - Use ex. Hillcrest well and Retrofit ex. Treatment Facility	Option 1B - Use ex. Hillcrest well and Build New Treatment Facility	Option 2 - Use Ex. Hillcrest well, Build New Treatment Facility on-site and Develop New PW onsite	Option 3 - Build New well (adjacent to CLASS site) and New Treatment Facility at Ex. Municipal site
Natural Environment **Weight: 30%**	• Ex. well has a valid permit to take water, no additional testing required. • No impact to environmental features. • No potential impact to cultural heritage features.	• Ex. well has a valid permit to take water, no additional testing required. • No impact to environmental features. • No potential impact to cultural heritage features.	• System to include redundancy in supply with 2 wells. • No impact to environmental features. • No potential impact to cultural heritage features.	• Minor impact to significant environmental features. • Archaeological assessment needed for the well site.
Sub-total Score – Natural Environment	**24.5**	**26.0**	**28.0**	**23.0**
Technical and Operational **Weight: 30%**	• Ex. Hillcrest well can provide about 20% of additional supply needs. • Operational and maintenance challenges will continue due to the tight layout and configuration of the existing building. • Keeping the existing well and facility will require more frequent service and maintenance.	• Ex. Hillcrest well can provide about 20% of additional supply needs. • Construction of new treatment building on site will require more coordination during construction due to the tight site. • New treatment building will be designed with sufficient clearances to address current operational and maintenance challenges with tight spaces. New building also provides flexibility for treatment equipment upgrades, if needed.	• New production well anticipated to provide about 40% of additional supply needs. Testing and permitting for the new well required. • Construction of new treatment building on site and new production well will require additional coordination during construction due to the tight site. • New treatment building will be designed with sufficient clearances to address current operational and maintenance challenges with tight spaces. New building also provides flexibility for treatment equipment upgrades, if needed. • Consultation and coordinating with regulatory agencies required for permitting of new well.	• New production well anticipated to provide about 33% of additional supply needs. Testing and permitting for the new well required. • Consultation and coordinating with regulatory agencies required for permitting of new well.
Sub-total Score – Technical & Operational	**20.0**	**23.5**	**24.5**	**21.0**

Category	Option 1A - Use ex. Hillcrest well and Retrofit ex. Treatment Facility	Option 1B - Use ex. Hillcrest well and Build New Treatment Facility	Option 2 - Use Ex. Hillcrest well, Build New Treatment Facility on-site and Develop New PW onsite	Option 3 - Build New well (adjacent to CLASS site) and New Treatment Facility at Ex. Municipal site
Socio-Cultural **Weight: 20%**	• Least short-term impacts from dust, noise, vibration on sensitive receptors due to shortest construction duration. • No visual improvements to the old look of existing building. Landscaping opportunities can be implemented.	• Moderate short-term impacts from dust, noise, vibration on sensitive receptors due to construction of new treatment building onsite. • New building would be closer to private resident on the back. To be designed to blend-in with character of surrounding residential area. • Landscaping opportunities to be implemented to reduce long-term visual impacts.	• Some short-term impacts from dust, noise, vibration on sensitive receptors due to construction of new treatment building and production well onsite. • Temporary road closure may result due to construction of new well. Access to residential properties will be maintained. • New building would be closer to private resident on the back. To be designed to blend-in with character of surrounding residential area. • Landscaping opportunities to be implemented to reduce long-term visual impacts.	• Some traffic disruption on Church St. S due to watermain crossing. Traffic control measures to be implemented as needed. • Minor short-term impacts during construction due to industrial character of the area. • Temporary and permanent easements may be required for feed line.
Sub-total Score – Socio Cultural	**18.0**	**17.3**	**16.0**	**18.0**
Economic **Weight: 20%**	Cost for water production is $\$75.8/m^3$ based on 20-year LCC $2.0M	Cost for water production is $\$91.6/m^3$ based on 20-year LCC $2.4M	Cost for water production is $\$62.4/m^3$ based on 20-year LCC $3.3M	Cost for water production is $\$80.6/m^3$ based on 20-year LCC $3.4M
Sub-total Score – Economic	**16.5**	**13.6**	**20.0**	**15.5**
Total Overall Maximum Weighted Score	**79.0**	**80.5**	**88.5**	**77.5**

