

**Replacement of Inglewood
 Municipal Well #2
 Schedule 'B' Class Environmental
 Assessment Study
 Project File
 Region of Peel**

Issue and Revision Record					
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TABLE OF CONTENTS

1. INTRODUCTION.....	5
1.1 BACKGROUND.....	5
1.2 EXISTING FACILITIES	5
2. PROJECT NEEDS ASSESSMENT	6
2.1 PROBLEM STATEMENT.....	6
2.2 PROJECT OBJECTIVE.....	6
3. DESCRIPTION OF STUDY AREA	7
4. IDENTIFICATION AND SCREENING OF ALTERNATIVES	9
4.1 CLASS EA PROCESS.....	9
4.2 INGLEWOOD WELL #2 REPLACEMENT CLASS EA SCHEDULE	11
4.3 CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA)	11
4.4 IDENTIFICATION OF LONG-LIST OF ALTERNATIVES	12
4.5 SCREENING OF LONG-LIST OF ALTERNATIVES	12
4.6 IDENTIFICATION OF THE SHORT-LIST OF ALTERNATIVES.....	13
4.7 GROUNDWATER EXPLORATION PROGRAM.....	14
4.8 EVALUATION OF THE SHORT-LIST OF ALTERNATIVES.....	14
5. WELL TESTING RESULTS.....	23
5.1 WATER QUALITY	25
5.2 GUDI ASSESSMENT.....	25
5.3 CREDIT VALLEY CONSERVATION AUTHORITY - ENVIRONMENTAL IMPACT STUDY.....	26
6. PUBLIC AND AGENCY CONSULTATION	31
6.1 GENERAL	31
6.2 PUBLIC AND AGENCY/STAKEHOLDER NOTIFICATION	31
6.3 RESPONSES FROM STAKEHOLDERS, AGENCIES AND PUBLIC.....	32
6.4 FIRST NATIONS CONSULTATION	34
6.5 PUBLIC INFORMATION CENTRE (PIC) SUMMARY	34
7. IDENTIFICATION OF PREFERRED SOLUTION	36
7.1 WATERMAIN ROUTE SELECTION.....	37
7.2 ARCHAEOLOGICAL IMPACTS	42
7.3 NATURAL ENVIRONMENTAL IMPACTS	42
7.4 CULTURAL HERITAGE ASSESSMENT.....	43
7.5 SOCIO-ECONOMIC IMPACTS	44
7.6 NIAGARA ESCARPMENT COMMISSION (NEC).....	44
8. IMPLEMENTATION.....	45
8.1 APPROVALS PROCESS.....	45
8.2 COMMITMENTS AND MITIGATION MEASURES.....	45
8.3 CLASS ENVIRONMENTAL ASSESSMENT REQUIREMENTS	46
8.4 NOTICE OF COMPLETION	46

8.5 OBJECTIONS TO THE PROJECT	47
8.6 AGENCY APPROVALS.....	48
8.7 CONCLUSIONS AND RECOMMENDATIONS.....	49

LIST OF TABLES

TABLE 4-1 EVALUATION CRITERIA	14
TABLE 4-2 EVALUATION SUMMARY FOR SITE N.....	18
TABLE 4-3 EVALUATION SUMMARY FOR SITE K.....	19
TABLE 5-1 NOTICE PUBLICATION DATES	31
TABLE 5-2 STAKEHOLDER CORRESPONDENCE SUMMARY	32

LIST OF FIGURES

FIGURE 3-1 REPLACEMENT OF INGLEWOOD WELL #2 CLASS EA STUDY AREA..	7
FIGURE 3-2 INGLEWOOD WELL HOUSE #3.....	8
FIGURE 4-1 DECISION MAKING PROCESS.....	10
FIGURE 4-2 DECISION MAKING PROCESS.....	11
FIGURE 4-3 TEST WELL LOCATIONS.....	13
FIGURE 4-4 POTENTIAL WATERMAIN ROUTES FOR SITE N.....	16
FIGURE 4-5 POTENTIAL WATERMAIN ROUTES FOR SITE K.....	17
FIGURE 7-1 POTENTIAL WATERMAIN ROUTES FOR SITE N.....	37

LIST OF APPENDICES

APPENDIX A – DETAILED EVALUATION

APPENDIX B – STAKEHOLDER LIST & NOTICES

APPENDIX C – AGENCY AND STAKEHOLDER RESPONSES

APPENDIX D – PIC MATERIALS

APPENDIX E – REPORTS:

1. Region of Peel Schedule B Class EA – Inglewood Well Draft Natural Environment Report, dated November 23, 2015, Hatch Mott MacDonald
2. Groundwater Development Program Village of Inglewood Regional Municipality of Peel, dated September 3, 2015, Geo Kamp Ltd.
3. Well Construction Program Village of Inglewood – Ing #4 Regional Municipality of Peel, dated May 26, 2016, Geo Kamp Ltd.

4. Cultural Heritage Resource Assessment: Built Heritage Resources and Cultural Heritage Landscapes Existing Conditions and Impact Assessment, dated April 2016, ASI Archaeological and Cultural Heritage Services
5. Stage 1 Archaeological Assessment Inglewood New Well, Part of Lots 3 and 4, Concessions 1 West of Centre Road, dated April 15, 2016, ASI Archaeological and Cultural Heritage Services
6. Inglewood Well 4 Environmental Impact Study, dated March 2016, Credit Valley Conservation
7. Geotechnical Investigation, Watermain Installation, Inglewood Well 4, dated July 27, 2016, Terraprobe Inc.

1. Introduction

1.1 Background

The Region of Peel has initiated an Environmental Assessment (Class EA) study to provide a new municipal well to service the Village of Inglewood.

Due to the implications of the Clean Water Act 2006 and the newly approved CTC Source Water Protection Plan (Effective as of December 31, 2015), the Region identified the need to replace existing Inglewood Well #2 with a new municipal well (Inglewood Well #4) of equivalent capacity.

1.2 Existing Facilities

The Village of Inglewood is serviced by two existing municipal groundwater production wells (Inglewood Well #2, Inglewood Well #3) each with a maximum permitted water taking of 1,295 m³/day.

The permitted capacity of the existing municipal wells (1,295 m³/day) is sufficient to address both the current and future water supply requirements for the Village of Inglewood.

Inglewood Well #2 pumps raw water into Inglewood Well House (15707 McLaughlin Rd.) and is treated through a 20 micron cartridge pre-filter followed by a 1 micron absolute membrane filter equipped with ten membrane modules. UV is used for primary disinfection and sodium hypochlorite is used for secondary disinfection. The treated water then enters the water distribution system.

Inglewood Well #3 pumps raw water into Inglewood Well House #3 (15964 Hurontario St.) where sodium hypochlorite is applied to the raw water to oxidize the iron in solution and the water is then filtered through greensand media to remove the iron. The filter effluent is treated with sodium hypochlorite for primary and secondary disinfection. The treated water chlorine contact time is provided by approximately 300m of 300mm water main before entering the water distribution system.

2. Project Needs Assessment

Due to the implications of the Clean Water Act 2006 and the newly approved CTC Source Water Protection Plan which came into effect on December 31, 2015, and to fulfill the existing servicing needs of the Inglewood community, the Region of Peel identified the need to replace existing Inglewood Well #2 by a new municipal well (Inglewood Well #4).

2.1 Problem Statement

The Region of Peel has identified the need to provide a new municipal well to service the Village of Inglewood within the Town of Caledon and allow for the abandonment of Well #2.

2.2 Project Objective

Investigate alternative solutions and methods to provide a new municipal well for the Village of Inglewood to replace an existing municipal well (Well #2). Through this project, the Region has the opportunity to improve system reliability and security of supply for the Village of Inglewood.

3. Description of Study Area

The study area for the Class Environmental Assessment is found within the Town of Caledon (formerly the Townships of Caledon and Albion) and is defined by the following borders (Refer to Figure 3-1 for road and study area locations):

- North of Forks of the Credit Rd;
- East of Kennedy Rd;
- South of Boston Mills Rd; and,
- West of McLaughlin Rd.

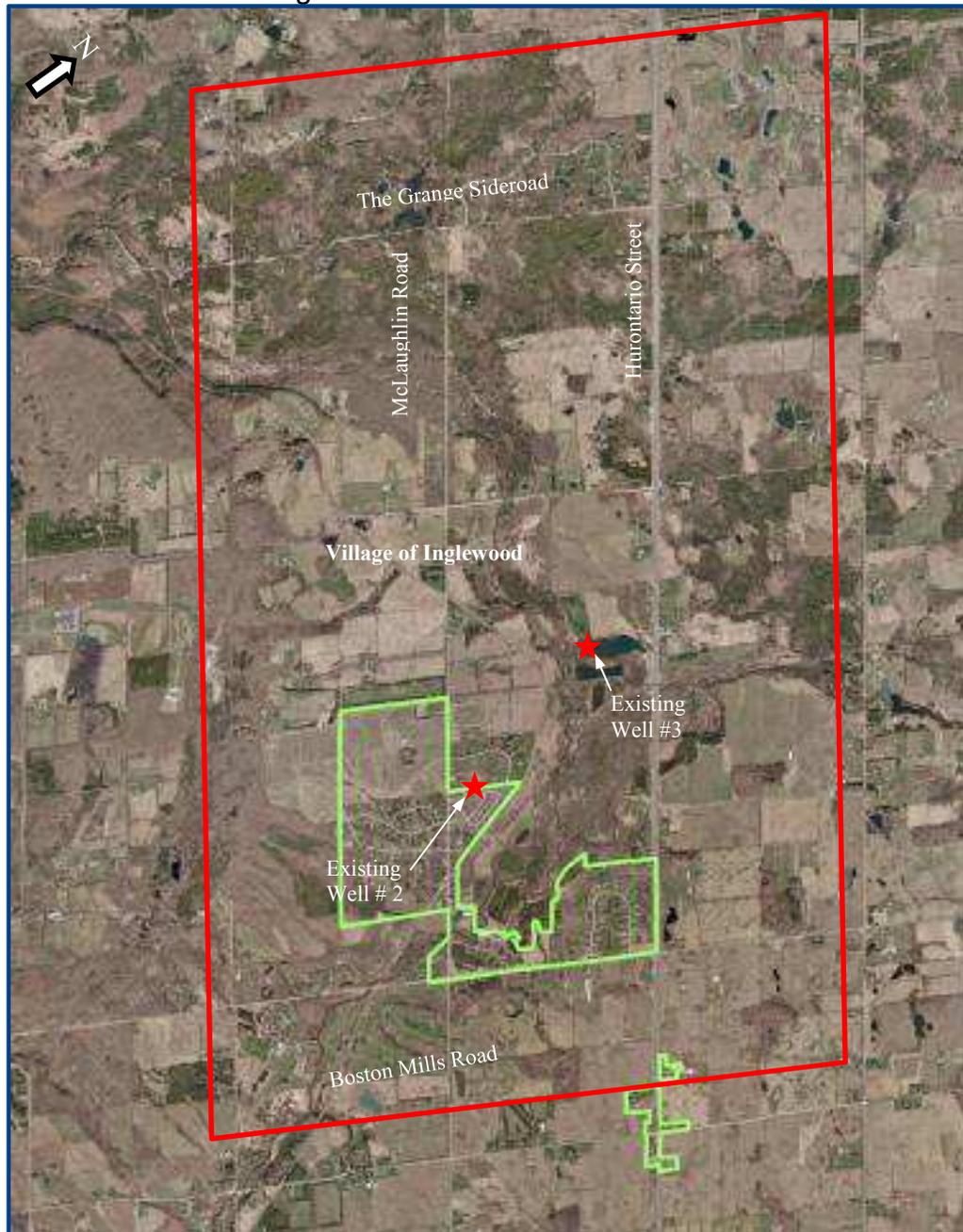


Figure 3-1 Replacement of Inglewood Well #2 Class EA Study Area

The Village of Inglewood is located in the Town of Caledon, Regional Municipality of Peel. A general outline indicating the Village location is shown in Figure 3-1.

Inglewood Well #2 was constructed in 1978 and is a shallow well (9.4m deep) that is considered to be groundwater under the direct influence of surface water (GUDI) as it is located adjacent to the Credit River.

Inglewood Well #3 was constructed in 1995 and is a deep well (54.7m deep) that is considered to be groundwater (Non-GUDI). It is located on the west side of Highway 10 adjacent to the southern boundary of the Ken Whillans Resource Management Area.



