



Canadian Environmental  
Assessment Agency

Agence canadienne  
d'évaluation environnementale

# Town of Shelburne Long-Term Well Project

Comprehensive Study Report



**January 2014**

Canada 

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## Executive Summary

The Town of Shelburne (the proponent) proposes to develop a new drinking water supply well (the Project) with a pumping rate of 596,775 cubic metres per annum located 3 kilometres (km) west of the Town of Shelburne on 2nd Line southwest. The proposal consists of conveying groundwater from the proposed well site via a water main constructed for the Project along existing right of ways to a connection with the current water supply system infrastructure. The proposed water main route is approximately 4 km in length, and follows 2nd Line southwest to Provincial Highway 89, then precedes eastward along Highway 89 until connecting with Shelburne's current water supply system.

Components of the Shelburne long-term well for additional water supply are listed below.

- Proposed well;
- Enclosed single-story well house, approximately 100 m<sup>2</sup> in size;
- A backup well, adjacent to the proposed well, and associated pumping and connection equipment;
- A 4 km water main route linking the new well site to the existing water supply infrastructure;
- An upgrade of the chlorination facilities to treat additional raw water from the new well site at the current treatment facilities; and
- Ancillary items such as fencing (as warranted), a pump system, a high lift pumping facility and a backup generator.

The Project is subject to a comprehensive study type environmental assessment (EA) as it is described in section 10 of the *Comprehensive Study List Regulations* under the former *Canadian Environmental Assessment Act* (former Act).

Infrastructure Canada (INFC) is a responsible authority under the former Act. The project is being developed with funding from the Federal Economic Development Agency for Southern Ontario under their Ontario Potable Water

Program. A federal EA is required to enable a decision to be made to fund the Project. The Federal Economic Development Agency for Southern Ontario is handling this file as part of a service agreement with INFC.

The Project is subject to a Schedule B Municipal Class EA under the *Ontario Environmental Assessment Act*. The governments of Canada and Ontario conducted the EAs cooperatively to the fullest extent possible pursuant to the *Canada-Ontario Agreement on Environmental Assessment Cooperation* (Cooperation Agreement).

The Agency evaluated the Project's potential to cause significant adverse environmental effects based on a review of the proposed Project and its predicted effects on the valued ecosystem components (VECs). This evaluation was completed based on information provided by the proponent and comments provided by federal experts, Aboriginal groups and the public through various consultation opportunities.

The Canadian Environmental Assessment Agency (the Agency) prepared this Comprehensive Study Report (CSR) in consultation with INFC, Fisheries and Oceans Canada (DFO), Environment Canada (EC), Natural Resources Canada (NRCan), and Health Canada (HC) following a technical review of the proponent's Environmental Impact Statement and an evaluation of the environmental effects of the Project. The Minister of the Environment will consider this report and comments received from the public and Aboriginal groups before issuing the EA decision statement.

A VEC is a notable feature of the natural or human environment that is likely to be affected by the Project. The Environmental Impact Statement identified and assessed the Project's effects on the following VECs: atmospheric environment; landforms, soils, snow and ice;

water resources (surface and groundwater), wetlands; freshwater fish, fish habitat and fisheries; birds, other wildlife and their habitats and protected areas; species at risk (as listed under the *Species at Risk Act*) and species of conservation concern; historical and cultural resources; current use of lands and resources, including for traditional purposes by Aboriginal persons and health and community health.

The environmental effects of the Project have been determined using assessment methods and analytical tools that reflect current best practices of environmental and socio-economic practitioners, including the consideration of cumulative effects and potential accidents and malfunctions. It is the conclusion of the EIS that the Project can be constructed and decommissioned without significant adverse environmental effects.

The Agency concludes that the Project is not likely to cause significant adverse environmental effects, taking into account the implementation of mitigation measures described in this comprehensive study report.

A follow-up program study will be implemented to verify the accuracy of the EA and to determine the effectiveness of the mitigation measures for the Project. Follow-up is planned in relation to the VECs. The follow-up program includes monitoring the groundwater quantity and quality for security of drinking water for the habitants of the Town of Shelburne. The monitoring program also includes observation of the surface water levels in the Willow Brook Wetland Complex, a locally, but non-Provincially Significant Wetland complex, to protect fish and fish habitat.

Following a public consultation on this report, the Minister of the Environment will decide whether, taking into account the implementation of mitigation measures, the Project is likely to cause significant adverse environmental effects. The Project will then be referred back to INFC for an appropriate course of action in accordance with section 37 of the former Act.

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## List of Acronyms, Initialisms and Abbreviations

<b>Agency</b>	Canadian Environmental Assessment Agency
<b>CSR</b>	comprehensive study report
<b>EA</b>	environmental assessment
<b>EIS</b>	environmental impact statement
<b>former Act</b>	<i>Canadian Environmental Assessment Act</i> (1992)
<b>km</b>	kilometre
<b>m</b>	metre
<b>m<sup>3</sup>/a</b>	cubic metres per annum
<b>mbgs</b>	metres below ground surface
<b>m<sup>3</sup>/d</b>	cubic metres per day
<b>Minister</b>	federal Minister of the Environment
<b>ODWQS</b>	Ontario Drinking Water Quality Standard
<b>Project</b>	Town of Shelburne Long-Term Well for Additional Water Supply Project
<b>proponent</b>	Town of Shelburne
<b>Province</b>	Ontario
<b>SAR</b>	species at risk
<b>SARA</b>	<i>Species at Risk Act</i>
<b>TW7-10</b>	proposed well
<b>VEC</b>	valued ecosystem component



# 1. Introduction

## 1.1 Project Overview

The Town of Shelburne (the proponent), Ontario, is proposing to develop a new drinking water supply well (the Project) with a pumping rate of 596,775 cubic metres per annum (m<sup>3</sup>/a). This additional water supply is being sought as a result of projected population growth of the Town, potential changes to the Ontario Drinking Water Quality Standard (ODWQS) for arsenic, and the declining performance of existing water wells.

## 1.2 Environmental Assessment Context and Process

### 1.2.1 Purpose of the CSR

This comprehensive study report (CSR) presents the Canadian Environmental Assessment Agency's (the Agency's) analysis to determine whether or not the Project is likely to cause significant adverse environmental effects.

The Federal Minister of the Environment (the Minister) will consider this report and comments received from the public and Aboriginal groups when issuing an environmental assessment (EA) decision statement in relation to the Project. The Minister may request additional information or require that public concerns be addressed further before issuing the EA decision statement. The Minister will refer the Project back to INFC following the EA decision statement for appropriate action under section 37 of the former Act.

### 1.2.2 Federal EA Process

The former Act applied to federal authorities that contemplated certain actions or decisions that would enable a project to proceed in whole or in part. A federal EA is required in order to enable the Project to proceed because INFC may provide financial assistance to the Town of Shelburne.

The Project is subject to a comprehensive study type EA as it is described under Part III, section 10 of the Schedule to the *Comprehensive Study List Regulations* under the former Act, the proposed construction, decommissioning or abandonment of a facility for the extraction of 200,000 m<sup>3</sup>/a or more of ground water.

The Agency is responsible for the conduct of the comprehensive study and prepared this CSR in consultation with INFC and the Federal Economic Development Agency for Southern Ontario, which is involved in this Project as part of a service agreement with INFC. Environment Canada, Natural Resources Canada, and Health Canada provided advice in relation to their respective mandates and areas of expertise.

### 1.2.3 Cooperative EA Process

The Project requires a Schedule B Municipal Class EA under the *Ontario Environmental Assessment Act*. The governments of Canada and Ontario conducted the EAs cooperatively to the fullest extent possible pursuant to the *Canada-Ontario Agreement on Environmental Assessment Cooperation* (Cooperation Agreement).

## 2. Project Description

### 2.1 Purpose of and Need for the Project

The purpose of the Project is to provide additional drinking water to the Town of Shelburne. This additional capacity is needed as a result of projected population growth of the Town, potential changes to the ODWQS for arsenic, and the declining performance of current water wells.