10.6 Recommended Water Supply Implementation Option

Based on the results of the detailed evaluation process, the preliminary preferred water supply servicing solution to address existing concerns with the security of water supply and the p*rojected supply deficit capacity to accommodate planned growth in the Town to 2031 is:*

- Option 2 – Use Existing Hillcrest well, New Treatment Facility onsite and Develop New Production Well onsite

From a comparative evaluation with the other three (3) implementation options identified; Option 2 provided the following major advantages:

- The new production well has the potential to contribute about 40% of the projected water supply deficit for the Municipality to the year 2031.
- The recommended option provides the lowest overall cost per m^3 of treated water.
- The two (2) wells (existing and new production wells) would provide redundancy in supply with one of the wells acting as a back-up well.
- The new infrastructure provides treatment and operational flexibility. The configuration and layout of new treatment facility will provide safe clearances for access, operation and maintenance activities.
- The new treatment building will be designed to improve the aesthetic appearance of existing building. The construction of new infrastructure can be done by either traditional construction methods or by installation of a prefabricated facility.

11 Preferred Water Supply Solution

11.1 Overview

The preferred water supply servicing solution recommended for implementation has been selected with consideration to the results of the evaluation process and feedback obtained from the public throughout the Class EA study.

The results of the decision-making process followed in this Class EA study support the selection of *Option 2 - Use Existing Hillcrest well, New Treatment Facility onsite and Develop New Production Well onsite* as a key component of the preferred supply servicing solution. In addition, the preliminary screening step followed in the study identified that the following alternative solutions be considered in combination with the preferred recommended supply servicing solution:

- Alternative 3 – Reduce Water Demands through Conservation Measures. Reduce Water Demands through Conservation Measures. This would include a reduction in water demands through mandatory/voluntary conservation measures. The Town has an incentive program in effect that provides a rebate for low flush toilets and rain barrels and disseminates water conservation facts and information. In addition, the Town has by-laws to enforce water conservation measures by restricting the use of water for lawn care and car washing. Additional water conservation initiatives may include programs to educate both the general public and industrial users of ways to reduce water usage.
- Alternative 5 – Increase Town of Collingwood Pipeline Supply Capacity. The Town is in discussions with the Town of Collingwood; however, the RAB Water Treatment Plant is currently constrained at meeting their own demands and signed agreements. This alternative will require the Town to re-negotiate the existing agreement to increase the 2030 maximum pipeline supply beyond 23,500 m^3/d. The supply of additional capacity over the agreed amount is subject to negotiation but timing is a more critical concern to the Town.
- Alternative 6 – Expand, Upgrade, Optimize Existing Groundwater System. This alternative involves potential expansion, upgrades, or modifications to the existing municipal groundwater systems to satisfy the projected water supply deficit. Other municipal wells may have the potential for improvement of their current production and/or treatment capacity. Implementation of an optimization study would be required to confirm the aquifer potential and any possible upgrades or expansions to the existing treatment and/or distribution systems, associated with each of the municipal wells.

In general Option 2 comprises the following:

- Decommission and demolish all existing infrastructure onsite, above and below ground, except for the existing Hillcrest well, which will remain in place and put back in service.
- Build a new pump house and treatment building towards the back of the property, by either traditional construction methods or by installation of a prefabricated facility. The new pump house will be built above grade level and equipped with the necessary treatment equipment to provide for the required disinfection.
- The existing Hillcrest well will be maintained and connected to the new treatment facility immediately after construction of the new building. The existing well will continued to be used up to its existing permitted water taking capacity of 9.5 L/s (821 m^3/d).

- Develop a new production well onsite. Preliminary step-testing completed on the existing Hillcrest well anticipates that the new production well can potentially yield a maximum production capacity of 19.0 L/s (1,642 m^3/d) and would require treatment for disinfection only. Based on the higher production capacity anticipated for the new well, the new well is expected to be larger than the existing one. Well development will include the required testing and water characterization to confirm maximum long-term sustainable well yield and treatment requirements. The new production well will be connected to the new treatment facility for further treatment prior to distribution. The exact location of the new production well will be confirmed in the next stages of the project.
- Install a new outdoor emergency standby diesel generator with a weatherproof enclosure onsite.
- Opinion of probable capital costs, including contingency and engineering costs are estimated to be approximately $2.8 Million. The associated 20-year life cycle costs are estimated to be approximately $3.3 Million.