Figure 3-2 Inglewood Well House #3

4. Identification and Screening of Alternatives

4.1 Class EA Process

This project is being undertaken as a Class EA in compliance with the Municipal Engineers Associations document entitled “Municipal Class Environmental Assessment”, MEA, October 2000, as amended in 2007, 2011 & 2015. Under the Class EA, projects are subject to varying levels of environmental review/screening depending on the extent of their potential impact.

Projects fall into four schedules of undertakings including:

- **Schedule A:** Projects which are essentially pre-approved and exempt from the Class EA procedures.
- **Schedule A+:** Projects are also considered to be pre-approved; however, they require that the public be advised prior to their project implementation.
- **Schedule B:** Projects are those considered to potentially have some adverse environmental effects. In the case of Schedule B projects, proponents are required to undertake a screening process, involving mandatory contact with directly affected public or relevant review agencies, to ensure that they are aware of the project and that their concerns are addressed. If there are no outstanding concerns, then the proponent may proceed to implementation.
- **Schedule C:** Projects are those that have the potential for significant environmental effects and must proceed through the full planning and documentation procedures specified in the Municipal Class EA document. Schedule C projects require that an ESR be prepared and filed for review by the public and review agencies.

There are five phases of the Class EA process as follows:

- **Phase 1:** Identify the problem (deficiency) or opportunity.
- **Phase 2:** Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment, and establish the preferred solution taking into account public and review agency input.
- **Phase 3:** Examine alternative methods of implementing the preferred solution, based on the existing environment, public and review agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.
- **Phase 4:** Document, in an ESR a summary of the rationale, and the planning, design and consultation process of the project as established through the above phases, and make such a document available for scrutiny for at least 30 calendar days by review agencies and the public. At the time of filing the ESR, the public and review agencies must be notified. During the minimum 30-day review period, no work shall be undertaken that will adversely affect the matter under review. Provided no significant impacts

are identified during this review period and no Part II Order requests are received from the public and review agencies, the Schedule C EA process is completed and the proponent is free to proceed with implementation and construction.

- **Phase 5:** Complete contract drawings and documents, and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities.

For Schedule 'B' undertakings, only Phases 1, 2 and 5 apply. The Class EA flow chart is included as Figure 4-2 below.

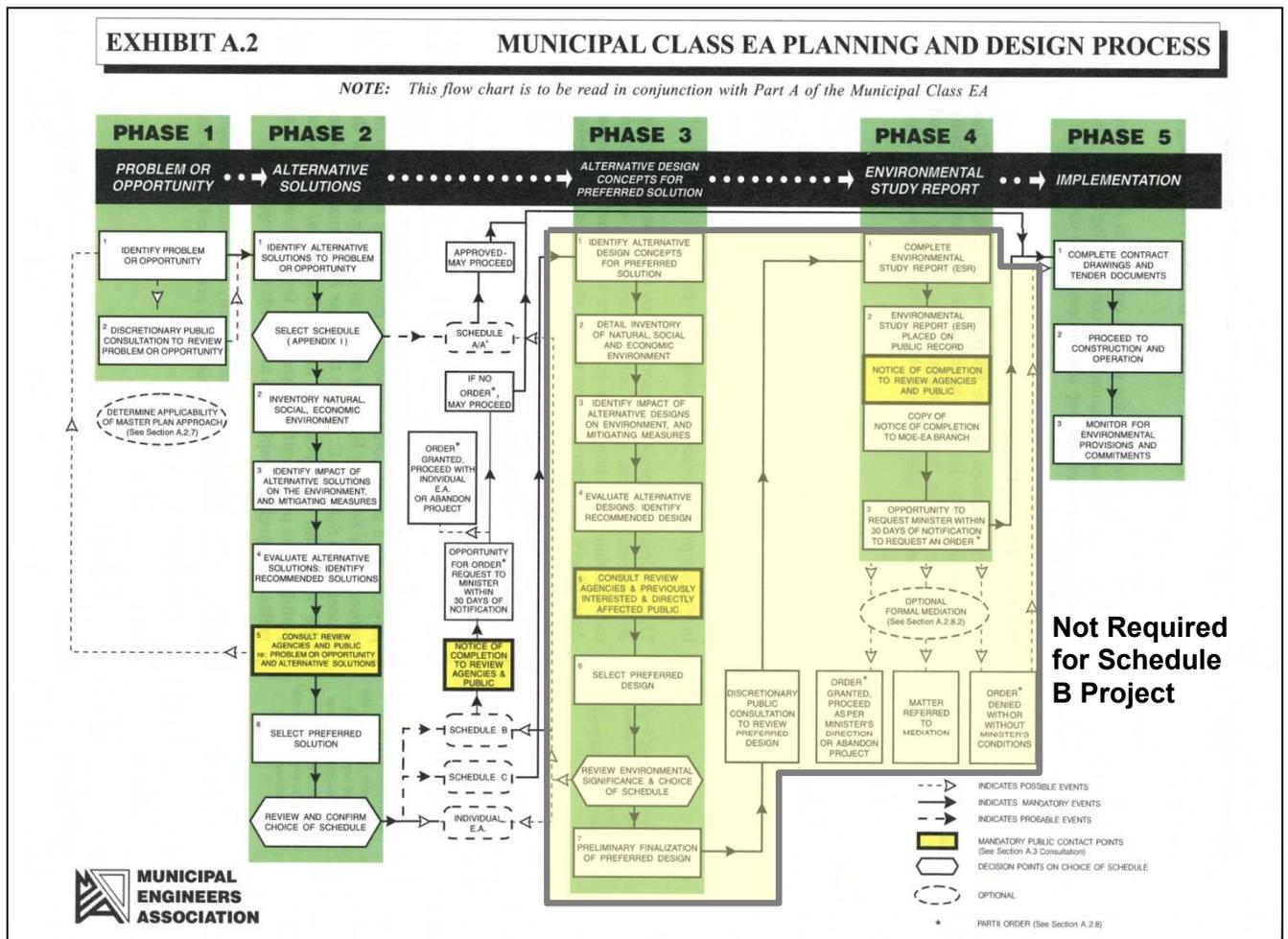


Figure 4-1 Decision Making Process

A full description of the Class EA procedure is contained in the document entitled "Municipal Class Environmental Assessment", MEA, October 2000, as amended in 2007, 2011 & 2015".

4.2 Inglewood Well #2 Replacement Class EA Schedule

As the project described in this report involves the establishment of a new well at a new municipal well site and potential land acquisition for the establishment of a new watermain (raw water) not located within an existing road allowance or utility corridor, the Schedule 'B' process (Phases 1 and 2) as defined in the MEA document entitled "Municipal Class Environmental Assessment", MEA, October 2000, as amended in 2007, 2011 & 2015 applies to this project.

A two-step process, as outlined in the MEA document entitled "Municipal Class Environmental Assessment", MEA, October 2000, as amended in 2007, 2011 & 2015, was followed for this Schedule 'B' Municipal Class EA to ensure that all potential solutions are given equal consideration (Figure 4-2). This process allows for early elimination of alternatives that have little chance of becoming a viable solution. Only solutions that meet all of the screening criteria are carried forward for the detailed evaluation.

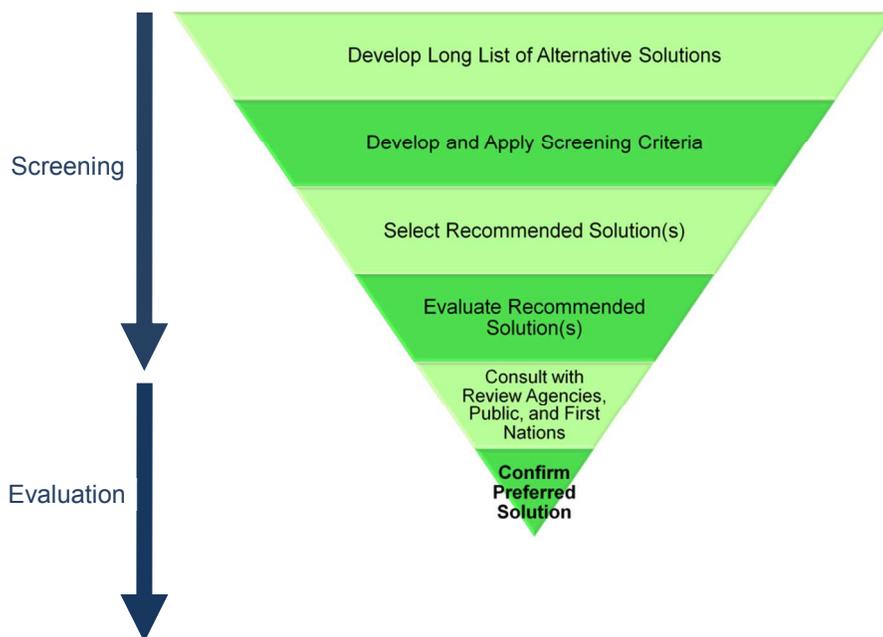


Figure 4-2 Decision Making Process

4.3 Canadian Environmental Assessment Act (CEAA)

Municipal projects may be subject to the requirements of the CEAA. The establishment of a new well at a new municipal well site and potential land acquisition for the establishment of a new watermain (raw water) are not CEAA triggers and therefore this project is not subject to the requirements of the CEAA.

4.4 Identification of Long-List of Alternatives

A long list of alternatives was developed which includes the ‘do nothing’ option, limiting growth within the area, methods to reduce demand and alternative options for the construction of either well or lake based supply within the study area. The Long List of Alternatives is as follows:

Alternative A - “Do Nothing”

Continue with existing operations (“Baseline” alternative with Well #2 in service).

Alternative B - “System Capacity Reduction”

Abandon Well #2 without constructing a new municipal well.

Alternative C - “Implement Water Conservation Measures”

Reduce system demands and water supply (well capacity) requirements through water use conservation.

Alternative D – “Construct a New Municipal Well Supply”

Construct a new municipal well with sufficient capacity to replace existing Well #2.

Alternative E – “Extend Lake-based Water Supply”

Construct a new transmission main from the existing lake-based water supply to Inglewood.

Alternative F – “Increase Capacity of Existing Well”

Increase Capacity of Well #3 without constructing a new municipal well.

4.5 Screening of Long-List of Alternatives

The Long List of Alternatives was screened based on whether the alternative would satisfy the problem statement. The descriptions of the alternatives incorporating the screening rationale are outlined below.

Alternative A - “Do Nothing”

This alternative does not address the identified Problem Statement. Well #2 is not a viable long-term water supply. “Do Nothing” is an alternative required by the Class EA process. *(This Alternative was not evaluated further since it does not address the water servicing requirements for the Village of Inglewood).*

Alternative B - “System Capacity Reduction”

Reduce system capacity through the abandonment of Well #2. Existing level of service and security of supply cannot be maintained with this alternative. *(This Alternative was not evaluated further since it does not address the identified Problem Statement).*

Alternative C - “Implement Water Conservation Measures”

The Region of Peel has implemented a comprehensive program of water conservation program. *(This is considered to form part of all the alternatives).*

Alternative D – “Construct a New Municipal Well Supply”

Providing a new production well with sufficient sustainable yield to replace Well #2 will address the Problem Statement. *(This Alternative was carried forward for further evaluation).*

Alternative E – “Extend Lake-Based Water Supply”

Extension of the lake-based water supply system to provide servicing for the Village of Inglewood. (This alternative is not permitted under current legislation (i.e. Greenbelt Act, 2005) and therefore was not evaluated further).

Alternative F - “Increase Capacity of Existing Well”

Existing level of service and security of supply cannot be maintained with this alternative as there would be no redundancy for the water supply (i.e. Well #3 only). (This Alternative was not evaluated further since it does not address the identified Problem Statement).

4.6 Identification of the Short-List of Alternatives

Based the screening described in Section 4.2, the following alternatives were carried forward for further evaluation: Alternative D “Construct a New Municipal Well Supply”. With this, a list of proposed sites was developed and selection of test well locations and evaluation are outlined in Sections 4.7, 4.8 and Figure 4-3.