The Town has estimated that an increase of 1,067 m<sup>3</sup>/d of water is required to supply the projected increase in the Town's population by 2032. The proposed well would draw 1,635 m<sup>3</sup>/d or 596,775 m<sup>3</sup>/a of groundwater. This pumping rate would result in an additional 568 m<sup>3</sup>/d beyond the required 1,067 m<sup>3</sup>/d. This additional supply will result in a greater overall water supply security for the Town of Shelburne by reducing demand from current wells—the supply from some of these wells is not considered “firm” as no backup well or generator is present. One of the Town's five groundwater wells was recently abandoned due to declining performance.

Regular monitoring of water quality of the Town's water supply has also indicated elevated concentrations of naturally-occurring arsenic in the raw water from some of the current wells. Although the Town is currently in compliance with the ODWQS for arsenic under Ontario Regulation (O. Reg.) 169/03, the provincial

**The purpose of the Project is to provide additional drinking water to the Town of Shelburne.**

Ministry of Environment has indicated that the ODWQS for arsenic will be reduced in the future. If the ODWQS for arsenic is lowered, the Town would be out of compliance in some of its wells. Accordingly, the Town is looking for an alternative water supply source that would have reduced levels of arsenic to meet anticipated future standards.

### 2.2 Project description

#### 2.2.1 Location

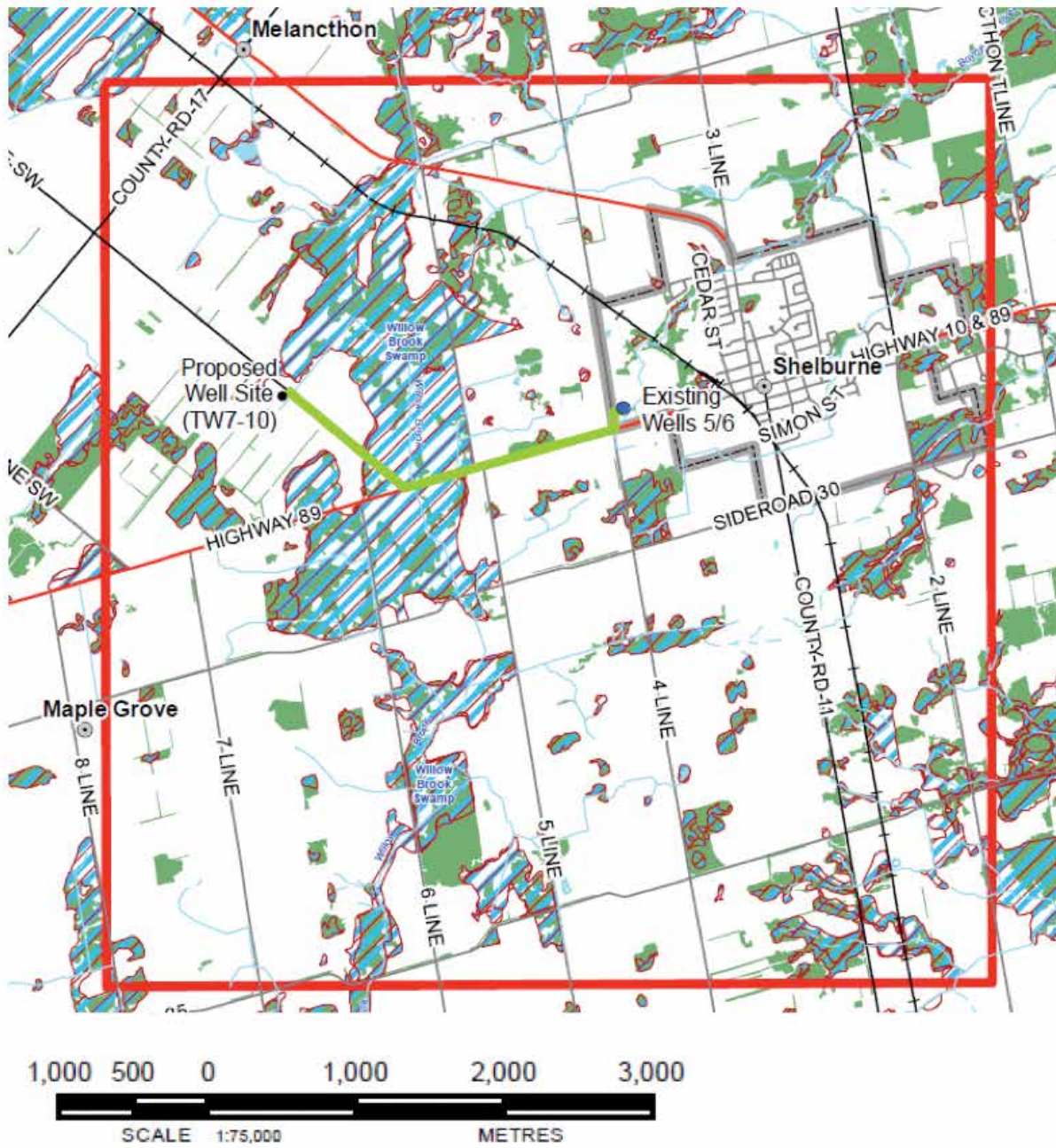
The proposed well would be located approximately three kilometres (km) west of the Town of Shelburne on 2nd Line southwest (Figure 2-1). The proposal consists of the construction of a water main along existing right of ways allowing for the conveyance of groundwater from the well site via a water main. The proposed water main route is approximately four kilometres in length. It follows 2nd Line southeast to Provincial Highway 89, then proceeds eastward along Highway 89 to the Town's existing well to be decommissioned located north of the corner of Highway 89 and 4th Line on the west side of Shelburne.

#### 2.2.2 Components

Components of the Project are listed below.

- Well house. There will be an enclosed single-storey well house located at the well site. The building will occupy approximately 100 m<sup>2</sup> (10 m x 10 m);
- Proposed well. Minor modifications to the current test well will transform it into the proposed well;
- A backup well, which is to be drilled at the well site, adjacent to the proposed well. Associated pumping and connection equipment will be installed onsite;

Figure 2-1: Project Location



**LEGEND**

- Proposed Well Site
- Existing Well 5/6
- ⊙ City / Town
- + Railways
- Highway
- Major Road
- Local Road
- Watercourse, Permanent
- - - Watercourse, Intermittent
- Proposed Watermain
- Waterbody
- LJO Wetland
- Town Boundary
- Wooded Areas
- Study Area

Source: Golder and Associates. Photos taken July 17, 2012.

- A water main, which is to be placed at least 1.8 m below ground surface to prevent freezing. Total length is 4 km linking the new well site to current water supply infrastructure;
- An upgrade of the chlorination facilities to treat additional raw water from the new well site at the current treatment facilities; and
- Ancillary items including fencing, a pump system, a high lift pumping facility and a backup generator.

### 2.2.3 Activities

Key activities associated with construction, operation and maintenance of the Project are listed below.

#### Construction

- Stripping of topsoil at the well site and along the water main routes (if not installed by directional drilling);
- Construction equipment delivery and lay down areas;
- Installation of concrete foundation and construction of well house;
- Development of the proposed well from the existing test well;
- Construction of a back-up well;
- Installation of fencing;
- Installation of pump system and components;
- Excavation and backfilling for water main installation;
- Inspection and testing of Project components;
- Site restoration including topsoil cover and revegetation; and
- Installation of a backup generator.

#### Operation phase

Routine operations and maintenance at the well site and along the water main route.

### 2.2.4 Schedule

Construction is planned to begin in the spring of 2014 pending regulatory approval. This phase is expected to last approximately four months. Production for the Project will begin in late 2014. The life of the Project is expected to be at least 20 years.

**The proposed well would be located approximately three kilometres (km) west of the Town of Shelburne on 2nd Line southwest.**

## 3. Scope of the Assessment

### 3.1 Scope of the Project

The scoping process sets the limits of an EA, and focuses the study on relevant factors and concerns, which were outlined in the Environmental Impact Statement Guidelines (EIS Guidelines) <http://www.ceaa.gc.ca/050/documents-eng.cfm?evaluation=63955>.