The site will ultimately comprise of two (2) wells. Either well can be used as a backup to the other, providing redundancy in supply, therefore, the wells are not anticipated to operate simultaneously. Alternatively, the existing Hillcrest well can be converted to a monitoring well after a new production well has been developed and connected to the new treatment system.

A new connection to the existing water distribution system will be required to connect the new treatment facility to the existing watermain running in front of the current site, on George Street. Although the current treatment facility is not connected to the municipal sanitary system, provision for a potential connection to the existing sanitary sewer on George Street may has been made. The sanitary connection will be confirmed during detailed design. A preliminary conceptual layout for the preferred water supply servicing solution, Option 2, is provided in Figure 19.

Figure 19: Preferred Water Supply Servicing Solution, Key Component: Option 2 – Conceptual Layout

11.2 Alternate Implementation Option for Additional Consideration

Should well development of the new production well proposed at the Hillcrest site reveal that the actual production capacity of the new supply source is significantly lower than the theoretical anticipated rate of 19 L/s, the Town may need to re-consider the merits

of Option 3 – Build a new well on a new site (adjacent to CLASS site) and build a new treatment facility at an existing municipal site.

Option 3 obtained a lower score, relative to Options 1 and 2, mainly due to the lower sustainable yield of 15 L/s, anticipated from this well, which translated into a lower score in the natural environmental criteria as well as in the economic criteria. Nevertheless, should the Town fail to obtain additional supply capacity after implementation and/or exploration of the preferred recommended solution, combined with the other short-listed alternatives, a potential new well in the vicinity of CLASS test well TW1-93 site, could help to alleviate some of the additional supply deficit.

Option 3 resulted in life cycle costs slightly above the costs for Option 2, mostly due to the lower potential rated capacity from a new well in Option 3. However, Option 3 offers several benefits largely associated with the industrial character of the area. Re-consideration to further explore Option 3 is dependant on the Town being able to achieve a significant reduction in the water supply deficit after implementation of the preferred recommended solution. Should the Town need to reconsider Option 3, additional consideration will need to be given to address accessibility and safety for a new well potentially located in a flood hazard zone. Specific design features would need to be implemented to flood-proof associated infrastructure sitting in floodplain areas.

With consideration to the above, Option 3 – Build a new well on a new site (adjacent to CLASS site) and build a new treatment facility at an existing municipal site could potentially be re-considered or explored further as component of the preferred servicing solution for this Class EA study, should factors out of the control of the Town, impede or compromise an appropriate reduction in the water supply deficit.

11.3 Required Permits, Approvals and Additional Investigations

Review and approvals from regulatory agencies will be required during preliminary and detailed design prior to construction and implementation of the major infrastructure related to Option 2, as listed in Table 36.

Table 36: Anticipated Permits, Approvals and Additional Investigations

Approval Agency	Permit/Approval Required
Nottawasaga Valley Source Protection Authority	• Approval of Updated Source Protection Plan – including delineation of new WHPAs, amendment of existing WHPAs as a result of new production well,

Approval Agency	Permit/Approval Required
	and corresponding public engagement and consultation.
Ministry of the Environment, Conservation and Parks (MECP)	• Temporary and permanent PTTW for new production well • Amendment to Municipal Drinking Water Works Permit • Amendment to Municipal Drinking Water License • Approval of Updated Source Protection Plan • Air and Noise Emissions Regulatory Compliance
Utility Companies	• Hydro connection/service upgrade permit/approval • ESA Review
Town of New Tecumseth	• Site Plan Approval (may be required) • Building Permit (may be required)
	• Designated Substance Survey to support decommissioning and removal of existing infrastructure. • Detailed Geotechnical Investigation to support detailed design

11.4 Implementation Schedule

One of the major advantages of Option 2 is that the existing production well, Hillcrest well, can be put back in operation as soon as minor equipment upgrades are completed and once the new treatment building is constructed onsite. This enables the Town to use a component of the existing municipal system to start closing the gap between water system demands and water supply deficit. Having an existing municipal production well onsite also provides opportunities for a phased construction and implementation approach. As such, the existing production well can be used to support the water supply capacity in the system, while the new production well, with a potentially much higher production yield, is developed onsite. The preliminary implementation schedule for the preferred water supply servicing solution is shown in Table 37.