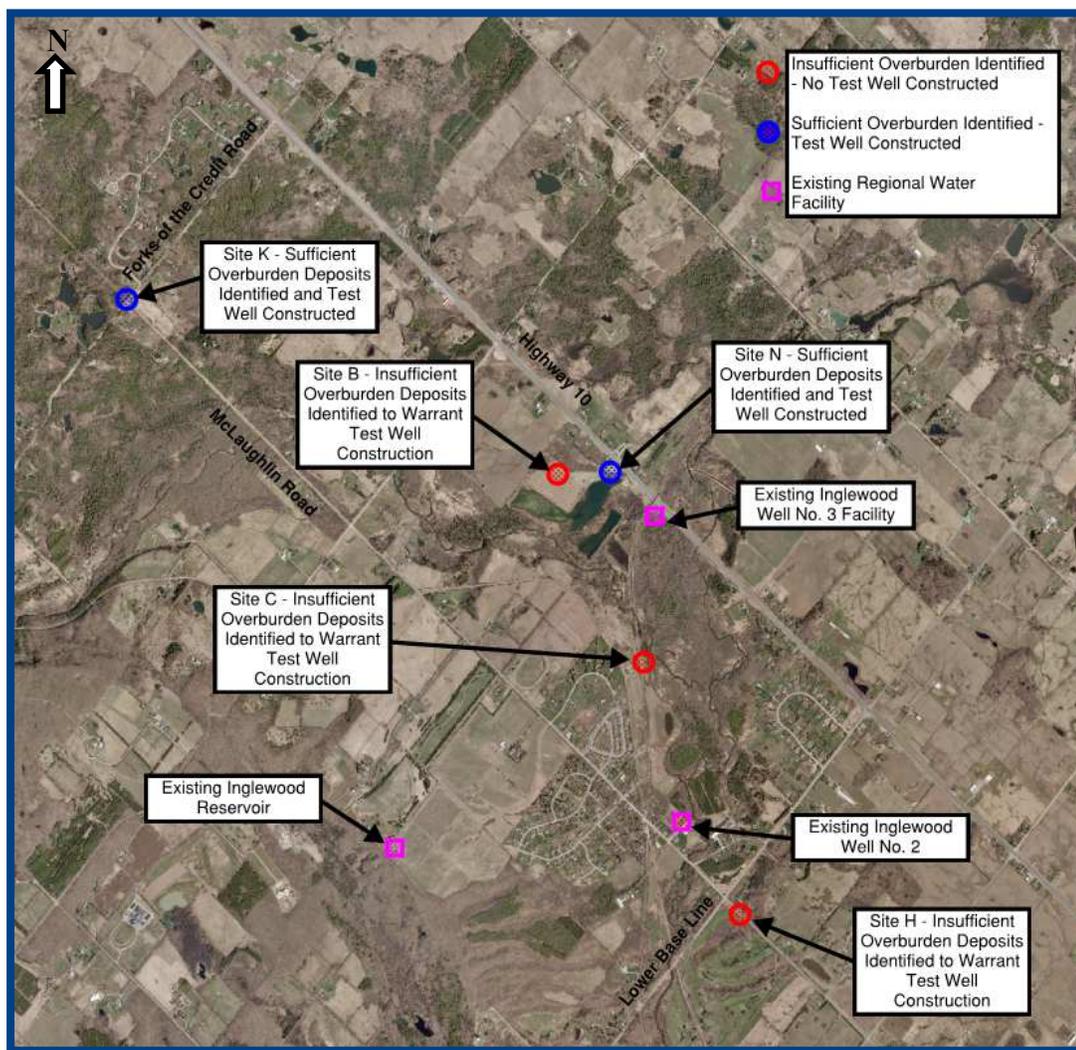


Figure 4-3 Test Well Locations

4.7 Groundwater Exploration Program

The focus of the groundwater exploration program was to examine the buried bedrock valley aquifer complex in the vicinity of the Village of Inglewood and to establish two (2) high yielding deep test wells.

A total of nine (9) potentially viable test well sites were identified and prioritized for drilling. A total of five (5) test holes were drilled until two (2) viable test holes were located:

- Three (3) test holes (Sites B, C & H) failed to identify sufficient coarse grained overburden deposits to warrant the construction of test wells.
- Two (2) test holes (Sites K & N) were successful in encountering sufficient coarse grained overburden (deep aquifer) deposits that warranted the construction of test wells.

4.8 Evaluation of the Short-List of Alternatives

The evaluation criteria and indicators were grouped according to the following six “Factors” (in no particular order) addressing each aspect of the “environment” as defined in the Ontario Environmental Assessment Act (EAA):

- Water Supply Factors
- Economic Factors
- Technical Factors
- Social Environment and Land Use Factors
- Agricultural Policies and Legislation Factors
- Natural Environment Factors

The criteria were developed by the Project Team for each criterion within the six “Factors” in order to provide a clear method of identifying and measuring the potential effects on the environment associated with each criterion for each alternative. The Criteria for evaluating of the Alternatives are documented in Table 4-1 below and the evaluation of the alternative solutions is found in Table 4-1 below.

Table 4-1 Evaluation Criteria

WATER SUPPLY	Sustainable Capacity
	Water Quality
	Groundwater Interference
	Surface Water Interference
ECONOMICS	Costs Relating to Operations & Maintenance and Infrastructure
	Property Acquisition

TECHNICAL	Constructability
	Maximize Use of Existing Infrastructure
	Reliability
SOCIAL ENVIRONMENT AND LAND USE	Socio-Economic
	Agricultural and Cultural Heritage
AGRICULTURAL POLICIES AND LEGISLATION	Oak Ridges Moraine and Greenbelt
	Source Water Protection
	Niagara Escarpment Commission
NATURAL ENVIRONMENT	ANSI and ESA/Core Areas
	Wetlands and Watercourses
	Species at Risk

Based on the Criteria presented in Table 4-1, the short-listed alternatives (including their associated watermains and other associated infrastructure required for implementation) were evaluated from least preferred to most preferred. A qualitative/comparative evaluation process was utilized to determine the alternative with the least adverse effects. Evaluations were primarily based on the professional expertise of the project team.

A summary of the key aspects of the short-listed alternatives is provided as follows:

4.8.1 Site N (Alternative D1) – Test Well N-2014 (TWN-14)

TWN-14 was drilled on the south side of the Ken Whillans Resource Management Area north service entrance, approximate 50 m west of Highway #10.

- Completed to a depth of 58.5 m below ground level
- Tested capacity of 2,304 m³/day
- Concluded to be Non-GUDI
- Treatment required for iron levels (0.319 to 0.333 mg/L) which are slightly above the Ontario Drinking Water Standards Aesthetic Objective of 0.3 mg/L. Detailed test results are included in the Groundwater Development Program Report included in Appendix E
- Potential Watermain Routes (Refer to
- Figure 4-4 below):
 - Approximately 400m of New 150mm Watermain to Existing Well #3 Treatment Facility
 - Power and control systems to be integrated with Well #3 Treatment Facility

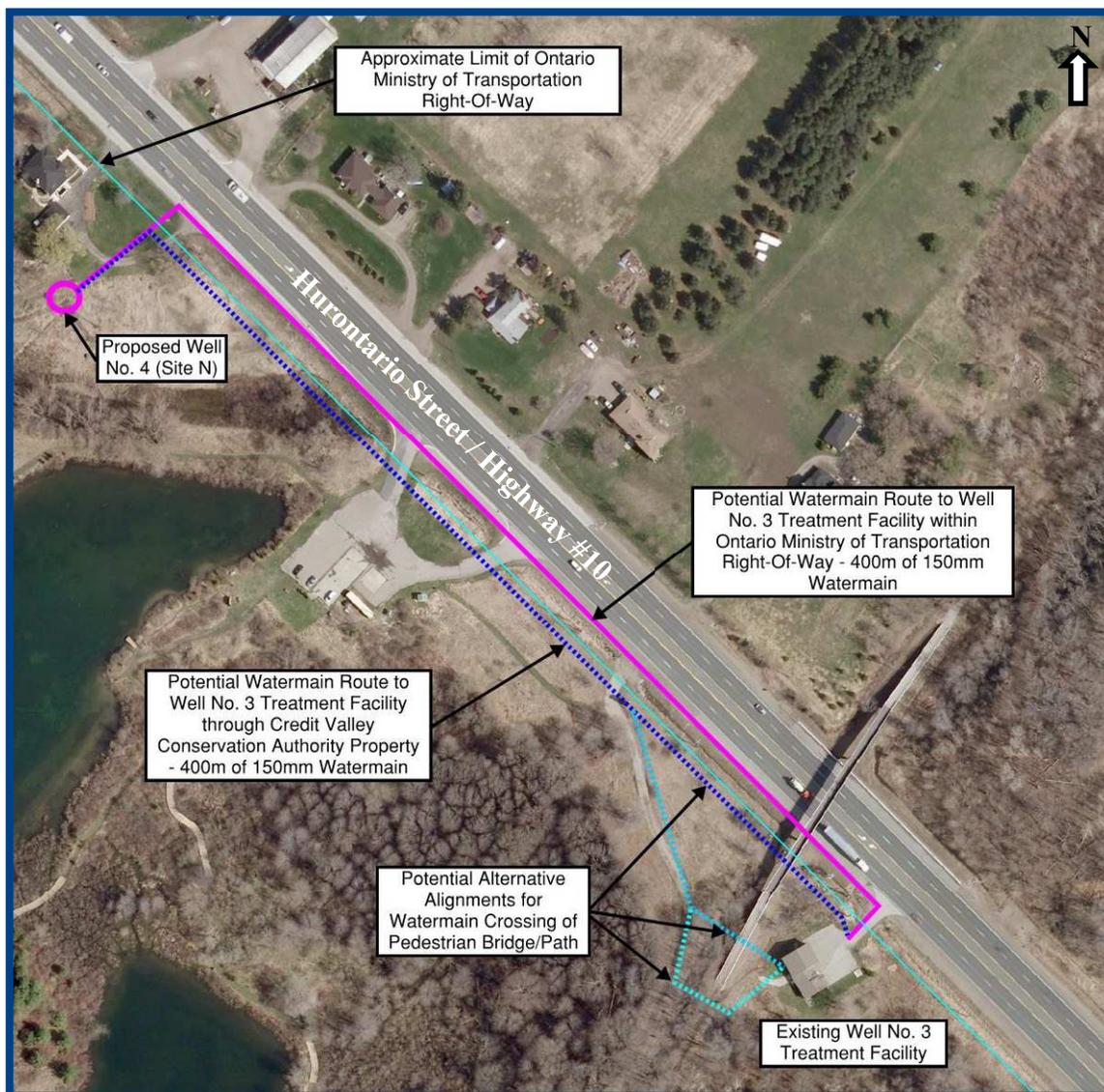


Figure 4-4 Potential Watermain Routes for Site N

4.8.2 Site K (Alternative D2) – Test Well K-2015 (TWK-15)

TWK-15 was drilled on the east side of the Cedar Road, approximate 10 m north of the Forks of the Credit Road.

- Completed to a depth of 64.0 m below ground level
- Tested capacity of 1,440 m³/day
- Concluded to be Non-GUDI
- Treatment required for iron levels (0.340 to 0.438 mg/L) which are slightly above the Ontario Drinking Water Standards Aesthetic Objective of 0.3 mg/L. Detailed test results are included in the Groundwater Development Program Report included in Appendix E
- Potential Watermain Routes (Refer to Figure 4-5 below):

August 2016

- Option 1: Approximately 4,600m of New 150mm Watermain to Existing Well #3 Treatment Facility
 - New power and control systems will be independent of Well #3 Treatment Facility
- Option 2: Approximately 3,500m of New 150mm Watermain to Existing Inglewood Distribution System
 - New Treatment Facility will be required. No integration with existing Well #3 Treatment Facility