### 3.2 Factors to be considered

The following factors were considered as part of the comprehensive study pursuant to subsections 16(1) and 16(2) of the former Act:

- The environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project, and any cumulative environmental effects that are likely to result in combination with other projects or activities that have been or will be carried out;
- The significance of the effects referenced above;
- Comments from the public that are received during the review;
- Comments from Aboriginal groups that are received during the review;
- Measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;
- The purpose of the Project;
- Alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of the alternative means;
- The need for, and the requirement of, any follow-up program in respect of the Project; and
- The capacity of renewable resources that is likely to be significantly affected by the Project to meet present and future needs.

Under subsection 16(1)(e) of the former Act, the Agency also required the assessment of the need for the Project, an evaluation of alternatives to the Project, and an articulation of the benefits of the EA to Canadians.

### 3.3 Scope of the Factors

#### 3.3.1 Identification of Valued Ecosystem Components (VECs)

In determining significant environmental effects, the EA focused on those components of the environment that have particular value or significance and are likely to be impacted by the Project. These are referred to as valued ecosystem components (VECs).

The VEC selection process included consideration of the temporal and spatial scope of the Project and anticipated project-environment interactions. The proponent also considered: reviews of previous environmental investigations on the study area, similar water supply projects completed by the Town and other municipalities, feedback received from the public, technical expert judgement and discussions with federal authorities.

The selected VECs and their rationale for inclusion are outlined in Table 3-1.

**Table 3-1: Potentially Affected VECs**

VEC	Rationale for Selection of VEC
<b>Physical Environment</b>	
Groundwater quantity and quality	<ul style="list-style-type: none"> <li>• Ecological health</li> <li>• Human health</li> <li>• Socio-economic importance</li> </ul>
Surface water quantity and quality	<ul style="list-style-type: none"> <li>• Human health (water quality)</li> <li>• Ecological health (water quality and quantity)</li> <li>• Recreation (water quality and quantity)</li> <li>• Traditional and current Aboriginal use (water quality and quantity)</li> </ul>
Soils and terrain	<ul style="list-style-type: none"> <li>• Ecological health</li> <li>• Socio-economic importance</li> <li>• Traditional and current Aboriginal use</li> </ul>
<b>Biological Environment</b>	
Fish, fish habitat and aquatic ecosystems	<ul style="list-style-type: none"> <li>• Native species</li> <li>• Ecological health</li> <li>• Socio-economic importance</li> <li>• Recreation</li> <li>• Traditional and current Aboriginal use</li> </ul>
Vegetation	<ul style="list-style-type: none"> <li>• Native species</li> <li>• Ecological health</li> <li>• Conservation status of protected species</li> </ul>
Wildlife and wildlife habitat	<ul style="list-style-type: none"> <li>• Native species</li> <li>• Ecological health</li> <li>• Conservation status of protected species</li> </ul>
<b>Atmospheric Environment</b>	
Noise and vibration levels	<ul style="list-style-type: none"> <li>• Human health</li> <li>• Ecological health</li> </ul>
Air quality	<ul style="list-style-type: none"> <li>• Human health</li> <li>• Ecological health</li> </ul>
<b>Socio-Economic Environment</b>	
Human health	<ul style="list-style-type: none"> <li>• Human health</li> </ul>
Aboriginal land use and resources use	<ul style="list-style-type: none"> <li>• Traditional and current Aboriginal use</li> </ul>
Physical and cultural heritage (archaeological)	<ul style="list-style-type: none"> <li>• Cultural and heritage significance</li> <li>• Traditional and current Aboriginal use</li> </ul>

### 3.3.2 Spatial & Temporal Boundaries

Spatial boundaries are defined as the geographical extent within which environmental effects can be reasonably expected to be affected by the Project, or may be relevant to the assessment of cumulative effects. They are defined by taking into account the spatial extent of potential environmental effects on VECs, traditional and

local knowledge, current and proposed land use by Aboriginal groups, and ecological, technical, social and cultural considerations.

The temporal boundaries of this EA are defined based on the timing and duration of project activities that could adversely affect

the environment. The purpose of the temporal boundaries is to identify when an effect may occur in relation to specific project phases and activities. In general, temporal boundaries for this assessment include the construction, operation and maintenance phases of the Project.

### Study Area

Table 3-2 describes the study area boundaries for VECs. These boundaries consist of the Project footprint plus a buffer zone within which direct and indirect effects of the Project can be reasonably expected to occur.

**Table 3-2: Study Areas for VECs**

VEC	Study Area Definition
<b>Physical Environment</b>	
Groundwater quantity and quality	The area up to 1.5 km from the Project site.
Surface water quantity and quality	Waterbodies affected by the Project are assessed up to 1.5 km from the proposed well site.  As the well site is near the surface water divide of the Grand River and Nottawasaga Valley watersheds, the regional study for surface water quantity and quality takes into consideration the possible influence of the well within parts of both watersheds. The well head protection areas for the current Shelburne water supply system (SWSS) currently extend into the Grand River watershed.
Soils and terrain	The Project site, including the well site and right of ways affected by the water main route.
<b>Biological Environment</b>	
Fish, fish habitat and aquatic ecosystems	The area up to 1.5 km from the well site and within the right of way for the water main route.
Vegetation	The area up to 1.5 km around the well site and the right of way for the water main route.
Wildlife and wildlife habitat	The area up to 1.5 km around the well site and the right of way for the water main route.
<b>Atmospheric Environment</b>	
Noise and vibration levels	The area encompasses an area up to 1.5 km from the Project site.
Air quality	The area up to 1.5 km from the Project site.
<b>Socio-Economic Environment</b>	
Human health	The area includes the Town of Shelburne approximately 4 km from the well site.
Aboriginal land and resources use	The area evaluated for all alternative well sites.
Physical and cultural heritage (archaeological)	The area evaluated for all alternative well sites.

## 4. Project Alternatives

Based on paragraph 16(1)(e) of the former Act, the Agency requires that proponents assess alternatives to the Project as part of a comprehensive study. Alternatives to the Project are functionally different ways to meet the Project’s need and purpose. As well, in accordance with paragraph 16(2)(b) of the former Act, the comprehensive study process included consideration of technically and economically feasible alternative means of carrying out the Project, and the environmental effects of any

such alternative means. The evaluation of both of these factors is presented in the following sections, based on evaluations conducted by the proponent.

### 4.1 Alternatives to the Project

The proponent evaluated four alternatives to the Project to fulfil the objective of addressing the water supply and water quality needs of the Town of Shelburne. Table 4-1 outlines the options and the rationale for selection or non-selection.

**Table 4-1: Alternatives to the Project**

Option	Details	Rationale for selection or non-selection
Do nothing	This option involves no improvements, changes or additions to the current Shelburne water supply system (SWSS).	This alternative would leave the Town with a limited water supply to sustain current development and projected growth. It would not result in a lower overall arsenic concentration in the Town’s drinking water to meet anticipated water quality standards.
Implement water conservation	The Town continues to implement strategies and programs to reduce water demand in Shelburne (e.g. water metering).	The Town would still need to increase the water supply to meet demands associated with projected growth. It would not result in reduced levels of arsenic in the Town’s drinking water to meet the anticipated future water quality standards.
Limit community growth	The Town could fix the current boundary, preventing new development.	It would not result in reduced levels of arsenic in the Town’s drinking water to meet the anticipated future water quality standards.
Treat current wells for arsenic	Implement arsenic treatment technologies, such as: coagulation and filtration, lime softening, activated alumina, ion exchange, reverse osmosis, electrodialysis reversal, and nanofiltration.	The cost of implementing this technology is not economically achievable for the Town. Treating the existing water supply would not address the need for additional water supply.
Securing a new deep well <b>(proposed project)</b>	Establish a new groundwater well that is capable of providing an additional supply with arsenic levels below future drinking water standards.	This option will resolve both the water supply problem and enable compliance with the future water quality standard for arsenic.