Table 37: Preliminary Implementation Schedule

Description of Work	Commencement Year
Development and Construction of New Production Well at Hillcrest site	2021
Detailed Design of New Treatment Facility at Hillcrest site	2021

Description of Work	Commencement Year
Decommissioning and Demolition of Existing Infrastructure at Hillcrest site (except existing production well) and Construction of New Treatment Facility at Hillcrest site	2022

In addition to the above, the Town will continue to explore the implementation viability of the supplementing alternative strategies being recommended as part of the preferred solution including; reducing water demands through conservation measures, increasing the supply capacity from Town of Collingwood Pipeline and expanding/ upgrading/ optimizing the Town's existing groundwater system.

12 Proposed Mitigation of Potential Impacts and Monitoring

The following section provides a description of some of the potential impacts on key criteria anticipated as a result of the implementation of the preferred water supply solution, as outlined in this report, as well as some mitigation measures proposed to minimize or avoid such anticipated impacts.

Implementation of the proposed infrastructure for Option 2 is not expected to have significant impacts on the existing natural environment or cultural heritage resources. Due to the limited physical available space at the existing Hillcrest site, demolishment of existing infrastructure and construction of new infrastructure will result in moderate short-term construction impacts such as noise, dust, vibration and visuals, primarily on adjacent residents.

In general, public health and safety is a priority to the Town and as such, all design and construction related to the new production well and treatment facility will adhere to strict safety guidelines and all applicable codes and standards. All construction work must be carried out in accordance with the Occupational Health and Safety Act (OHSA) and other local regulations. Specific mitigation measures, as described below, are recommended for implementation to reduce anticipated potential impacts.

12.1 Water Quality/Quantity

The Hillcrest well is located within the existing pump house, which is recommended to be decommissioned and demolished. The Hillcrest well is expected to be put back in service as part of this project; therefore, appropriate protection measures would need to be implemented to ensure that the structural integrity of the existing well is maintained during demolition and construction works. Step testing completed at the Hillcrest well

concluded that no interference with other municipal wells in the area is expected at the current well rated capacity of 9.5 L/s.

Development of the new well onsite will be carried out by a licensed well contactor and in compliance with current regulations, including Ontario Regulation 903/90 Wells (O. Reg. 903/90) and the guidance provided in the Draft GUDI TOR Technical Support Document: Determination of Minimum Treatment for Municipal Residential Drinking Water Systems Using Subsurface Raw Water Supplies, January 2019, or the most up-to-date version.

The new well, anticipated to have a larger diameter than the existing well, is expected to be located at the front of the property to facilitate accessibility to the site with the well drill. The exact location of the new well will be confirmed in the next stages of the project, but major consideration will be given to ensuring that surface drainage is away from the well. Corrosion resistant casings will be utilized, such as stainless steel or plastic. Testing and water quality characterization for the new well will be completed during well development to confirm maximum sustainable well yield and water treatment requirements. However, based on the water quality results obtained during step testing of the Hillcrest well, a new production well in the vicinity of the existing well is anticipated to be of relatively high quality, necessitating only treatment for disinfection. Re-fueling of construction equipment need to be carefully practiced.

12.2 Socio-Cultural

Demolition of the existing facility and construction of a new treatment facility at the existing Hillcrest site will have some short-term moderate impacts, such as noise, vibration, dust, traffic, etc., along with some visual impacts due to staging of construction equipment and fencing. These activities will primarily impact the adjacent residents as well as residents using George Street, for commuting purposes.

The following mitigation measures will be taken to mitigate anticipated short and long-term impacts to the adjacent residents:

- Temporary fencing will be used around the construction areas to minimize noise, dust, mud and visual impacts.
- Construction of the project will be carried out in accordance with the municipal noise requirements. Construction equipment will be operated according to the applicable Town of New Tecumseth's Noise Control By-Law, which imposes limitations and restrictions for operation of construction equipment between certain hours.
- Construction equipment will be appropriately maintained to ensure that exhaust emissions meet industry standards.