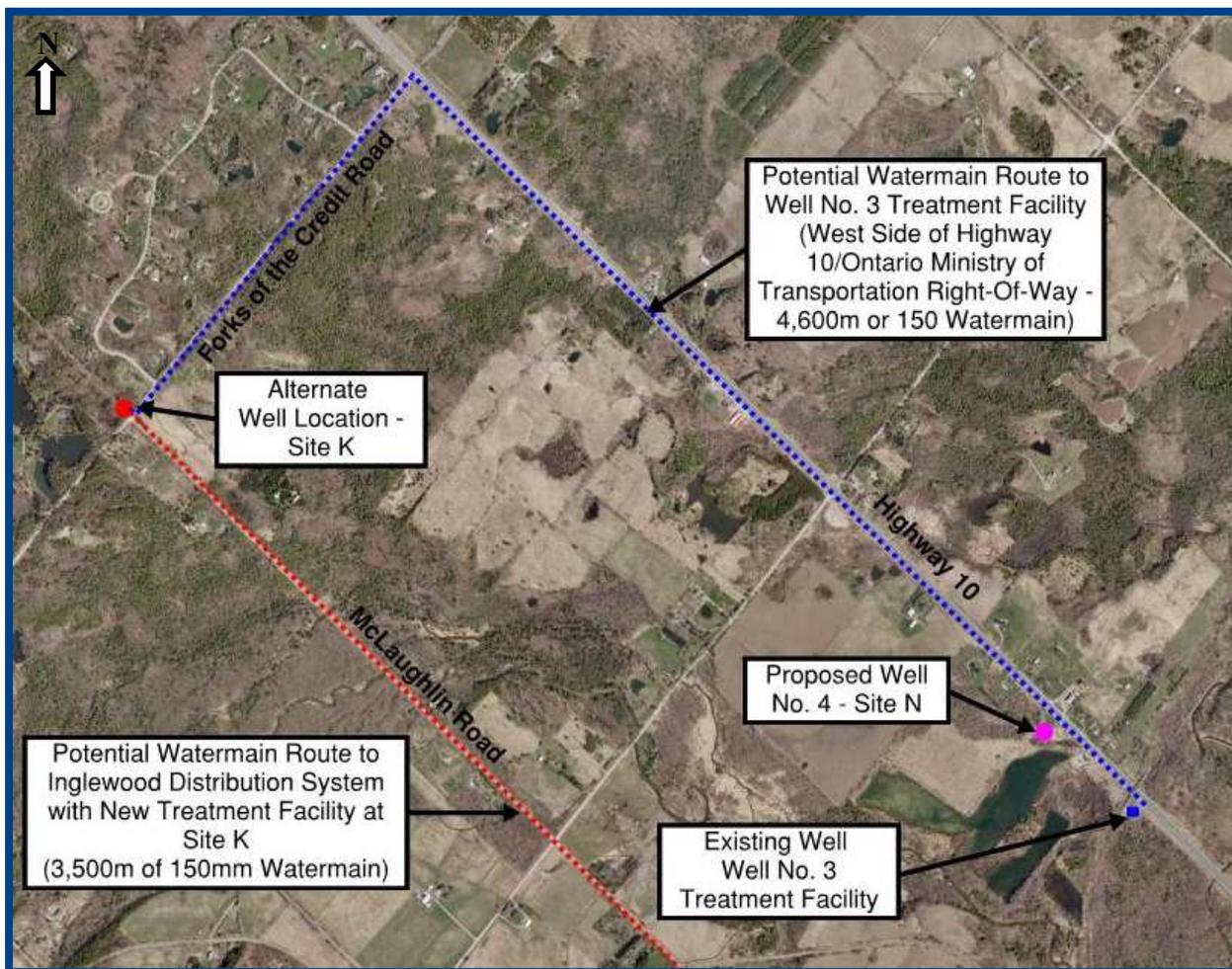


Figure 4-5 Potential Watermain Routes for Site K

4.8.3 Evaluation of Alternatives

Table 4-2 and Table 4-3 below provide a summary of the evaluation results with the detailed evaluation provided in Appendix A. The symbols in the tables provide a graphical representation of the relative level of potentially adverse effects with the “Least Preferred” representing a “high” level of potentially adverse effects and “Most Preferred” representing a “low” level of potentially adverse effects.



Table 4-2 Evaluation Summary for Site N

Criteria	Analysis	Item Score
Water Supply		
Sustainable Capacity	Sustainability of required capacity of 900 L/min is confirmed through field testing	
Water Quality	Water quality meets objectives	
Groundwater Influence	There are # private wells within the area.	
Surface Water Influence	It was determined through field testing that the well is not under direct influence of Surface Water	
Technical		
Constructability	No watercourse or wetland crossing	
Maximize Use of Existing Infrastructure	Short distance of WM. Able to connect to existing Well #3 treatment facility with limited capacity improvements required	
Reliability	Relatively short length of watermain	
Natural Environment		
ANSI and ESA/Core Areas	Site is adjacent to provincially significant wetlands (PSWs), unevaluated wetlands, fish habitat, woodlands and ANSIs.	
Wetlands and Watercourses	No watercourse crossings. Alignment of watermain will be within the vicinity of wetlands	
Species at Risk	There is the potential for species at risk to be located within the vicinity of the proposed works. No SARs were observed during the site visit	
Social Environment and Land Use		
Socio-Economic	Watermain route is proposed to be within or adjacent to the ROW. Watermain construction will temporarily limit access to Resource Management Park	
Archeological and Cultural Heritage	No registered archeological sites or cultural heritage resources. Stage 2 Archeological investigation will be required to confirm that there is no archaeological potential.	

August 2016

Criteria	Analysis	Item Score
Agricultural Policies and Land Use		
Oak Ridges Moraine and Greenbelt	Watermain portion is partially situated within the Natural Heritage System where the existing pump-house is located	
Niagara Escarpment and Commission	Well and watermain are within the NEC plan area	
Source Water Protection	Well location is within the same aquifer and area as the existing Well #3. Source protection plans for the area are in effect	
Economic		
Costs Relating to Operations & Maintenance and Infrastructure	Due to short length of the watermain and the use of the existing Well #3 treatment facility the costs related to O&M will be relatively low.	
Property Acquisition	Easements will be required along the watermain route	
Ranking		1

Table 4-3 Evaluation Summary for Site K

Criteria	Analysis	Item Score
Water Supply		
Sustainable Capacity	Sustainability of required capacity of 900 L/min is confirmed through field testing	
Water Quality	Moderate levels of Iron	
Groundwater Influence	There are a number of private wells within the area.	
Surface Water Influence	Initial pump tests show limited to no impact on surface water	

Criteria	Analysis	Item Score
Technical		
Constructability	Two (2) watercourse crossings and no wetland crossing	
Maximize Use of Existing Infrastructure	Relatively long distance of WM. Able to connect to existing Well #3 treatment facility with limited capacity improvements required	
Reliability	Relatively long length of watermain	
Natural Environment		
ANSI and ESA/Core Areas	Site is adjacent to provincially significant wetlands (PSWs), unevaluated wetlands, fish habitat, woodlands and ANSIs.	
Wetlands and Watercourses	There are two (2) watercourse crossings along the alignment. Alignment of watermain will be adjacent to wetlands	
Species at Risk	There is the potential for species at risk to be located within the vicinity of the proposed works. No SARs were observed during the site visit	
Social Environment and Land Use		
Socio-Economic	Watermain route is proposed to be within road ROW. Construction will potentially cause temporary traffic restrictions. Watermain construction will temporarily limit access to Resource Management Park	
Archeological and Cultural Heritage	No registered archeological sites or cultural heritage resources. Stage 2 Archaeological investigation will be required to confirm that there is no archaeological potential.	
Agricultural Policies and Land Use		
Oak Ridges Moraine and Greenbelt	Site K is mapped as being fully within the Natural Heritage System of the Greenbelt Plan	
Niagara Escarpment and Commission	Well and watermain are within the NEC plan area	
Source Water Protection	A new Source Protection Plan will be required for this site	

August 2016

Criteria	Analysis	Item Score
Economic		
Costs Relating to Operations & Maintenance and Infrastructure	Due to length of the watermain and the use of the existing Well #3 treatment facility the costs related to O&M will be relatively moderate. The capital costs for the installation of the watermain will be relatively high due to the length	
Property Acquisition	Easements will be required along the watermain route and within the vicinity of the well	
Ranking		2

Based on the evaluation, Site N has several key advantages over Site K that lead to it being the preferred alternative with the least potential negative impacts. A comparison of the evaluation of the sites relative to the six key criteria is summarized as follows:

- **Water Supply**
 - Both Site N and Site K can provide sustainable water supplies of acceptable water quality and are non-GUDI.
 - *There is no significant difference between the alternatives with regard to water supply.*
- **Technical**
 - The primary technical difference between Site N and Site K is that Site K will require a significantly longer watermain to be constructed to connect it to the Well #3 facility.
 - Two (2) additional water crossings would also be required for the Site K watermain (fewer watercourse crossings is preferred).
 - *Site N is therefore preferred relative to Site K with regard to the technical criteria.*
- **Natural Environment**
 - Two (2) additional water crossings would also be required for the Site K watermain (fewer watercourse crossings is preferred).
 - Both will require the wells and associated watermains to be constructed adjacent to wetland areas, ANSIs, woodlands and fish habitat. Slight preference for Site N due to the reduced length of watermain required.
 - Due to the overall length of watermain required, Site K has the great potential for negative effects in the natural environment.
 - *Site N is therefore preferred relative to Site K with regard to the natural environment criteria.*
- **Social Environment and Land Use**
 - Both alternatives have no registered archeological sites or cultural heritage resources. A Stage 2 Archaeological investigation will be

August 2016

- required to confirm that there is no archaeological potential for both alternatives.
- The watermain routes for both alternatives are proposed to be within or immediately adjacent to the existing ROW. Construction will potentially cause temporary traffic restrictions along the routes. Watermain construction will temporarily limit access to Resource Management Park. Due to the length of watermain required for Site K, Site N is slightly preferred with regard to construction impacts.
 - *Site N is therefore slightly preferred relative to Site K with regard to the Social Environment and Land Use criteria.*
- **Agricultural Policies and Legislation**
 - Site K is mapped as being fully within the Natural Heritage System of the Greenbelt Plan. Only a short section of the watermain required for Site N will be located within the Natural Heritage System of the Greenbelt Plan. Therefore, Site N is therefore slightly preferred relative to Site K.
 - For both alternatives, the well and watermain are within the NEC plan area. Slight preference for Site N due to the reduced length of watermain required.
 - Site K will require a new Source Protection Plan. Site N is located within the same aquifer and area as the existing Well #3. Source protection plans for the area are in effect. Therefore, Site N is preferred in relation to source water protection.
 - *Site N is therefore preferred relative to Site K with regard to the Agricultural Policies and Legislation criteria.*
 - **Economic**
 - The primary economic difference between Site N and Site K is that Site K will require a significantly longer watermain to be constructed to connect it to the Well #3 facility, resulting in significantly higher capital costs.
 - Operations and maintenance costs will be comparable given that both alternatives will utilize the existing Well #3 facility for treatment.
 - Property acquisition will be required for both alternatives although Site K may involve multiple property owners whereas Site N has the potential to be implemented with the involvement of a single property owner.
 - *Site N is therefore preferred relative to Site K with regard to the economic criteria.*

Therefore, based on the evaluation Site N was carried forward for further testing and investigation.

5. WELL TESTING RESULTS

The focus of the Well Replacement Program was to construct a new well within the buried bedrock valley aquifer complex as close as possible to the Village of Inglewood water distribution system. A total of five test wells were drilled from October 2014 to January 2015. Three test holes failed to identify sufficient overburden deposits to warrant the construction of a test wells and these test holes were abandoned. Two test wells encountered significant groundwater resources:

- Test Well N (TWN) at the Ken Whillans Resource Management Area and;
- Test Well K (TWK) near the intersection of McLaughlin and Forks of the Credit Roads.

Based on the results of the groundwater exploration program, it was recommended that the new well be installed at the site of Test Well N (TWN) due to its proximity to the existing Village of Inglewood water distribution system. Well Initiatives Limited was retained by the Region of Peel Region to install a new well (referred to as Well #4) with the potential to be utilized as a new municipal well (if it qualifies) at a location 9 m south of TWN on the Ken Whillans Resource Management Area. The installation and testing of Well #4 was completed during October and November 2014. The new well is a 200 mm (8 inch) diameter natural pack well with 2.7 m (9 feet) of 90 slot screen from 57.0 to 59.7 m below grade. Refer to the “Well Construction Program Village of Inglewood – Well #4”, dated May 26, 2016 prepared by Geo Kamp Limited in Appendix E for additional information.

Based on well depths, geology and background monitoring, it is inferred that the Inglewood Well #3 aquifer is unconfined to semi-confined at Well #3 and semi-confined near Well #4. The downward hydraulic gradients suggest that the aquifer is potentially recharged in the vicinity of Well #3, thus influencing groundwater levels at all depths. The weight of the recharge precipitation affects the aquifer pressure in more confined areas.

Step drawdown tests were completed on Well #4 on October 23, 2015 in order to estimate well yields for the aquifer performance test. An 18-day aquifer performance test from October 26 to November 13, 2015 was completed with Well #4 at a rate of 900 L/min to obtain factual data about the well performance of Well #4. A combined aquifer performance test was carried out with Well #3 and Well #4 at both 900 L/min from November 16 to 20, 2015. During all the tests, the discharge water from Well #4 was piped to the Credit River located approximately 1,000 m to the west and the discharge water from Well #3 was piped 500 m to the south to the Little Credit River to make certain that the pumped water was not recirculated or influenced water levels.