The preferred solution is securing a new deep well. In addition, the Town of Shelburne will continue with the current water conservation program to reduce demand.

## **4.2 Alternative means of carrying out the Project**

The proponent considered the development of other well sites as an economically and technically feasible alternative means of carrying out the proposed Project.

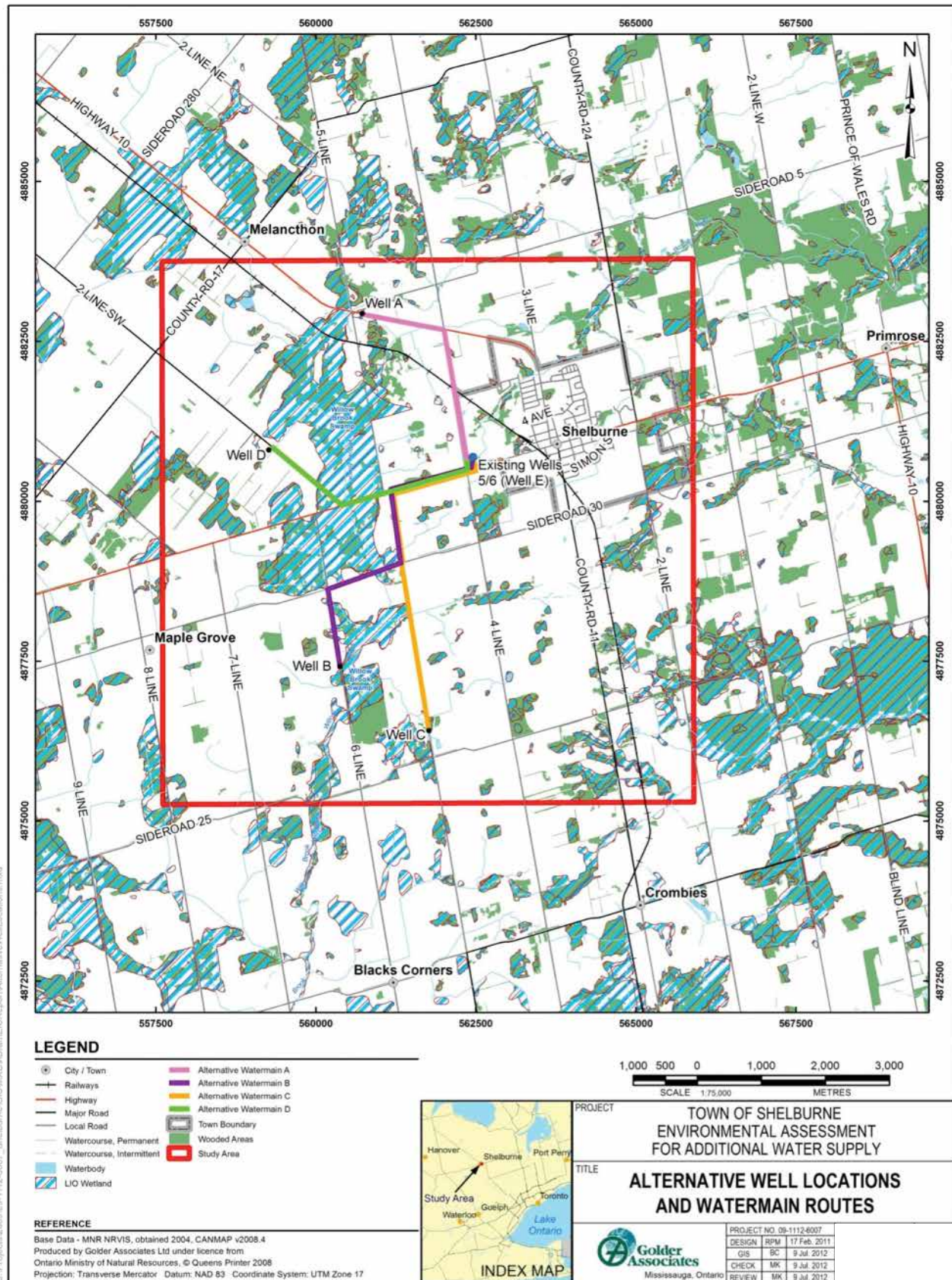
The following criteria were considered in determining the potential alternative locations for the well site:

- The well site must be within a five kilometer radius outside of the Town boundary due to the feasibility of installing the water main to the Town;
- The location of the well must have the potential yield that meets or exceeds a flow rate of 1,067 m<sup>3</sup>/d;
- The location is to be in an area that avoids overlap with municipal well capture areas;
- The potential well location is to minimize interference with current wells;
- It provides potable water, preferably with no or negligible arsenic concentrations; and
- It is not to have a negative impact on ecological and surface water features.

The Town chose three sites for testing based on these criteria (alternatives A, B and C). In each of these areas, it was expected that a suitable municipal water supply source could be developed from the shallow bedrock aquifer located approximately 30 metres below ground surface.

An additional well site, alternative D, was also considered following consultation with the Ontario Geological Survey that suggested that a well in a deeper bedrock formation, located approximately 86.5 metres deep, may meet the Town's needs. Figure 4-1 shows the alternative well locations and watermain routes.

Figure 4-1: Alternative Well Locations and Water Main Routes



Source: Golder and Associates. Photos taken July 17, 2012.

A summary of the proponent’s evaluation of the potential well locations for the proposed Project is presented in Table 4-2.

Construction of water mains for the four well locations has the potential to affect surface water quality in watercourses through increased sedimentation occurring during construction of the crossings. As alternative A requires the fewest crossings, it has the lowest potential for this type of effect.

Alternative well location D is likely to have the relative lowest potential for effects on surface water quantity and flow because the well will be installed deeper than the other three alternative well locations, which will result in less drawdown.

All four of the alternative well locations are adjacent to a locally significant wetland—the Willow Brook Wetland Complex. However, alternative well location A is at the headwaters of the Boyne River, a coldwater fishery, increasing the likelihood of potential effects on aquatic wildlife and habitat. The water main will be installed along existing public right of ways, which will avoid the need for vegetation removal, subsequently avoiding potential effects on wildlife and wildlife habitat. As such, alternative well locations B, C and D are not likely to have adverse effects on wildlife and wildlife habitat.

Construction activities will largely be contained to the public right of ways; therefore, all of the potential alternative well locations have minimal potential to affect species at risk (SAR)

**Table 4.2: Alternative Well Locations Considered**

Alternative	Technical Feasibility	Economic Feasibility	Environmental Effects
A	Considered feasible	Considered feasible. Relatively lower capital cost due to a shorter water main route (3.4 km).	Low potential for impacts to surface water quality. Water main would cross one watercourse.  Moderate potential for effects on wildlife habitat and diversity, and terrestrial and aquatic wildlife compared to other alternatives, due to its location at the headwaters of the Boyne River, a cold water fishery.
B	Considered feasible	Considered feasible. Relatively higher capital cost due to longer water main route of 5.1 km.	Moderate potential for impacts to surface water quality compared to other alternatives. Water main would cross four watercourses.
C	Considered feasible	Considered feasible. Relatively higher capital cost due to longer water main route of 5.3 km.	Moderate potential for impacts to surface water quality compared to other alternatives. Water main would cross four watercourses.
D (preferred option)	Considered feasible	Considered feasible. Expected highest capital cost, although it includes a shorter water main route of 3.7 km. Installation cost is greater due to the depth of the well.	Low potential for impacts to surface water quality. Water main would cross two watercourses.  Lowest potential changes to surface water quantity and flow due to greater depth.

in the Study Area. SAR includes those species identified on the Species at Risk Act (SARA) as a listed wildlife species and its critical habitat.

The proponent also looked at potential effects of the alternatives on the economic, social, and technical environments to satisfy the provincial process. The Environmental Impact Statement provides more information on this subject.