- Property owners adjacent to the Hillcrest site where construction activities will take place will be notified in advance and provided with Town's contact information should they encounter any problems during construction.
- Development of the new well will require temporary closure of a section of George Street to accommodate well drilling equipment for a temporary period. Continued vehicular access to private residents in the area will be maintained through alternate residential roads.
- The aesthetics of the new pump house will be improved over the existing building. The new pump house will be architecturally designed to blend-in with the residential character and feel of the community.
- Minimum Setbacks from property lines will be provided in accordance with the Town's Zoning By-Law. Fencing and landscaping opportunities will be incorporated during the detailed design stage. In addition, opportunities to reduce the footprint requirements for the proposed infrastructure will be explored in the design stages.

12.3 Climate Change

The new water treatment facility will incorporate energy efficiency lighting and equipment. Low use of chemicals is expected in the treatment facility, which will result in low volume of trucks transporting chemical to the site, and thus, minimal emissions from truck traffic.

The permanent standby generator will be located onsite; however, it is expected to be used only for emergency situations. The emergency standby genset will located outdoors and contained in a stand alone, weatherproof, noise attenuated enclosure. The genset will be designed to meet the required air emission regulations set by the MECP, such as low exhaust stack height. The performance of the genset will be monitored regularly, in agreement with the manufacturer recommendations, to ensure that the air emissions regulation compliance is continuously met.

Minor vegetation removal is expected, although, landscape opportunities to compensate for any vegetation removal, and to contribute to carbon sinks and minimize disturbances to adjacent residents will be reviewed during detailed design.

12.4 Source Water Protection

Mapping data from the Lake Simcoe Region Conservation Area confirms the presence of Wellhead Protection Area (WHPA) within the Hillcrest site, associated with the existing municipal production well. No Significant Groundwater Recharge Areas or Highly Vulnerable Areas within the proposed construction area have been identified.

The development of a new production well at the Hillcrest site will require an assessment of the vulnerability of the new well within the existing drinking water system and an update of the existing Source Water Protection Plan. Due to the close proximity between the existing and the new production well, source water protection plan policies for the new WHPAs would not expect to apply to new large geographic areas or to a very limited extent.

The new standby generator on site would include handling and storage of fuel to operate the generator. The handling and storage of fuel is considered to be a significant threat to drinking water as listed in the Source Water Protection Plan for the Nottawasaga Valley Source Protection Area. The proposed works also include the construction of underground watermains to provide for the connection of the supply well(s) to the new treatment facility and the connection to the existing distribution system. Pipeline installation is generally considered a low threat to municipal drinking water due to the potential release into the groundwater of a number of chemicals. The only chemical anticipated to be used for treatment in the new facility is sodium hypochlorite; nevertheless, to reduce, manage or eliminate any threats, the Town will exercise every effort to reduce the potential for release of chemicals (common in such treatment facilities and pumping stations) and fuel by applying best available design and construction practices in accordance with the governing regulations and standards, such as secondary containment for fuel storage, monitoring process for spill/ leak detection, and obtaining any necessary approvals from the approval agencies.

12.5 Construction Related Impacts

12.5.1 Noise and Vibration

Potential noise and vibration effects are anticipated in connection with demolition of existing above and below ground infrastructure, construction traffic and construction equipment. Noise during operation of the new treatment facility is not expected to differ from baseline conditions, when the facility used to be operational. Also, monthly testing of the outdoor emergency standby generator would result in production of some noise on site. The proposed mitigation measures include the following:

- A noise study will need to be completed to assess the sound emissions from the genset. The sound levels would be minimized by installing a weatherproof, sound attenuating enclosure, an acoustic wall, or a combination of the two, to meet the Noise Emissions Regulation Compliance.
- Demolition and construction noise can be minimized by the use of construction walls or fencing around the construction areas.

- Construction of the project to be carried out in accordance with the municipal noise requirements. Construction equipment will be operated according to the applicable Town of New Tecumseth's Noise Control By-Law, which imposes limitations and restrictions for operation of construction equipment between certain hours.
- Ensuring all vehicles and construction equipment are equipped with effective muffling devices and are operated in a fashion to minimize noise in the project area.
- Throughout the construction period, the Town will ensure the contractors undertake measures to reduce noise disturbances as much as possible.