Monitoring for interference was examined at 58 locations to address potential ground water and surface water concerns. Automated water level recorders were installed at all locations. Water level data was also collected by manually measuring all wells to verify automated water level measurements. The following is a summary of the 58 locations:

- Pumped well (Well #4)
- One production well (Well #3)
- 16 monitoring well locations (test/observation wells and boreholes)
- 15 shallow ground water stations (drive points)
- 8 surface water locations (staff gauges) and;
- 17 local domestic wells

The CVC was concerned about potential impacts on surface water features with regard to the Well #4 aquifer performance test and as such a number of new surface water features were established for monitoring (this was in addition the already existing 23 surface water/drive point locations and is included in the 58 locations listed above). Further to a meeting with the CVC in September 2015 and a follow up field inspection in October 2015, four new CVC monitoring features were established:

- Credit River:
- Kidd Pond Wetland:
- Wetland/Organics area located East of Well #3
- Orchard Pond Monitoring Wells

Based on the drawdown observed with the two aquifer performance tests, interference generally depends on well depth and the horizontal distance from Well #3 and Well #4. The interference is also more influenced by the volume pumped rather than the duration of the pumping test. A distance-drawdown curve, based on water levels near the end of the four-day combined aquifer performance test suggests that the cone of influence is irregular in shape but may extend to a distance of 800 m, along the axis of the buried valley aquifer complex (from Well #4). The cone of influence appears to extend beyond the Orchard Pond because interference was observed in the deeper wells on either side of this surface water feature. The drawdown observed suggests that developed aquifer is at Well #4 semi-confined because shallow groundwater drawdown was observed but the cone of influence extended past the recharge boundary of these surface water features.

Generally, it appears that wells completed at higher overburden elevations experienced less interference as compared to wells completed to deeper depths. Overall, there was no more than 0.6 m of drawdown in the domestic wells monitored with the exception of the Ford 4-Inch well (domestic well) which experienced up to 1.95 m drawdown because this is a deep wells located along the axis of the buried bedrock valley about 180 m from Well #4. The drawdown

at the Ford 4-Inch well is not considered serious because there is sufficient available drawdown in this well to operate adequately with the observed drawdown (and the well is not in service). In view of the available drawdown in the other domestic wells monitored, it is considered that no significant interference will occur within existing domestic wells as a consequence of the combined operation Well #3 and Well #4.

5.1 Water Quality

Water samples collected during aquifer testing of Well #4 were submitted to Agat Laboratories for water quality analyses. Water samples were collected at 3.5 hours, one day, eight days, 15 days and 18-days after the pump start up and submitted for general water quality. Water samples were collected from Well #4 at the end of the test and submitted for the entire suite of the ODWS (Ont. Reg. 169/03), except for bromate, chloramines, dioxins and furans and microcystin-LR. The concentrations of parameters for which analyses were completed are within the Ontario Drinking Water Standards (Ont. Reg. 169/03), except for hardness in all samples collected and iron in the 15 and 18-day samples.

The hardness concentration reported, ranging from 187 to 193 mg/L in the samples collected, exceed the ODWS (operational guideline) of 80 to 100. This operational guideline is established to ensure efficient treatment of the water (predominantly in surface water treatment plants). Elevated hardness is common in groundwater supplies and is not generally considered an issue.

The iron concentration reported of 0.319 mg/L (15 days) and 0.333 mg/L (18-days), exceeds the ODWS of 0.3 mg/L (aesthetic objective). Iron levels in excess of this Standard may cause stains on plumbing fixtures and laundry, as well as undesirable tastes and odours. Elevated iron is common in groundwater supplies and is and aesthetic objective.

The Ontario Drinking Water Standard (aesthetic) for sodium is 200 mg/L. Sodium levels exceeding 20 mg/L may be of interest or concern to health authorities who wish to prescribe sodium restricted diets for patients. The sodium levels of 22.9 to 26.1 mg/L at Well #4 exceed the low sodium restriction.

5.2 GUDI Assessment

Given that Well #4 is a new well, there is no historical microbiological water quality available (except for zero total coliforms at the end of 18-day pumping test). Based on the Well #3 historical raw bacteriological information (five years of weekly samples), the raw water from Well #3 does not exhibit microbiological evidence to suggest contamination by surface water (Well #4 is part of the same aquifer complex).

There is also no long term turbidity information available except for field turbidity measurements that indicate that the well is not sand/turbidity free at pump start up but is essentially sand and turbidity free after 8 minutes of pumping. The turbidity was less than 1 NTU during the 18-day aquifer performance test and did not appear to fluctuate. It is expected that Well #4 will yield sand and turbidity free water with normal operational use.

Well #4 is located approximately 65 m from the Orchard Pond and groundwater flow calculations suggest that it could take approximately 53 days for the Orchard Pond water to reach Well #3 (if directly captured). Although interference was observed within the shallow groundwater (water table), this interference is not indicative of directly capturing surface water. It is concluded that Well #4 is not GUDI because:

- It could take up to 53 days for Orchard Pond surface water to reach Well #4 (if directly captured);
- There was no observable response to the Well #4 18-day aquifer performance test at DP3-02, SG3-02 and Orchard Pond MW-s (which are located at the Orchard Pond) and;
- The cone of influence extended past the recharge boundary of the Orchard Pond.

Refer to the “Well Construction Program Village of Inglewood – Ing #4”, dated May 26, 2016 prepared by Geo Kamp Limited in Appendix E for additional information.

5.3 Credit Valley Conservation Authority - Environmental Impact Study

As a key stakeholder, the Credit Valley Conservation Authority (CVC) identified two primary areas of concern:

- Hydrogeological Concerns; and
- Ecological Concerns.

The results of the well testing program were summarized in a “Preliminary Draft Hydrogeologic Report” completed by Geo Kamp Limited and dated January 22, 2016 (Refer to Appendix E).

In view of ecological concerns, the CVC completed an Environmental Impact Study (EIS), based on the results of the October to November 2015 aquifer testing. A draft copy of the Credit Valley Conservation, Inglewood Well 4, Environmental Impact Study, Draft Report, March 2016, is provided in Appendix E.

Based on a review of the TWN aquifer testing (Test Drilling Report, Geo Kamp Limited, September 3, 2015) the CVC selected a study area of approximately 848 hectares that extended to the following major roads:

- The Grange Sideroad;
- McLaughlin Road;
- Olde Baseline Road; and
- Kennedy Road

The CVC EIS identified Designated Features (within the study area) that included:

- Region Of Peel Greenlands System;
- Niagara Escarpment Plan;
- Oak Ridges Moraine Greenbelt Plan;
- Areas Of Natural And Scientific Interest (ANSI)
- Significant Wetlands;
- Other Wetlands;
- Environmentally Significant Areas;
- Town Of Caledon Environmental Policy Area; and
- Credit River Watershed Natural Heritage System.

The CVC EIS also included summary of Land Use and Natural Vegetation that covered the following categories:

- Land Use;
- Aquatic Ecosystems (Streams, Rivers, Lakes and Ponds);
- Wetlands; and
- Woodlands: Forests, Plantations and Regeneration

The CVC then completed an inventory of the Flora and Fauna as per the above noted Designated Features and Land Use with regard to:

- Flora;
- Fauna;
- Significant Species;
- Fish Habitat; and
- Wildlife Habitat.

Based on the inventory of the Flora and Fauna as per the above noted Designated Features and Land Use, the CVC completed an Ecological Assessment of Hydrologically Sensitive Natural Heritage Features regarding the following topics:

- Hydrologic Risk Assessment;
- Community Risk Assessment;
- Vegetation Risk Assessment;
- Orchard And Kidd Pond Vulnerability;
- Species At Risk Vulnerability; and
- Fish & Fish Habitat Vulnerability.

In order to assess the impact of hydrologic alteration associated with the operation of Well #3 and 4, both the observed and inferred drawdowns were used to assess the vulnerability of each significant natural heritage feature to the specific amount of hydrologic alteration. Each feature's vulnerability (or the risk of producing impacts) was assessed based on the magnitude of hydrologic change expected, the relationship of the community's current hydrologic characteristics (soil moisture regime) to known hydrologic thresholds, and the feature's sensitivity to that type and level of change.

Overall, the community risk assessment shows that there is a low risk of the proposed Well #4 producing negative impacts on the ecological composition, structure and function of most of the natural features within the shallow zone of influence. A couple of features may be impacted if Well #4 was operated at 900 L/min for extended periods of time. There may be a moderate risk of negatively impacting a Willow Mineral Thicket Swamp, based on the amount of observed drawdown, the current characteristic of the wetland's hydrologic regime (soil moisture regime), and the species associated with the community. Under this scenario, some localized wetland loss could occur, but the wetland should still persist; however, there may be some notable alteration of species abundance and distribution over time. The Willow Mineral Thicket Swamp is part of significant valleylands, significant wildlife habitat, and likely part of the significant Forks of the Credit Wetland Complex.

A hydrologic risk assessment was conducted on two wetland communities within the shallow zone of influence where there was sufficient pre-existing baseline hydrologic information. Feature 14 is a Willow Mineral Thicket Swamp, and a Swamp Maple Mineral Deciduous Swamp. Both wetlands are part of significant valleylands, significant wildlife habitat, and likely part of the significant Forks of the Credit Wetland Complex. The hydrologic risk assessment shows that the operation of Well #4 at 900 L/min for extended periods of time could produce low to moderate risks of negatively impacting the ecological composition, structure and function of these wetland communities. It is important to recognize that the pump test was carried out during a period when groundwater levels are normally rising (except for fall 2015) and the pumping of Well #4 produced results where groundwater levels were moving in the opposite direction (i.e. falling). Due to the connection between the groundwater system and surface water, these impacts may be more significant because of the effects of the groundwater drawdown on the hydroperiod of the wetland.

Under the scenario where Inglewood Wells 3 and 4 are each pumped simultaneously at 900 L/min for extended periods of time, half of communities where soil moisture regime data is available would be at moderate to high risk of negative impacts on their ecological composition, structure and function according to the community risk assessment. A moderate risk scenario could produce some localized loss of wetland within the feature; however, the wetland should still exist with some notable alteration of species abundance and

distribution. High risk scenarios are of the magnitude to produce hydrologic conditions that are not known to support wetlands. This would result in a loss of all or most of the wetland and its obligate wetland species. Results of this pump test indicate that Inglewood Well #3 exerts a greater influence on the wetlands than Well 4. Well #3 has been in operation since 1995, and there is evidence in the vegetation composition and structure to suggest that this well may already be impacting the wetlands associated with the significant Inglewood Lowlands and Forks of the Credit Wetland Complexes. Depending on the details of its operation program, the development of Well #4 may provide opportunities to reduce the hydrologic pressures on these wetlands.

The Ontario Ministry of Natural Resources and Forestry have identified species at risk in the study area including, Barn Swallow, Bobolink, Butternut, Canada Warbler, Eastern Meadowlark, Eastern Snapping Turtle, and Eastern Wood Pewee. The Ministry has also noted the likelihood of Eastern Small-footed Myotis, Little Brown Myotis and Northern Myotis occurring in the area. CVC has additional records for species at risk in the area including, Monarch, Eastern Milk Snake, Bank Swallow, and Western Chorus Frog. Based on the observed hydrologic response to the pump tests and the sensitivity of these species and their habitats, there is a low risk of negatively impacting these species or their habitats. However, Western Chorus Frog has been heard in this area and could be vulnerable to hydrologic alterations, but the exact location of this species occurrence is not known. Also, Western Chorus Frog has been listed federally as threatened, but not provincially.

Some of the wetlands discussed above are part of significant woodlands and valleylands, so the assessments above also apply to these significant natural heritage features. No impacts on fish habitat are anticipated. With regards to significant wildlife habitat, the observed hydrologic response is not expected to impact most SWH functions in the shallow zone of influence. However, both pumping scenarios (i.e. Well #4 only, and Well #3 and Well #4 together) could negatively impact the habitat of terrestrial crayfish. Also, there is some uncertainty of the ability of both scenarios to negatively impact probable significant woodland amphibian breeding habitat, but there is potential for impacts. More information on the amphibian population would be required.

The environmental impacts assessment was based on two pump tests where the pumps were operated at a rate of 900 L/min continuously for extended periods of time. The assessment shows that operating these wells under these parameters would produce varying levels of negative impacts on the ecological composition, structure and function of some of the significant natural heritage features within the shallow zone of influence. However, as previously noted, this is not reflective of normal operating conditions for the Inglewood Wells. Reducing the rate, duration, and timing of pumping should reduce existing and potential hydrologic impacts on the significant natural features.