### **4.3 Agency's Assessment**

The Agency is satisfied that the proponent has considered alternatives to the Project. The Agency is also satisfied that the proponent has identified and assessed the environmental effects of technically and economically viable alternative means of carrying out the Project.

## 5. Consultation

### 5.1 Public Consultation Activities

Three formal public participation opportunities are being provided during this comprehensive study as required under the former Act. For this Project, the Agency provided public comment periods on the Draft EIS Guidelines and a Summary of the EIS. Notices of these opportunities to participate were posted on the Canadian Environmental Assessment Registry Website. Notices were also provided through local media. In addition, the Agency is currently inviting the public to provide comments on the CSR before issuing an EA decision statement. Table 5-1 shows the public consultation opportunities for this comprehensive study.

The Agency is currently inviting the public to comment on this comprehensive study report. The Minister of the Environment will consider this report and comments received from the public and Aboriginal groups in making an EA decision.

The proponent distributed project notices to members of the local community and published notices in local newspapers as part of their consultation activities. A public open house was held in the Town of Shelburne on October 22, 2012 that provided general information on the Project and environmental studies that have been conducted.

**The Minister of the Environment will consider this report and comments received from the public and Aboriginal groups in making an EA decision.**

The Agency supports public participation through its Participant Funding Program. A total of \$20,000 regular funding was available to facilitate the public's participation in the EA of this Project. However, no applications were received.

### 5.2 Aboriginal Consultation Summary

The federal government has a legal duty to consult and, where appropriate, to accommodate when its proposed conduct might adversely affect established or potential Aboriginal or treaty<sup>1</sup>. Aboriginal consultation is

**Table 5-1: Public Consultation Opportunities during the EA**

Document or Subject of Consultation	Dates
Draft EIS Guidelines	December 15, 2011 to January 30, 2012
EIS Summary	March 6, 2013 to April 5, 2013
Comprehensive Study Report	TBC

<sup>1</sup> Aboriginal rights are rights that some Aboriginal peoples of Canada hold as a result of their ancestors' long-standing use and occupancy of the land. The rights of certain Aboriginal peoples to hunt trap and fish on ancestral lands are examples of Aboriginal rights. Aboriginal rights vary from group to group depending on the customs, practices and traditions that have formed part of their distinctive cultures (Aboriginal Affairs and Northern Development Canada, <http://www.aadnc-aandc.gc.ca/eng/1100100014642/1100100014643>).

**The federal government has a legal duty to consult and, where appropriate, to accommodate when its proposed conduct might adversely affect established or potential Aboriginal or treaty right.**

also an important part of good governance and sound policy development and decision making. In addition to the federal government's constitutional obligations, the former Act requires that all federal EAs consider the effect of any project-related change in the environment, and also the effect of that change on current use of land and resources for traditional purposes by Aboriginal persons. The former Act also requires consideration of the effect of any project-related change in the environment on physical and cultural heritage, and "any structure, site, or thing that is of historical or archaeological significance," such as sites historically occupied by Aboriginal peoples.

The Agency served as Crown Consultation Coordinator (CCC) for the EA of this Project. The Agency, together with federal responsible authorities, integrated consultation activities into

the EA process to the greatest extent possible. Seven Aboriginal groups were identified as having a potential interest in the Project: Beausoleil First Nation, Chippewas of Georgina Island First Nation, Chippewas of Rama First Nation, Mississaugas of the New Credit First Nation, Saugeen First Nation, Six Nations of the Grand River Territory and the Métis.

The Agency communicated with the identified groups through phone calls, emails, letters, and meetings. These efforts supplemented the three formal public consultation opportunities noted in Table 5.1.

Through the Agency's Participant Funding Program (PFP), \$20,000 regular funding was available to reimburse eligible expenses incurred by the identified Aboriginal groups during their participation in the EA. No applications were received.

The Agency met with representatives of the elected Chief and Council of the Six Nations of the Grand River to outline the federal EA process, highlight the key stages of Aboriginal consultation, and invite feedback on the proposed consultation approach. Six Nations representatives voiced their wish to be kept informed of key developments in the EA process, which the Agency ensured took place as the EA progressed. Representatives of the elected Chief and Council of the Six Nations of the Grand River were the only identified Aboriginal group to request a meeting directly with the Agency.

The Haudenosaunee Development Institute (HDI) expressed interest in meeting directly with the proponent to discuss the Project. The HDI is the formal organization of the Six Nations of the Grand River traditional leadership, which exists in modern form as the Haudenosaunee Confederacy Chiefs Council (HCCC). The proponent and HDI met on December 5, 2012.

The meeting included a presentation on the Project and a summary of the EIS findings. In addition, HDI and the proponent discussed opportunities for HDI to be engaged regarding the development of current and future projects involving the Town of Shelburne.

The Project is located within an area that has a rich history in terms of Aboriginal traditional use and in the area of the pre-confederation Upper Canada treaties. Beausoleil First Nation, Chippewas of Georgina Island First Nation, Chippewas of Rama First Nation, the Mississaugas of New Credit, Six Nations of the Grand River and Saugeen First Nation are signatories to these pre-confederation treaties and continue to assert rights in the Project area. In particular, the Project is located within the original Haldimand Tract, which was a parcel of land purchased by the British Crown from the Mississauga in 1784. The Haldimand Tract was given to the Six Nations of the Grand River to provide a permanent settlement base as they had been displaced as a result of their allegiance to the British Crown during the American Revolutionary War. Although most of the land has been sold off in pieces, Six Nations continue to assert rights and title to the whole area. The Métis Nation of Ontario asserts traditional harvesting rights on behalf of Métis people throughout the province of Ontario, including in the Project area.

During the three formal opportunities, and as a result of the Agency's efforts to consult directly with potentially impacted Aboriginal groups, no substantive issues were raised relating to the potential for the Project to impact any of the communities' Aboriginal or treaty rights. In addition, the environmental effects of the Project are expected to be minimal. Therefore the Agency is satisfied that there are no potential adverse impacts of the Project on established or asserted Aboriginal or Treaty rights.

### **5.3 Summary of Issues Identified**

As noted above, no major concerns were raised relating to the potential for the Project to impact any of the communities' Aboriginal or treaty rights of the seven Aboriginal groups that were engaged as part of the EA for this Project.

Both the public and Aboriginal groups raised concerns regarding potential impacts to water availability and quality if a quarry proposed in Melancthon Township was allowed to proceed. However, the quarry proposal has since been withdrawn.

## 6. Environmental Effects Assessment

### 6.1 Approach

The Agency, in cooperation with other federal authorities and the Province of Ontario, evaluated the proponent's assessment of the Project's potential adverse environmental effects on the VECs. The analysis of environmental effects was based on information and technical supporting documents prepared and provided by the proponent, comments received during the public and Aboriginal consultation processes, and proposed mitigation measures.

Mitigation measures were specified to reduce potential adverse environmental effects. Many of these measures have been integrated into the Project design or operational plans. The environmental effects remaining after the implementation of mitigation measures—the residual effects—were evaluated using the *Reference Guide: Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects* (Federal Environmental Assessment Review, 1994). Appendix A provides a summary of the environmental effects assessment for the Project.

The requirements of the proposed follow-up program have been identified for those VECs where there may be uncertainty about the magnitude of an environmental effect and the effectiveness of proposed mitigation measures (see section 8.0).

### 6.2 Groundwater quantity and quality

Most of the study area is located in the Boyne River subwatershed, which is part of the larger Nottawasaga River watershed. The proposed well site is within the Grand River watershed and is within 120 m of the watershed divide with the Nottawasaga River. The proposed Project would create an intra-basin transfer

where water would be pumped from the Grand River watershed and treated wastewater would be discharged from the Shelburne Water Supply System into the Boyne River in the Nottawasaga River watershed. Underlying the study area, the Guelph and Gasport formations are regionally extensive aquifers that contain sufficient quantities for water for domestic use.