12.5.2 Dust/Mud

Demolition works and construction traffic could create additional dust and mud. There are no anticipated concerns regarding dust and mud during normal facility operation. The proposed mitigation measures include the following:

- Dust control measures such as the application of water to be implemented as required.
- The Town will ensure that the contractor maintain public roadways clean and free of mud on a consistent basis.

12.5.3 Traffic

Most of the construction activities will be limited to the construction area in the vicinity of the existing Hillcrest site. During the production well development a temporary closure of a section of George Street will most likely be needed to accommodate well drilling equipment. The proposed mitigation measures include the following:

- Appropriate hours of work will be specified in the contract.
- Continued vehicular access to private residents in the area will be maintained through alternate residential roads.
- Any lane closures will be completed in accordance with best practices to protect safety to the workers and to the general public.
- Residents in the area will be kept informed ahead of time of any road closures and anticipated timing, as well as the overall schedule of construction.
- All standard best practices for vehicle and pedestrian safety will be employed throughout the construction areas. All construction will adhere to strict safety guidelines.

12.6 Disturbance to Natural Environmental Features

Other than ornamental grass and a few shrubs, there is no significant environmental features within or in the vicinity of the existing Hillcrest site. Minimal impact is expected from the removal of an existing tree adjacent to the existing pump house for the proposed construction works. Landscape opportunities will be reviewed during the detailed design stage. Potential indirect impacts to environmental features, within and around the construction zones, can be avoided by using standard mitigation measures during construction such as:

- Clear delineation of work site vegetation clearing zone and vegetation retention zones will be established in both the contract documents and in the field.
- Erosion and sediment control fencing will be designed, installed and maintained throughout the construction stages, as required. Adequate containment of all construction generated sediment should be implemented, specifically for the downstream side of any temporary topsoil stockpile locations.
- Appropriate vegetation clearing techniques will be used during construction, as well as appropriate clearing and disposal of all construction-related debris following construction.
- Contamination of soils through spills and leaks can be avoided by ensuring that the fuel storage, refueling and maintenance of construction equipment is handled properly as per standards and provincial regulations. Construction equipment should never be allowed into or adjacent to drainage swales on-site. The Contractor will be required to submit a detailed response and action plan for dealing with the containment and cleanup of any spills during construction.

12.7 Public Consultation

Public and agency input was sought at key stages of the Class EA process. An Online PIC was held between September 30 and October 23, 2020. All PIC related materials, including a PowerPoint presentation, video and narrative of the video presentation were available on the project webpage.

Public concerns were raised mainly related to concerns regarding the sources for additional supply capacity, including the Collingwood pipeline, the Tottenham wells, the new Hillcrest well site, as well as other supplementing sources to achieve the total projected demands in the system. Other concerns raised by an adjacent resident were related to the footprint of the new building, proximity to his residence and potential ways to mitigate visual disturbances. Official responses to the residents were provided by the

Project Team and is included in Appendix D. Public feedback was considered to confirm the recommended water supply solution.

Public consultation with directly impacting residents will continue during the design and construction of this project. The Town will continue to inform and provide updates as the project progresses. A dedicated contact person from the Town will be available to respond to any immediate issues or concerns that may come up before or during construction.

13 Class EA Phase 4 – Class EA Report Conclusions and Recommendations

Through completion of a Municipal Class EA study, Option 2 – using the existing Hillcrest well, as well as developing and installing a new production well onsite has been identified as the primary component of the preferred water supply servicing solution. Other supplementing alternative strategies recommended to be implemented in conjunction with Option 2 include:

- Reducing Water Demands through Conservation Measures;
- Increasing the Town of Collingwood Pipeline Supply Capacity; and,
- Expanding, Upgrading, Optimizing the Town's Existing Groundwater System

Public and agency input was sought at key stages of the Class EA process to provide the public with opportunities to comment on the project. Through the consultation process, some public concerns and issues were raised associated with the implementation of key infrastructure recommended for Option 2. Potential impacts associated with the implementation of the recommended alternative solution were identified as well as available mitigation measures. The socio-cultural implications of this project are directly related to the proximity of the new treatment facility/pumphouse to private residences and the associated short-term construction impacts. Due to the nature of this project and the limited area of the Hillcrest site, some inevitable effects in terms of dust, noise, truck traffic and fuel spills will be felt around the construction areas. Potential effects can be reduced or avoided by implementation of mitigation measures outlined in this report.