In summary, the pumping of Well #4 at 900 L/min appears to be a low to moderate risk regarding environmental features. As such, it appears that the CVC is prepared accept the replacement of Well #2 with Well #4. However, the combined pumping of Well #3 and Well #4 both at 900 L/min may present a higher risk for some environmental features. This issue was discussed in detail with the CVC and MNR and it is anticipated that these risks can be mitigated through operational strategies for these wells. It is recommended that further discussions during the implementation phase of the preferred alternative be undertaken between CVC, MNR and the Region regarding the development of operational strategies for the operation of these wells to mitigate the associated risk.

6. Public and Agency Consultation

6.1 General

Public consultation is a key component of the Class Environmental Assessment process. The primary method for public consultation adopted for this study was a Public Information Centre (PIC). The PIC provides residents/stakeholders with an opportunity to meet the Project Team review the project scope and provide input related to the project.

The following provides a summary of the key points of contact with the stakeholders and the public for this study:

- Notice of Study Commencement
- Stakeholder Contact/Consultation
- Notice of Public Information Centre
- Public Information Centre Notice of Study Completion (30 Day Review Period)

6.2 Public and Agency/Stakeholder Notification

The Notice of Commencement was published in October 2015 and is available on the Region's website (<http://www.peelregion.ca/pw/water/enviro-assess/inglewood-well.html>). A listing of Agencies and Stakeholders that were identified as potentially having an interest in this project is provided in Appendix B. Each Stakeholder/Agency identified and "and the residents located in the existing well head protection areas for Inglewood Well #2 and #3 were sent a copy of the Notice of Commencement, the Notice of Public Information Centre and the Notice of Study Completion.

Notice was provided through the following sources:

Table 6-1 Notice Publication Dates

Notice	Dates	Publication/Website
Notice of Study Commencement	October 2015	www.peelregion.ca
	October 22, 2015 September 24, 2015	Caledon Enterprise Caledon Citizens
Notice of Public Consultation Centre (March 3, 2016)	February 18, 2016	www.peelregion.ca
	February 18, 2016 February 18, 2016	Caledon Enterprise Caledon Citizens
Notice of Study Completion	August 25, 2016	www.peelregion.ca
	August 25, 2016 August 25, 2016	Caledon Enterprise Caledon Citizens

August 2016

In addition, the Notice of Commencement, Notice of Public Information Centre and Notice of Study Completion are posted on Peel Region’s website (www.peelregion.ca).

Responses received from the identified Stakeholders and Agencies are included in Appendix C and summarized in Table 6-2 in the following section.

6.3 Responses from Stakeholders, Agencies and Public

The following provides a summary of the key comments/responses received from Stakeholders, Agencies and the Public during the Class EA process.

Table 6-2 Stakeholder Correspondence Summary

Agency	Comment	Response
<ul style="list-style-type: none"> • exp • Neola Investments Ltd. • Brampton Cardio Pulmonary Services • Credit Valley Quarries Co. Ltd. Inglewood Quarry • TRCA 	<ul style="list-style-type: none"> • Interested in being involved with the environmental assessment study for the new municipal well for Inglewood. 	<ul style="list-style-type: none"> • Hatch included on mailing list for future correspondence.
<ul style="list-style-type: none"> • MTO 	<ul style="list-style-type: none"> • Any work that is within the ministry’s permit control area will require permits, as well as site plan review and approval. 	<ul style="list-style-type: none"> • Hatch noted and will complete as necessary.
<ul style="list-style-type: none"> • MOECC 	<ul style="list-style-type: none"> • Requested to review the draft Report before filing. 	<ul style="list-style-type: none"> • Hatch noted as requested.
<ul style="list-style-type: none"> • Residents of Inglewood 	<ul style="list-style-type: none"> • Interested in the project, requested for additional information. 	<ul style="list-style-type: none"> • Hatch included on mailing list for future correspondence.
<ul style="list-style-type: none"> • Mississauga of the New Credit First Nation 	<ul style="list-style-type: none"> • At this time, MNCFN has a low level of concern about the project. Requested to notify MNCFN if there are any changes to the project which may impact MNCFN’s interests. MNCFN requests a copy of all associated environmental and/or archaeological reports. MNCFN employs Field Liaison Representatives who must be on location whenever any fieldwork for environmental and/or archaeological assessments is undertaken. 	<ul style="list-style-type: none"> • Hatch noted and will be included on mailing list for future correspondence.

Agency	Comment	Response
<ul style="list-style-type: none"> Hiawatha First Nation 	<ul style="list-style-type: none"> Proposed project is deemed to have little, if any, impact on Hiawatha First Nation's traditional territory and/or rights. Requested to be kept up to date with progress of the project. Requested to forward any archaeological reports to Hiawatha First Nation as they are completed. Any maps pertaining to the project should be sent to Hiawatha First Nation in a shape file. 	<ul style="list-style-type: none"> Hatch noted and will be included on mailing list for future correspondence.
<ul style="list-style-type: none"> TRCA 	<ul style="list-style-type: none"> Noted that TRCA staff received the Notice of Public Information Centre for the Inglewood Municipal Well Class EA on March 1, 2016. Staff were unable to attend meeting, but requested for a PDF copy of handouts and display materials, with drawings pre-scaled to print on 11"x17" pages: via discs, e-mail (if <2.5MB), FTP sites (if posted for at least 2 weeks). 	<ul style="list-style-type: none"> Hatch noted and will be providing information.
<ul style="list-style-type: none"> Resident of Inglewood 	<ul style="list-style-type: none"> Water supply complaint/concern 	<ul style="list-style-type: none"> Geo Kamp Ltd. inspected the well and determined it was related to mechanical features of the well system and not the aquifer impacts on the well.
<ul style="list-style-type: none"> Credit Valley Conservation 	<ul style="list-style-type: none"> Requested for a piezometer to be installed in the Credit River. Requested for a map that shows the extent of the area of the aquifer that is close to the surface. 	<ul style="list-style-type: none"> Geo Kamp Ltd. Responded and provided requested information.
<ul style="list-style-type: none"> Credit Valley Conservation 	<ul style="list-style-type: none"> Requested for 3 specific timeframe-based groundwater contour mapping for 23-day testing period. 	<ul style="list-style-type: none"> Geo Kamp Ltd. Responded and provided requested information.
<ul style="list-style-type: none"> Credit Valley Conservation 	<ul style="list-style-type: none"> CVC Hydrogeology Comments on Inglewood Well #4 Draft Well Construction Report (see attached e-mail sent March 3, 2016). 	<ul style="list-style-type: none"> Geo Kamp Ltd. Responded and provided requested information.

Responses received for the identified Stakeholders and Agencies are included in Appendix C.

In addition, the project team met directly with key Agencies during the Class EA process. These Agencies included:

- The Ministry of Transportation;
- The Town of Caledon;
- The Credit Valley Conservation Authority;
- The Niagara Escarpment Commission; and,
- The Ministry of Natural Resources and Forestry.

6.4 First Nations Consultation

The following First Nations and First Nations Agencies were included in the consultation process (Appendix B):

- Alderville First Nation
- Chippewas of Georgina Island
- Chippewas of Rama
- Curve Lake First Nation
- Hiawatha First Nation
- Huron Wendat First Nation
- Mississaugas of Scugog Island
- Mississaugas of the New Credit First Nation
- Six Nations of the Grand River
- Chiefs of Ontario
- Environment and Community Relations, Metis Nation of Ontario
- Beausoleil First Nation

A copy of the Notice of Commencement and Notice of Public Information Centre were mailed directly to each of the First Nations listed above. In addition, a copy of the Notice of Completion will be mailed directly to the First Nations Stakeholders.

Responses received for the identified First Nations Stakeholders are included in Appendix C.

6.5 Public Information Centre (PIC) Summary

The PIC was held at the Inglewood Community Centre in Inglewood on March 3, 2016 from 6:00 pm to 8:00 pm. It was conducted as an 'Open House' format and both Peel Region Staff and Consultant Staff were available to answer questions and/or discuss the study with the PIC attendees. A total of eleven (11) individuals signed in over the course of the evening which included residents, business owners, the local councillor and a rep for a community group. Comment sheets were provided requesting input on the EA process completed to date. There was one completed comment sheets submitted at or following the

PIC, which only indicated they were satisfied with the project as presented and included no additional comments.

7. Identification of Preferred Solution

Phase 2 of a Municipal Class EA includes the identification of alternative solutions for subsequent evaluation and the establishment of the preferred solution, taking into consideration public and review agency input.

The results of the public and stakeholder consultation support the recommended solution. As a result, the preferred alternative for additional water supply in the Community of Caledon East is Proceed with **Option D, “Construct a New Municipal Well Supply”** as the preferred alternative. These proposed works will include the following:

- A new groundwater protection well (Well #4) at Site N, located approximately 400 m north of existing Inglewood Well #3, west of Highway 10.
- The new well will provide a minimum of 1,295 m³/d (900 L/min) of sustainable water supply capacity.
- Groundwater from Well #4 will be pumped directly to the Inglewood Well #3 facility for treatment.
- Modifications to the existing Inglewood Well #3 treatment facility may be required (i.e., additional filter), which may require an increase in the existing building footprint (i.e., addition) within the existing property limits.
- A watermain will be constructed adjacent (parallel) to Highway 10 through the CVC property (easement required).
- Testing indicates that both existing Well #3 and proposed Well #4 can be operated simultaneously. It is recommended that further discussions during the implementation phase of the preferred alternative be undertaken between CVC, MNR and the Region regarding the development of operational strategies for the operation of these wells to mitigate the risk associated with combined pumping of these wells.

This project file provides for a review of the impact of the proposed work on the natural and socio-economic environment. The review is based on archaeological assessments, natural heritage assessments, environmental reviews, capital cost projections and social impact assessments. The supporting reports and technical memoranda can be found in Appendix E. A summary of the findings is presented below.

7.1 Watermain Route Selection

For Site N, two primary watermain route alternatives were identified: Highway 10 ROW Alignment and the CVC Property Alignment (Refer to Figure 7-1 below).

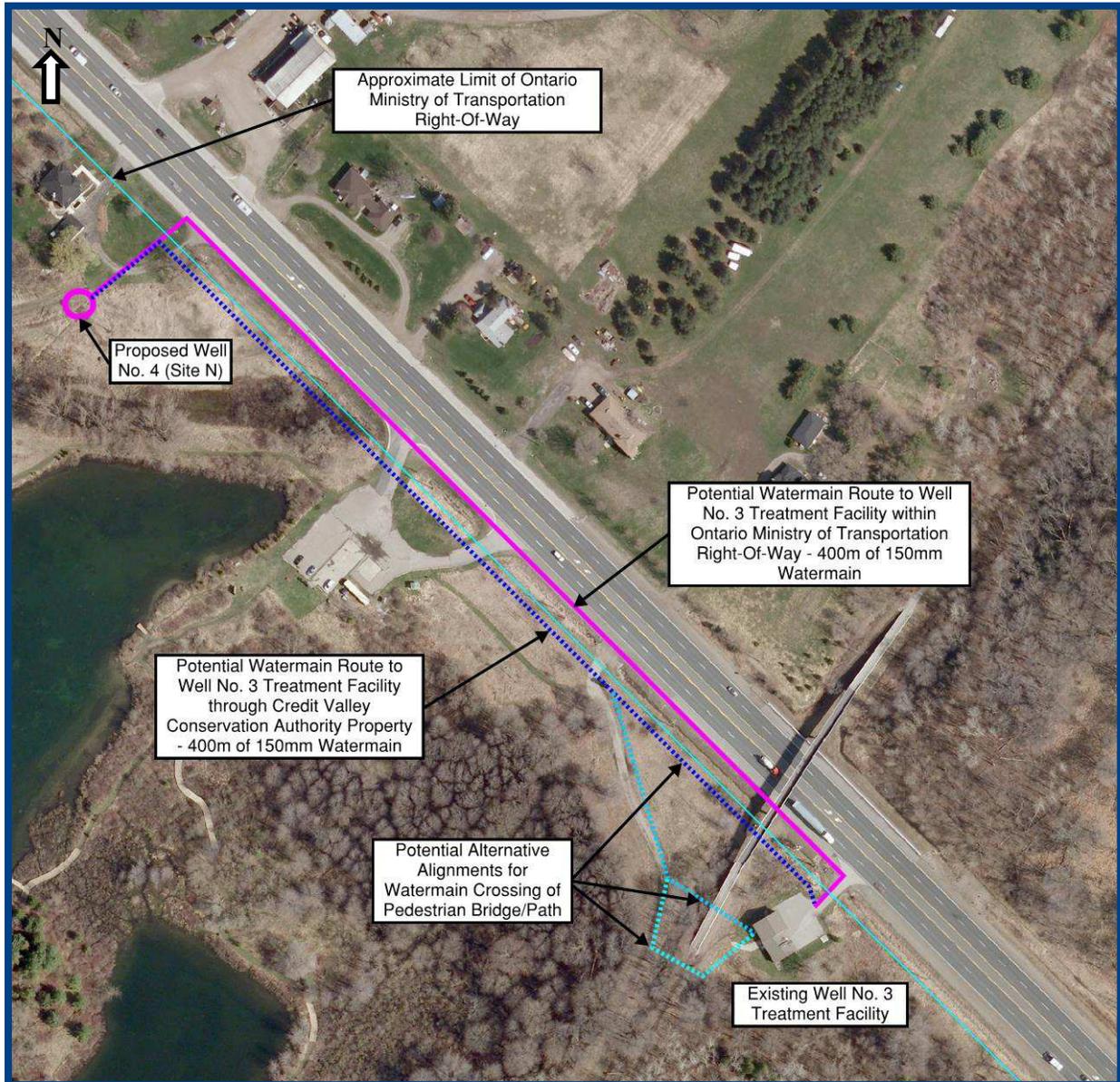


Figure 7-1 Potential Watermain Routes for Site N

The following provides an overview of the evaluation of the alternative alignments:

7.1.1 Highway 10 Alignment

- **Technical**

- Requires approximately 400m (+/-) of watermain to connect to the existing Well #3 facility. For hydraulic performance, there is negligible difference between either alignment.
- CVC were receptive to the use of open cut construction methodologies.
- MTO noted a distinct preference for the use of trenchless technologies for constructing the watermain within the ROW, but did not preclude the use of open cut construction.
- An Encroachment Permit would be required for future maintenance/repair activities within the ROW.
- Alignment may not provide sufficient space for the watermain to be installed below the Caledon Trailway Bridge without disturbing the existing support pier(s) and may require specialized construction methods and potentially increased risk.

- **Property/Access**

- Initial discussions were undertaken with the CVC with regard to the feasibility of installing the proposed watermain within the CVC lands (Ken Whillans Resource Management Area). CVC were receptive to the proposed alignment (east from Well #4 to Highway 10) including the use of open cut construction methodologies.
- Initial discussions were undertaken with the Ontario Ministry of Transportation (MTO) with regard to the feasibility of installing the proposed watermain within the existing ROW of Highway 10 (west side). In principal, the MTO had no objections to the proposed alignment (outside of the traffic lanes). It was noted that both an Encroachment Permit (watermain) and Application for Building and Land Use (Well) would be required. (Note: Access to the watermain within the ROW for future maintenance or repair activities would also require an Encroachment Permit).
- Initial discussions were undertaken with the Town of Caledon with regard to the feasibility of installing the proposed watermain across (below) the existing Caledon Trailway Bridge or the Caledon Trailway. The Town had no objections to the proposed installation, however and Engineers Letter was requested (to be provided during detailed design phase) to confirm that the proposed installation would not impact the existing Bridge.

- **Environment, Social and Archaeological**

- No significant impacts related to the natural environment are anticipated. Potential impacts are general limited to the area

within CVC property and can be mitigated using Best Management Practices (BMPs).

- A portion of the watermain alignment on CVC property will be subject to a Stage 2 Archaeological investigation as it may retain archaeological potential.
- For social impacts, there is negligible difference between either alignment with the impacts generally limited to short-term construction issues.

7.1.2 CVC Alignment

- **Technical**

- Requires approximately 400m (+/-) of watermain to connect to the existing Well #3 facility. For hydraulic performance, there is negligible difference between either alignment.
- CVC were receptive to the use of open cut construction methodologies.
- No MTO Encroachment Permits will be required for future maintenance/repair activities.
- Alignment provides adequate space for the watermain to be installed below the Caledon Trailway Bridge without disturbing the existing support piers and abutment or crossing the trailway further to the west, away from the existing bridge structure (To be determined during Detailed Design), resulting in reduced risk relative to the Highway 10 alignment.

- **Property/Access**

- Initial discussions were undertaken with the CVC with regard to the feasibility of installing the proposed watermain within the CVC lands (Ken Whillans Resource Management Area). CVC were receptive to the proposed alignment (immediately adjacent and parallel to Highway 10) including the use of open cut construction methodologies.
- Initial discussions were undertaken with the Town of Caledon with regard to the feasibility of installing the proposed watermain across (below) the existing Caledon Trailway Bridge or the Caledon Trailway. The Town had no objections to the proposed installation, however an Engineers Letter was requested (to be provided during detailed design phase) to confirm that the proposed installation would not impact the existing Bridge.

- **Environment, Social and Archaeological**

- No significant impacts related to the natural environment are anticipated. Potential impacts are general limited to the natural areas within CVC property and can be mitigated using Best Management Practices (BMPs).

- Portions of the watermain alignment on CVC property will be subject to a Stage 2 Archaeological investigation as it may retain archaeological potential.
- For social impacts, there is negligible difference between either alignment with the impacts generally limited to short-term construction issues.

Based on the above, the proposed CVC Property alignment is preferred to the Highway 10 ROW alignment due to the ability to effectively work with one key property owner, fewer issues associated with future access requirements (i.e., Encroachment Permit not required), ability to utilize open cut construction and reduced risk for the Trailway/Bridge crossing.

7.1.3 Geotechnical Investigation

The purpose of the geotechnical investigation was to explore the subsurface conditions within the project limits by borehole drilling, in-situ testing, and laboratory testing on soil samples. For more information, the Geotechnical Investigation Report can be found in Appendix E.

Soil Conditions for Watermain Installation

The following soil conditions were encountered along the proposed alignment of the raw watermain (CVC Property alignment):

- Borehole 1: Topsoil, Silty Clay (Fill), Sand (Fill), Sand, Silty Clay, Silt
- Borehole 2: Topsoil, Sand and Gravel (Fill), Gravel and Sand, Sand
- Borehole 3: Topsoil, Silty Clay (Fill), Silty Clay, Gravel and Sand, Sand
- Borehole 4: Topsoil, Silty Clay (Fill), Silty Clay, Gravel and Sand, Sand
- Borehole 5: Topsoil, Sand and Gravel, Silty Clay, Gravel and Sand

The soils encountered at this site are considered to be suitable for open cut excavation using trenching and excavating equipment, such as backhoes normally used by contractors for watermain installations.

For pipe embedment, Granular A material should be used and be placed in 150 mm thick loose lifts and uniformly compacted to at least 100% of the materials Standard Proctor Maximum Dry Density (SPMDD) using suitable vibratory compaction equipment. The majority of the fill and native soils are generally considered suitable for reuse as trench backfill provided they are free of topsoil, organic material or other deleterious material, and provided that these soils are approved for use by the Engineer. Trench backfill materials should be placed in maximum 300 mm loose lifts and be uniformly compacted.

In areas where the alignment is located below existing roads, it is recommended that the trench be backfilled with Granular B Type I or Type II compacted to 98% of SPMDD. Elsewhere, the backfill may consist of the excavated soil compacted to 95% SPMDD.

Trench plugs are recommended for placement in the trenches at 50 m intervals (or less) along the full length of the trench, where the invert of the trench is below the water table. The trench plug should be 1 m thick measured along the pipe, and should completely replace the embedment and backfill material.

Groundwater Conditions for Watermain Installation

The unstabilized ground water levels were measured in the boreholes during and upon completion of the drilling operations and this information is reported on the Borehole Logs. The measured unstabilized ground water levels after drilling was complete ranged between 0.5 to 1.5 m below grade. The ground water level is expected to fluctuate seasonally and will be influenced by major weather events.

In general, ground water seepage into excavations made through and within relatively impermeable silty clay soils will be limited and relatively large ground water volumes are not expected. Where cohesionless soils such as sands and silts, and sand and gravel are encountered below the ground water table, higher yields are anticipated.

For ground water discharge due to construction activities, a posting on the Environmental Activity and Sector Registry (EASR) is required for a combined ground water and storm water taking in excess of 50 m³/day. The dewatering volume for a trench measuring 3 m in width and up to 3.5 m deep is estimated to be 11.5 m³/day per metre length of trench.

The Ontario Ministry of Environment and Climate Change (MOECC) requires a short term Permit To Take Water (PTTW) for combined ground water and storm water takings in excess of 400 m³/day. A short term Permit to Take Water (PTTW) will not be required provided that the excavation length is designed to limit the dewatering volume (including precipitation) to less than 400 m³/day.

Soil Chemistry

To assess options for reuse or disposal of excess soils that will be generated during construction, two soil samples were submitted to AGAT Laboratories for chemical characterization with respect to general inorganic parameters including metals, pH, sodium adsorption ratio (SAR) and electrical conductivity (EC).

Based on visual and/or olfactory screening of soil samples, these nominal parameters are analysed when there are no indications of environmental impacts. However, additional sampling/testing will be required during construction to confirm disposal or re-use options.

The analytical results were compared to Table 1 (Residential/Parkland/Industrial/Commercial/Community Property Use) of the MOE Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act, April 15, 2011. Comparison of the test results to the MOE Standard indicates that there are no exceedances of the tested parameters.

7.2 Archaeological Impacts

The Stage 1 archaeological assessment determined that there are no archaeological sites registered within 1km of the proposed Well #4 location and watermain route (CVC property parallel to Highway 10). A review of the geography of the study area suggested that the study area has potential for the identification of Aboriginal and Euro-Canadian archaeological resources, depending on the degree to which soils have been disturbed.

The property inspection determined that the Hurontario Street ROW has been subject to deep and extensive land disturbance. Parts of the Site N (Well #4) location and associated watermain route were also documented to possess previous disturbance as well as low and wet conditions. As such, these lands are considered to not retain archaeological potential. The remainder of the Site N study area including portions of the watermain route, however retain archaeological potential and therefore warrants further archaeological assessment by Stage 2 test-pit survey at 5 m intervals prior to any proposed impacts by implementing the project. For more information, the Stage 1 Archaeological Report can be found in Appendix E.

7.3 Natural Environmental Impacts

For Site N and the proposed watermain route, the most sensitive features include provincially significant wetlands (PSWs), unevaluated wetlands, fish habitat, woodlands and areas of natural and scientific interest (ANSI). No watercourse crossings will be required for the watermain; however it will be located within the vicinity of wetlands. There is the potential for species at risk to be located within the vicinity of the proposed works however, no species at risk (SAR) were observed during the site visit.

Based on the evaluation and assessment of alternatives utilizing natural features criteria, impacts associated with Site N and the proposed watermain route can be avoided using Best Management Practices (BMPs).

As the project progresses to detailed design, mitigation measures that are site-specific should be developed in order to protect both terrestrial and aquatic environments and their respective ecological function. Where possible, avoidance measures should be implemented before resorting to mitigation and lastly rehabilitation to minimize negative effects on natural features. If the mitigation measures and/or BMPs are implemented, they will likely reduce the possible effects from the proposed development.

Construction timing should take into consideration natural features, more specifically wildlife. Vegetation removal should not take place during the core local breeding bird season which is established from April 1st to August 31st, as protected by the Migratory Birds Convention Act, 1994. If clearing should take

place within this timeframe, a qualified avian biologist should conduct nest searches prior to removal.

For Site N and the proposed watermain, erosion and sediment control measures (ESC) measures should be implemented to avoid impacts to the Little Credit Headwaters Candidate ANSI, as the watermain route just crosses into the ANSI at the Caledon Trailway. All ESC measures (e.g. heavy-duty silt fence, coir logs etc.) should be reflected on all construction drawings with notes on requirements.

The removal of trees and/or vegetation can be mitigated by planting trees in a suitable location, preferably within the same forest and/or woodland community. Tree and vegetation clearing should be limited as much as possible and follow the Town of Caledon Woodland By-Law No. 2000-100, which prohibits or regulates the destruction of trees in woodlands. All vegetation loss, including woodlands / forests should be compensated at a 3:1 ratio. Specifically, removal of street trees should be replaced at a 3:1 ratio, while forested areas should be replaced at a 3:1 ratio based on the area lost.

Mitigation of water quality effects of construction is the main recommended protective measure to be implemented generally throughout the project area, including sedimentation and erosion controls and at specific locations where dewatering of excavations may be required.

For more information, the Natural Environment Report can be found in Appendix E.