#### *Potential Environmental Effects*

The main potential effect on groundwater quality and quantity is from the long-term pumping of groundwater at the proposed well site, potentially resulting in drawdown of groundwater levels. Drawdown of groundwater during construction is considered temporary. During operation of the well, however, the horizontal radius of the predicted deep aquifer drawdown zone extends approximately one kilometre. Results of a 72-hour groundwater pumping test indicated that less than one meter of groundwater level drawdown is anticipated in wells greater than 300 m away and within the Guelph formation. The proponent's model of conceptual groundwater flow in the study area is depicted in Figure 6-1.

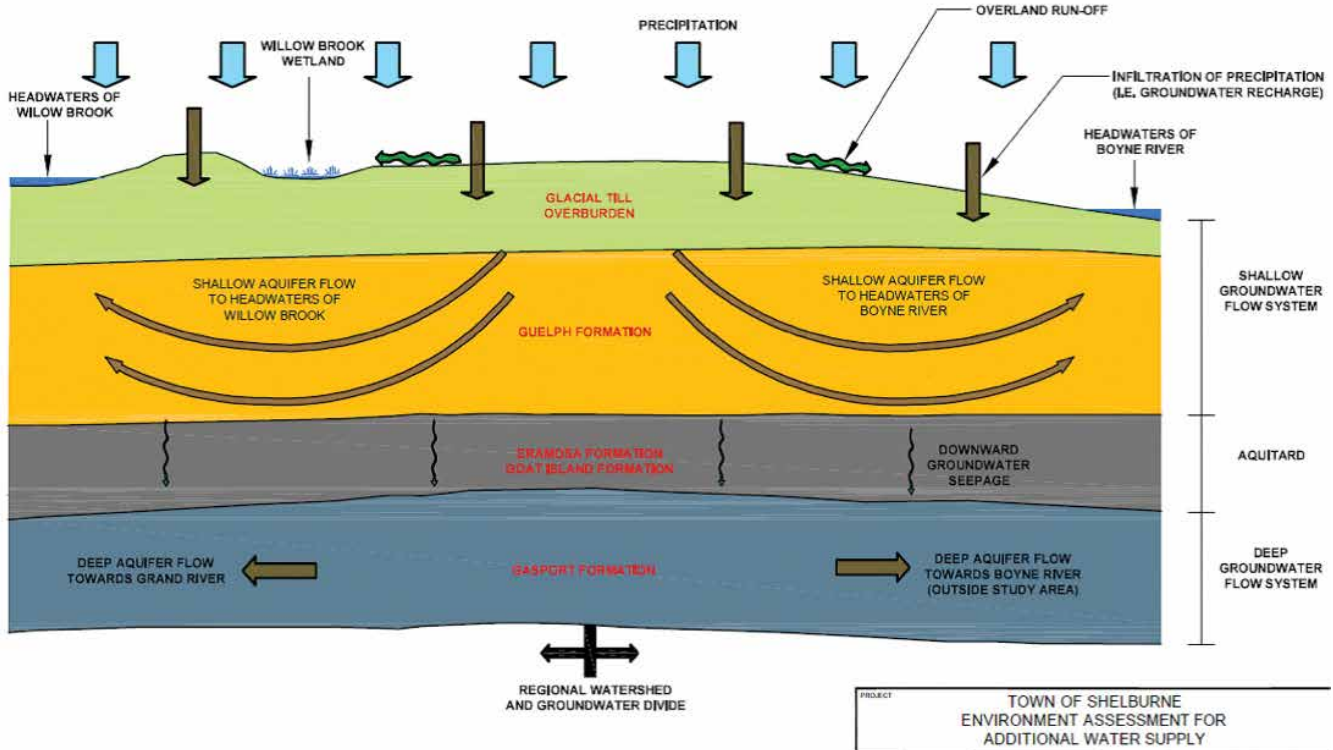
A drawdown in groundwater during operation may increase the arsenic levels in local private wells. Almost all local wells are completed in the shallow bedrock, and this shallow bedrock contains pyrite that can leach arsenic into the groundwater, and this leaching may be exacerbated by the drawdown of groundwater.

#### *Mitigation*

Private well owners within a 1.5 km radius of the well site will receive a letter from the Town at the time of commissioning providing information to respond to potential questions or concerns about their wells and water supplies. If private well owners complain during construction of



**Figure 6-1: Proponent's Model of Conceptual Groundwater Flow in the Study Area**



Source: Golder and Associates. Photos taken July 17, 2012.

the proposed well, these complaints will be investigated and resolved in accordance with the Ontario Ministry of Environment Permit to Take Water.

If it is determined that a local well owner has a reduced water supply caused by operation of the proposed well or if arsenic levels in private wells exceed provincial standards, the Town of Shelburne will either construct a deeper well(s) for the well owner(s), or connect them to the Town's public water supply.

**Monitoring and Follow up**

A groundwater level monitoring program will be implemented as part of the follow-up program to protect groundwater quantity and confirm predictions of groundwater drawdown. The pumping rate in the well cannot exceed the permitted rate of 1635 m<sup>3</sup>/day without a new provincial EA and Permit to Take Water.

Groundwater quality monitoring will be carried out as part of the Environmental Compliance Approval for operation of the proposed well.

Arsenic levels in private wells and the proposed well, in accordance with the ODWQS, will be monitored by the Town of Shelburne. Implementation of adaptive management measures, by way of the Ontario Environmental Permit to Take Water Approval, is also proposed in the follow-up program to confirm this conclusion.

**Government, Public and Aboriginal Comments**

Natural Resources Canada provided a technical review of information supplied by the proponent detailing groundwater quantity. When taking into account the groundwater monitoring follow-up plan, the reviewers were satisfied with the results of the environmental impact statement concluding that operation of the proposed well at 1,635 m<sup>3</sup>/day should not cause water loss to private well owners.

No specific concerns have been raised by public stakeholders or Aboriginal groups about the effects of the Project on groundwater quantity and quality.

### ***Agency Conclusions on the Significance of the Residual Environmental Effects***

The Agency concludes that the Project is not likely to cause significant adverse environmental effects to groundwater quantity and quality taking into account the implementation of the proposed mitigation measures.

## **6.3 Surface water quantity and quality**

Most of the study area is used for agriculture and contains several engineered drains to control surface water movement. Historical agricultural practices have modified the area and it now consists of a network of drains and wetlands influenced by human activity.

The main natural feature in the vicinity of the proposed well and water main route is the Willow Brook Wetland Complex consisting of swamp and marsh. Located within the Willow Brook Wetland Complex are three reaches of a municipal drain—the Amos Drainage Works. Reach 1 (Figure 6-2) contains abundant growth of cattail, willow shrubs and terrestrial grasses, and experiences variant water flow ranging from being completely dry to moderate flow during the spring runoff. Reach 2 (Figure 6-3) receives minimal flow, but does not experience completely dry conditions. Watercress, indicating groundwater seepage, was observed in Reach 2 during the proponent's field studies. Reach 3 (Figure 6-4), at the time of the study, was altered as a result of a beaver dam. Water flows of reaches 1 and 3 are heavily modified by agricultural practices and are likely dry during low-flow conditions. Water surplus within the headwaters leading into the Willow Brook Wetland Complex varies significantly throughout the year. Daily water surplus can range from 11,000 m<sup>3</sup>/day during the spring to no available surplus during the summer.

### ***Potential Environmental Effects***

Construction activities during installation of the watercourse crossing could increase suspended sediments in the Willow Brook Wetland Complex, and possibly impact fish and fish habitat.

Willow Brook Wetland Complex is a locally significant area for fish spawning and rearing and there is a commercial bait license for this wetland. As discussed in section 6.5, construction activities—stripping of topsoil and vegetation, soil erosion—during the installation of the watercourse crossing could increase suspended sediments in the Willow Brook Wetland Complex, and potentially negatively affect fish and fish habitat. The groundwater contribution toward the local surface water features is expected to be reduced by approximately 700 m<sup>3</sup>/day. In addition, seepage losses from surface catchments are predicted up to one kilometre around the proposed well site during operation of the well. Dry conditions during the summer currently exist due to lack of available water surplus. The long term operation of the proposed well at a rate of 1,635 m<sup>3</sup>/d should not affect the normal variation in water levels in the wetland or fish bearing reaches of Amos Drain. Seepage losses will not affect the seasonal habitat areas of low to no flow in summer and therefore fish and fish habitat availability is not expected to be adversely affected. The reduction in groundwater contribution due to the pumping of the proposed well is estimated to extend the dry conditions by two to four weeks. Residual adverse effects on surface water quality and quantity are not expected as a result of the Project.