Since the existing Hillcrest well and treatment facility is currently not operational, construction complexity is slightly reduced. However, due to the current size constraints of the Hillcrest site, construction staging will need to be carefully coordinated to accommodate the demolition of the existing assets and the construction of the new infrastructure. Opinion of probable capital costs, including contingency and engineering

costs are estimated to be approximately $2.8 Million. The associated 20-year life cycle costs are estimated to be approximately $3.3 Million.

The Town will provide site inspection and contract administration throughout the construction phases of the project. The site inspector will ensure that the Contractor is building the works as per the contractual drawings and specifications, as well as maintaining the necessary environmental protection measures. Construction progress meetings will be held regularly to monitor the progress of the project and address any issues that may arise during the construction phases.

It is recommended that the Town proceed with the detailed design and construction of the preferred water supply servicing solution, as outlined in this PFR, subject to receiving the necessary approvals. This PFR is being filed for a 30-day public review period. Provided that no major objections or Part II Orders are received during the review period, the project will proceed through the detailed design and construction phases as outlined in this PFR.

14 References

- Alliston Drinking Water Works Permit (DWWP) issued to The Corporation of the Town of New Tecumseth, Permit Number 123-201 Issue No. 2, July 2016.
- Alliston Municipal Drinking Water License (MDWL) issued to The Corporation of the Town of New Tecumseth, License Number 123-101, Issue No. 2, July 2016.
- Alliston Drinking Water System Annual Report, Town of New Tecumseth, February 2018
- Boyne River, 2013 Sub watershed Health Check, Nottawasaga Valley Conservation Authority, 2013.
- Census data from Statistics Canada, 2016
- Drinking Water Source Protection, Nottawasaga Valley Source Protection Area Approved Assessment Report, Chapter 2: Watershed Characterization, 2012.
- Drinking Water Source Protection, Nottawasaga Valley Source Protection Area Approved Assessment Report, Chapter 14: Town of New Tecumseth, 2012.
- Innisfil Creek, 2013 Sub watershed Health Check, Nottawasaga Valley Conservation Authority, 2013.
- Nottawasaga Valley Source Protection Area Approved Assessment Report, Township of New Tecumseth, Chapter 14, 2014.
- New Tecumseth – Well and Pump Station Improvements, Technical Memorandum No. 1 – Hillcrest Well and Pump Station, November 2017
- Official Plan for The Town of New Tecumseth, Approved by Simcoe County, March 2010

- Online Interactive Mapping, County of Simcoe. Retrieved from: https://opengis.simcoe.ca/public.
- Permit to Take Water (Groundwater) issued to The Corporation of the Town of New Tecumseth, Number 7725-9MKGF2, Ministry of Environment, 2014
- Register for Designated and Significant Properties, Town of New Tecumseth, updated May 2018. Retrieved from: https://www.newtecumseth.ca/en/parks-recreation-and-culture/resources/Documents/Heritage-Register-2018.pdf.
- South Simcoe Groundwater Study WHPA Report – Town of New Tecumseth, Appendix J, Golder Associates, August 2004
- Town of New Tecumseth - Water Supply, Distribution and Storage Master Plan, R.V. Anderson Associates Ltd., September 2016.
  Upper Nottawasaga River, 2013 Sub watershed Health Check, Nottawasaga Valley Conservation Authority, 2013.

A

Appendix A: Hydrogeological Assessment Report, Geo Kamp Ltd.

Appendices A - G have not been included in this report and are available for review at the Engineering Department or are can be accessed via the Town's website at below noted link

https://tntmail-my.sharepoint.com/:b:/g/personal/kkhurshid_newtecumseth_ca/EcG1sB3FY_RFpjFlB_5YGhsB0sr5yfcUVFIhO0VPjT5arg?e=MChvD5

B

Appendix B: Project Contact List

C

Appendix C: Project Notices

D

Appendix D: Public Consultation

E

Appendix E: Agency Consultation

F

Appendix F: Life Cycle Cost Estimates

G

Appendix G: Detailed Evaluation Matrix

CIMA+
500-5935 Airport Road
Mississauga, ON L4V 1W5
T 905 695 1005 F 905 695 0525
cima.ca