7.4 Cultural Heritage Assessment

Based on the results of the background research and field review, two cultural heritage resources were identified within and/or adjacent to the study area, consisting of two cultural heritage landscapes (CHL) as follows:

- CHL 1 - Former Railscape/Trail; Caledon Trailway (Identified during background research/field review)
- CHL 2 - Historical Agricultural Landscape; 16086 Hurontario Street (Identified during background research/field review)

Based on information available at the time of this assessment, none of the identified cultural heritage resources are anticipated to be affected by the activities associated with the installation of the watermain or Well #4. Based upon the conceptual layout and information available at the time of writing, it is not anticipated that the construction of the watermain will impact identified cultural heritage resources. For more information, the Cultural Heritage Resource Assessment Report can be found in Appendix E.

7.5 Socio-Economic Impacts

Well #4 and the proposed watermain required to connect to the Well #3 Treatment Facility are located immediately adjacent to the existing Highway 10 (Hurontario Street) ROW on CVC property (easement required). Due to the persistent traffic in this corridor, construction activities should not have a significant impact on the surrounding residents or the recreational use of the Ken Whillans Resource Management Area and the Caledon Trailway. Access will need to be maintained for the Ken Whillans Resource Management Area and the Caledon Trailway during construction. Due to the relatively limited duration and scope of construction anticipated, significant impacts are not anticipated.

Water services infrastructure is permitted in the Niagara Escarpment and Greenbelt Plan area provided that when siting and constructing the watermain, due consideration is given to identifying locations which minimize the potential impact on the natural environment and are keeping with existing or future watershed plans and budgets.

7.6 Niagara Escarpment Commission (NEC)

As noted in the Socio-Economic Impacts section, water service infrastructure is permitted in the Niagara Escarpment Plan area. The project team met with the NEC to review the steps taken during the well exploration program and EA process, as well as review the preferred alternative. No significant issues were raised by NEC given that the preferred alternative is permitted in the Niagara Escarpment Plan area. A Niagara Escarpment Development Permit will be required for the watermain.

8. IMPLEMENTATION

8.1 Approvals Process

Following the Public Information Centre, the Region's project team confirmed the preferred solution taking into account the comments received from the public and review agencies. This report is a Project File for the construction of a new well and associated watermain and it documents the study carried out by the Region in satisfaction of the Class EA planning process.

This Project File will be placed on the public record for a thirty (30) day review period during which time, any objections or concerns that cannot be resolved through discussions with the Region may be forwarded to the Minister of the Environment by requesting a "Part II Order". Alternatively, the public can request that the Region voluntarily elevate the project to a Schedule 'C' undertaking. The public will be notified of the publication of the Class EA Project File through a newspaper notice at the appropriate time, or through direct notification if requested. Agencies and Stakeholders that were identified as having an interest in this project including the residents located in the existing Well Head Protection Area will receive direct notification of the Notice of Completion.

The Region will be in compliance with the Municipal Class Environmental Assessment approvals process for the proposed replacement of Inglewood Well #2 in Inglewood once the specified public review process is completed without objection.

8.2 Commitments and Mitigation Measures

The proposed mitigating measures to be implemented include, but are not limited to the following:

- Further discussions during the implementation phase of the preferred alternative to be conducted between CVC, MNR and the Region regarding the development of operational strategies for the operation of Wells #3 and #4 to mitigate the risk associated with combined (simultaneous) pumping;
- Maintain access to the Ken Whillans Resource Management Area and the Caledon Trailway during construction.
- Traffic management measures, to Provincial Standards, will be implemented;
- Mud and dust control measures will be implemented (mud mats, tire racks, etc.);
- Size of working (disturbed) areas will be kept to a minimum;

- Sediment and erosion control measures will be utilized when working in the vicinity of watercourses and storm sewers that discharge to watercourses. (i.e., Silt fencing, straw bale check dams, etc.);
- Construction staging and temporary works will be put in place to minimize disruptions of water supply during construction. Water supply disruptions are not expected to affect residents; and
- Contractor's working hours for construction activities will be stipulated in accordance with local by-laws.

8.3 Class Environmental Assessment Requirements

In order to satisfy the Ontario Environmental Assessment Act (EA Act), the Region initiated this Class EA study in accordance with the Municipal Class Environmental Assessment process. This study addresses Phases 1 & 2 of the Municipal Class Environmental Assessment planning process for water projects as specified in the Notice of Completion.

8.4 Notice of Completion

For the purposes of this review, this Project File is being made available to the public and agencies for a specified review period. All potentially affected members of the public, stakeholders and those expressing an interest in the study, as well as relevant review agencies were notified by advertisements in the local newspaper and by letter where appropriate, that this study was complete and available for review. The Notice of Completion stated the date by which written comments and a Part II Order request must be submitted to the Ministry of Environment.

Written comments on this Project File should be submitted to:

Soyuz Mitra, P.Eng.

Project Manager, Environmental Assessments & Studies Water & Wastewater
Division, Program Planning & Compliance Public Works
Region of Peel
10 Peel Centre Drive, Suite A 4th Floor
Brampton ON L6T 4B9
Tel: 905-791-7800 Ext 4550
Fax: 905-791-0728
E-mail: soyuz.mitra@peelregion.ca

Part II Order requests must be received by the Minister before the end of the specified review period. Part II Order requests received after the specified review period will not be considered. Part II Order requests should be directed to:

The Honourable Glen R. Murray
Minister of the Environment and Climate Change
77 Wellesley Street West
11th Floor, Ferguson Block
Toronto, Ontario
M7A 2T5

A copy of the letter requesting a Part II Order must be sent to the Regional Municipality of Peel's Clerk and Project Manager. If no concerns are expressed by the conclusion of the specified review period, the Regional Municipality of Peel may proceed with the design and construction of the project as described in this Project File.

8.5 Objections to the Project

If a party objects to this project, then the objector should discuss their concerns within the public review period with the Regional Municipality of Peel directly. Within the specified public review period, if a resolution to the concerns cannot be achieved in consultation with the Regional Municipality of Peel, an objector may request that the Minister of the Environment consider issuing a Part II Order which may require the Regional Municipality of Peel to undertake an additional study. Alternatively, the public can request that the Region voluntarily elevate the project to a Schedule 'C' undertaking.

For any party with a concern that they feel has not been adequately addressed, the opportunity exists for a party to request that the Ontario Minister of the Environment review the status of the project. This is called a Request for a Part II Order. This request must be in writing providing reasons for the request and copied to the Clerk of the Regional Municipality of Peel.

The Minister will consider the request and make one of the following decisions, with the Minister's decision being final:

- Deny the request, stating the reason for the decision;
- Deny the request with conditions, such as requiring that the proponent prepare additional work related to a potential environmental impact of the project;
- Refer the matter to mediation, whereby a mediator will be appointed to endeavour to resolve the concern; or
 - Issue what is referred to as a Part II Order, which requires that the proponent comply with Part II of the Environmental Assessment Act and undertake the planning and design for the project and documenting it in an "Individual Environmental Assessment". An Individual Environmental Assessment once completed, must be submitted to the Minister of the

Environment for government review and approval prior to carrying out the project.

Members of the public are responsible for bringing any concerns to the attention of the Regional Municipality of Peel early in the planning process. In considering the acceptance or denial of a request for a Part II Order, the Minister shall consider the following issues:

- Extent and nature of public concern;
- Potential for significant adverse environmental effects;
- Need for broader consideration of alternatives;
- Consideration of urgency;
- Frivolous or vexatious nature of the request; and
 - Degree to which public consultation and dispute resolution has taken place.

If in the opinion of the Minister, a request is made with the intent of delaying the planning or implementation of a project, or which does not contain a reasonable amount of supporting information, that request may be denied by the Minister on the basis of being unsubstantiated.

The resolution of concerns in consultation with the Regional Municipality of Peel is preferable to having the Minister intervene later in the decision-making process. Upon receiving a request for a Part II Order it is likely that the Minister will encourage continued opportunities for an amicable resolution to be reached by ensuring direct consultation between the proponent and the person or party raising the concern. It is best to consult directly with the proponent first.

8.6 Agency Approvals

Compliance with the Environmental Assessment Act and the Municipal Class Environmental Assessment process does not preclude the Regional Municipality of Peel from additional agency approvals for the recommended projects. Following the completion of the Class Environmental Assessment process, the Regional Municipality of Peel must undertake discussions with relevant agencies to ensure that all applicable approvals are received prior to implementing projects. The following list highlights some of the approvals which may be necessary to carry out the proposed project.

Town of Caledon

The following approvals may be required from the Town of Caledon:

- Engineers Letter for Watermain Crossing of Trail Bridge
- Site Plan Approval (Not Anticipated);

Ministry of the Environment and Climate Change (MOECC)

The following approvals may be required from the Ontario Ministry of the Environment:

- Drinking Water Works Permits;
- Permit to Take Water; and
- Municipal Drinking Water License Application

Niagara Escarpment Commission (NEC)

The following approval may be required from the NEC:

- Niagara Escarpment Development Permit (Watermain Only)

Ministry of Transportation (MTO)

The following approval may be required from the MTO:

- Application for Building and Land Use Permit

Credit Valley Conservation (CVC)

The following approval may be required from the CVC:

- Application for Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Permit

Ministry of Tourism, Culture and Sport (MTCS)

The following assessment will be required by the MTCS:

- Stage 2 Archaeological Assessment (Test Pits – Locations Identified in Stage 1 Archaeological Assessment)

The Ministry of Natural Resources and Forestry (MNRF) is covered by the CVC and NEC Permits.

8.7 Conclusions and Recommendations

8.7.1 Conclusions

Through the completion of this Class EA, the preferred solution to the replacement of existing Inglewood Well #2 is to utilize Well #4 (Site N) as the new municipal production well along with a new raw watermain routed through CVC property (Ken Whillans Resource Management Area) to the existing Well #3 facility for treatment. The required works associated with the preferred solution will include the following:

- Install a new permanent submersible well pump and associated appurtenances within Well #4;

- Construct new raw watermain, electrical supply and communication cables to connect Well #4 to the existing Well #3 Treatment Facility adjacent (parallel) with Highway 10 within the CVC lands using open cut construction methods;
- Upgrade the existing electrical service to the existing Well #3 Treatment Facility including a new transformer;
- Upgrade process piping, Motor Control Centre (MCC), control systems and any other ancillary works required to fully incorporate Well #4 into the existing Well #3 Treatment system.

In addition, a new Filter Vessel/Unit may be incorporated within the existing Filtration System to increase system redundancy in the future. (Note: Incorporation of an additional filter unit may require a minor increase in the footprint (size) of the existing Treatment Facility which can be accommodated within the existing property limits).

Implementation of the preferred solution resolves the Problem/Opportunity Statements identified in Section 2.

Communications and consultations were undertaken throughout the study process with the public and key stakeholders including, but not limited to, the Credit Valley Conservation Authority (CVC), Town of Caledon, Ministry of Natural Resources and Forestry (MNRF), Ministry of Transportation (MTO) and the Niagara Escarpment Commission (NEC). No significant concerns were raised that cannot be addressed and resolved by the Region during implementation of the preferred solution.

Design and construction of the preferred solution is currently schedule for Q4 2016 through Q3 2017, although timing may be subject to change.

8.7.2 Recommendations and EA Commitments

This Municipal Class EA study was complete to ensure that the proposed replacement of Inglewood Well #2 project satisfies the requirements of the Environmental Assessment Act (EAA). Following the completion of the specified public review process without objection, it is recommended that:

- Based on the selection of Site N (Well #4) and the preferred watermain route, the Region of Peel should initiate negotiations with the CVC to secure all required permanent and temporary easements.
- During detailed design, the mitigation measures identified in this report should be verified and further refined (if necessary) based on the results of the following support studies (to be completed as part of the detailed design phase):
 - Stage 2 Archaeological Assessment

- Geotechnical Investigation

- The Region of Peel will conduct further discussions during the implementation phase of the preferred alternative between CVC, MNR and the Region regarding the development of operational strategies for the operation of Wells #3 and #4 to mitigate the risk associated with combined (simultaneous) pumping;
- The Region of Peel should continue to consult with the agencies identified in Section 8.6 during detailed design.
- The Region of Peel should continue to coordinate with the Town of Caledon through detailed design with regard to the requirements for constructing the raw watermain beneath the Caledon Trailway/Bridge.
- The Region of Peel should notify the appropriate Stakeholders of any archaeological findings resulting from the Stage 2 Archaeological Assessment.
- The Region of Peel should continue to communicate construction plans to the community as the project moves forward.
- For construction, all disturbed areas should be restored to their existing condition or better in a manner consistent with the surrounding natural environment access to the Ken Whillans Resource Management Area and the Caledon Trailway be maintained.