### ***Mitigation***

The Town plans to implement techniques such as silt fencing along water courses to avoid sedimentation, culverts and sediment traps to filter runoff, and dust control measures to mitigate effects on surface water quality. Construction

work in the Willow Brook Wetland Complex area will be timed to mid to late summer to correspond with the dry channel period, thereby protecting sensitive fish life stages that occur in spring. If the channel is not dry and it is necessary to isolate the section to be crossed, a fish rescue operation will be undertaken. The Fisheries and Oceans operational statements for protection of fish and fish habitat will also be followed.

### ***Monitoring and Follow up***

A monitoring program will be undertaken to protect surface water quantity, whereby the depth of the Willow Brook Wetland Complex will be indirectly observed. Water in a monitoring well in close proximity to the Wetland Complex will be measured regularly. If the water level in the monitoring well drops by 2 m, the Town will conduct an investigation into whether or not the drop in water level was due to the pumping of the proposed well. Pumping will stop if this is the case until the groundwater is recharged. Continuous monitoring of the system by a supervisory panel and data acquisition system will occur during operations.



**Figure 6-2: Amos Drain Reach 1**

### ***Government, Public and Aboriginal Comments***

Natural Resources Canada suggested the two metre trigger be reassessed after the construction of the well to ensure that unanticipated low groundwater levels are identified prior to having negative effects on surface water levels in the Willow Brook Wetland Complex. Environment Canada recommended that construction activities in the Willow Brook Wetland Complex be avoided during the breeding season. The proponent has agreed to provide SAR training for all contractors, and to withhold construction activity during the migratory bird breeding period. Environment Canada also recommended that if at any time in the future the ground water is withdrawn at the higher capacity rate to which the water mains will be constructed, the Town of Shelburne will examine potential impacts.

### ***Agency Conclusions on the Significance of the Residual Environmental Effects***

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on surface water quantity and quality taking into account the implementation of the proposed mitigation measures.



**Figure 6-3: Amos Drain Reach 2**

Source: Golder and Associates.  
Photos taken July 17, 2012

Figure 6-4: Amos Drain Reach 3



Source: Golder and Associates.  
Photos taken July 17, 2012

## 6.4 Soils and terrain

The local terrain is gently rolling, with subdued ridges separating poorly drained swamps and bogs. As a result, several engineered drains have been established to control local surface drainage.

### *Potential Environmental Effects*

Stripping of topsoil at the well site and along the water main route, and excavation and backfilling during construction may temporarily disturb or remove soils, thereby modifying the terrain.

### *Mitigation*

The proponent will minimize the stripping of topsoil, and restore the disturbed areas with seed and mulch upon completion of construction. Appropriate erosion and sediment control measures will be implemented prior to work, and maintained during the work phase and thereafter.

## *Government, Public and Aboriginal Comments*

No specific concerns were raised by federal authorities, the public or Aboriginal stakeholders about the effects of the Project on soils and terrain.

### *Agency Conclusions on the Significance of the Residual Environmental Effects*

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on soil and terrain taking into account the implementation of the proposed mitigation measures.

## 6.5 Fish and fish habitat

Reach 1 of the Amos Drainage Works experiences bouts of complete dryness, and the abundance of cattail and terrestrial grasses in this reach suggests there is no potential for fish habitat. There were no fish observed in Reach 1 at the time of investigation. Reach 2 is located in the Willow Brook Wetland Complex, and is deeper than Reach 1. This wetland reach contains an abundance of watercress growth, which is considered an indicator of groundwater seepage, and contains permanent fish refuge habitat. Reach 3 provides refuge for fish but is heavily modified by agricultural practices and likely does not contain water during low flow conditions.

The wetland evaluation record for the Willow Brook Wetland Complex indicates that it is considered a locally significant area for fish spawning and rearing, and that there is a commercial baitfish license for this wetland [MNR, 1983]. No aquatic SAR was found to be living in the Amos Drainage Works.

### *Potential Environmental Effects*

Construction activities during installation of the watercourse crossing could increase suspended sediments in the Willow Brook Wetland Complex, and possibly impact fish and fish habitat.

In terms of water flow in the Willow Brook Wetland Complex, seepage losses from surface catchments are predicted up to one kilometre around the proposed well site during its operation. In addition, the groundwater contribution towards the local surface water features is expected to be reduced by approximately 700 m<sup>3</sup>/day. Dry conditions in the headwater areas currently exist during the summer months due to a lack of available water surplus. The reduction in groundwater contribution due to the pumping of the proposed well is estimated to extend the dry conditions by two to four weeks. Dry conditions during the summer currently exist due to lack of available water surplus. The long term operation of the proposed well at a rate of 1,635 m<sup>3</sup>/d should not affect the normal variation in water levels in the wetland or fish bearing reaches of Amos Drainage Works (municipal drain). See page losses will not affect the seasonal habitat areas of low to no flow in summer and therefore fish and fish habitat availability is not expected to be adversely affected.

### ***Mitigation***

The Town plans to implement techniques such as silt fencing along water courses to avoid sedimentation, culverts and sediment traps to filter runoff, and dust control measures to mitigate the effects on surface water quality during construction. Construction work will be timed to mid to late summer to correspond with the dry channel period, thereby protecting sensitive fish life stages that occur in spring. If the channel is not dry and it is necessary to isolate the section to be crossed, a fish rescue operation will be undertaken. The Fisheries and Oceans operational statements for protection of fish and fish habitat will also be followed.

### ***Monitoring and Follow up***

A monitoring program will be undertaken to protect surface water quantity whereby the depth of the Willow Brook Wetland Complex will be indirectly

observed. Water in a monitoring well in close proximity to the Wetland Complex will be measured regularly. If the water level in the monitoring well drops by 2 m, the Town will investigate whether or not the drop in water level was due to the pumping of the proposed well. Pumping will stop if this case until the groundwater has recharged. Continuous monitoring of the system by a supervisory panel and data acquisition system will occur during operations.

### ***Government, Public, and Aboriginal Comments***

The Department of Fisheries and Oceans and Natural Resources Canada provided a review of information prepared for the assessment by the proponent on fish and fish habitat. Natural Resources Canada and the Agency raised concerns about the pumping of the proposed well lowering groundwater and, in turn, reducing the water supply to the Willow Brook Wetland Complex, in particular to Reach 2. Natural Resources Canada suggested that the water level of Reach 2 be monitored for effects of the proposed well pumping. Fisheries and Oceans was satisfied that operational statements will be followed for the construction of watercourse crossings to protect fish and fish habitat. No other specific concerns were raised by the technical reviewers, the public or Aboriginal stakeholders about the effects of the Project on fish and fish habitat.

### ***Agency Conclusions on the Significance of the Residual Environmental Effects***

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on fish and fish habitat taking into account the implementation of the proposed mitigation measures.

## 6.6 Vegetation

There is limited natural vegetation in the Project site. The proponent has stated there were no rare plant species or vegetation communities found within and surrounding the Project site.

### *Potential Environmental Effects*

Construction activities, such as the stripping of topsoil at the well site and along the water main route, could adversely affect vegetation. Construction of the well house includes permanent removal of 2,500 m<sup>2</sup> of common herbaceous vegetation from a fallow field. Surface water impacts associated with operation of the well may also indirectly affect vegetation surrounding local watercourses.

### *Mitigation*

The proponent will limit vegetation clearing to only those areas absolutely necessary and retain riparian vegetation where possible. Vegetation retention zones will be designated to reduce vegetation removal. Stripping of topsoil and vegetation will be restricted to designated areas and along right of ways. All disturbed areas will be restored with topsoil and reseeded as soon as possible.

### *Government, Public, and Aboriginal Comments*

No specific concerns were raised about the Project's potential effects on vegetation by Environment Canada, the public or Aboriginal stakeholders.

### *Agency Conclusions on the Significance of the Residual Environmental Effects*

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on vegetation taking into account the implementation of the proposed mitigation measures.

## 6.7 Wildlife and wildlife habitat

The Willow Brook Wetland Complex provides wildlife habitat for common species such as muskrat, raccoon, beaver, mink, coyote and fox, and is locally significant for deer. Potential adverse environmental effects caused by the Project are identified for common species and for species at risk (SAR). SAR includes those species identified on the *Species at Risk Act* (SARA) as a listed wildlife species and its critical habitat.

Numerous birds have been confirmed as breeding in the study area; the majority of these birds are protected under the federal *Migratory Birds Convention Act*, 1994. Three of these species are designated as threatened on the Species At Risk in Ontario (SARO) list and protected provincially (under sections 9 and 10 of the Ontario *Endangered Species Act* (ESA)): the Bobolink (*Dolichonyx oryzivorus*), the Eastern Meadowlark (*Sturnella magna*) and the Barn Swallow (*Hirundo rustica*). In addition, the Eastern Meadowlark and the Barn Swallow are designated SAR that are threatened species (THR) federally (listed on Schedule 1 of SARA). Breeding activity of Bobolink and Eastern Meadowlark was observed within the fallowfield where the well house is located. At least one pair of Barn swallows is nesting in the culvert at the intersection of Hwy 89 and 4th Line Road.

### *Potential Environmental Effects*

The removal of vegetation and topsoil during clearing and grubbing could alter wildlife habitat. The culvert at Hwy 89 and 4th Line will not be altered and thus effects on Barn Swallow nests are not anticipated. The installation of fencing could fragment terrestrial wildlife habitat. Delivery of construction equipment may cause vehicular collisions with wildlife. In addition, there may be disturbance to wildlife, including SAR, due to noise, dust and the physical presence

of construction equipment. Indirect effects on wildlife may occur from changes in vegetation, soil and terrain during the construction phase and during maintenance activities.

In terms of water flow in the Willow Brook Wetland Complex, seepage losses from surface catchments are predicted up to one kilometre around the proposed well site during operation of the well. In addition to losses, the groundwater contribution towards the Willow Brook Wetland Complex is expected to be reduced. Dry conditions in the headwater areas currently exist during the summer months due to a lack of available water surplus. The reduction in groundwater contribution due to the pumping of the proposed well is estimated to extend the dry conditions by two to four weeks. The extension of dry conditions may affect the wildlife using the wetland complex habitat.

### *Mitigation*

Construction activities will be restricted to a footprint of approximately 2,500 m<sup>2</sup> for the well site and approximately 4,000 m<sup>2</sup> for the water main route, which is only a small portion of the study area. In addition, construction activities will be contained within existing right of ways. As a result, minimal vegetation removal will be required. Construction activities that could affect nesting migratory birds (e.g. vegetation clearing, site grubbing, site access, excavation and piling of soil and fill) will not take place in migratory bird habitat during the breeding period (core activity May 1–July 31). If construction activities are necessary during this period, a site survey will be conducted by an ornithologist prior to the start of construction work. In addition to the above, SAR species-specific mitigation for Bobolink, Eastern meadowlark and Barn swallow will be specified through negotiations with Environment Canada. SAR training will be provided for all contractors.

### *Government, Public, and Aboriginal Comments*

Environment Canada noted concern for SAR species and breeding habitat for migratory birds. The proponent has agreed to provide SAR training for all contractors, and to withhold construction activity during the migratory bird breeding period. No other specific concerns were raised by Environment Canada, the public or Aboriginal stakeholders about the Project's potential effects on wildlife.

### *Agency Conclusions on the Significance of the Residual Environmental Effects*

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on wildlife and wildlife habitat taking into account the implementation of the proposed mitigation measures.

## **6.8 Air quality**

Air quality levels in the study area are influenced by agricultural operations and Highway 89. The proponent reported on eight air-quality compounds; Suspended Particulate Matter, PM<sub>10</sub> and PM<sub>2.5</sub> particulates, nitrogen oxides (NO<sub>x</sub>), nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide (SO<sub>2</sub>), carbon monoxide (CO) and ozone (O<sub>3</sub>). All eight air-quality compounds were within the Canada-Wide Standards.

### *Potential Environmental Effects*

There is potential for degradation of air quality during construction as a result of increased emissions and dust from construction vehicles at the well site and water main route. The increase in emissions and dust will be temporary, only occurring during the construction phase. Stripping of topsoil at the well site and water main route during construction may also cause dust in the air.

### *Mitigation*

The proponent will ensure that proper dust suppression measures are used, such as watering or using a dust cover, along with ensuring all vehicular equipment is in good working order.

### *Government, Public, and Aboriginal Comments*

Environment Canada provided a technical review of information prepared for the assessment by the proponent on air quality. No specific concerns were raised by Environment Canada, the public or Aboriginal stakeholders about the Project's potential effects on air quality.

### *Agency Conclusions on the Significance of the Residual Environmental Effects*

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on air quality taking into account the implementation of the proposed mitigation measures.

## **6.9 Noise and vibration**

Noise levels in the study area are influenced by agricultural operations and Highway 89, and are within regulatory limits of the Ontario Model Municipal Noise Control By-Law.

### *Potential Environmental Effects*

Construction vehicles activity, generator use, and building of the well site and water main are anticipated to create noise and vibration. This increase in noise levels will be temporary and only during the construction phase of the Project. Noise levels are not expected to be much different than common agricultural practices and routine road maintenance. Vibration will occur during excavation, but is not anticipated to travel far enough to be felt by local residents.

Residual noise effects could be experienced by Hyland Heights Elementary School, located approximately 750 metres from the proposed water main construction.

### *Mitigation*

The proponent will ensure equipment is in good working order and that use of a generator during power failures will be minimized to reduce the adverse environmental effects of the Project on noise levels. Equipment will only be operated during daylight hours (in compliance with local by-laws) and any noise complaints will be investigated and resolved.

### *Government, Public, and Aboriginal Comments*

No specific concerns were raised by federal departments, the public, or Aboriginal stakeholders about the Project's potential noise and vibration effects.

### *Agency Conclusions on the Significance of the Residual Environmental Effects*

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on noise taking into account the implementation of the proposed mitigation measures.

## **6.10 Human Health**

### *Potential Environmental Effects*

Potential indirect effects on human health relate to potential effects on drinking water quantity and quality from private wells. The main potential effect on water quality is from the long-term pumping of groundwater from the proposed well, potentially resulting in drawdown of groundwater levels. Effects to groundwater during construction are considered temporary. During operation of the well, however, the



horizontal radius of the predicted deep aquifer drawdown zone extends approximately one kilometre. Results of a 72-hour groundwater pumping test indicated that less than one meter of groundwater level drawdown is anticipated in wells greater than 300 metres away and within the Guelph formation.

A drawdown in groundwater during operation could change the arsenic levels in local private wells. Local wells are shallow and dug in areas where the shallow bedrock contains pyrite. The microbial degradation of pyrite leaches arsenic into the groundwater, and this leaching may be increased by the drawdown, in turn increasing arsenic levels in groundwater.

### ***Mitigation***

The Project will meet all Provincial Water Quality Objectives and Guidelines for Canadian Drinking Water Quality and Recreational Water Quality.

If it is determined that a local well owner has a reduced water supply caused by operation of the proposed well, or if arsenic levels in private wells exceed provincial standards, the Town of Shelburne will either construct a deeper well(s) for the well owner(s), or connect them to the Town's public water supply.

### ***Monitoring and Follow up***

To protect groundwater quantity and confirm predictions with respect to groundwater drawdown, a groundwater and surface water level monitoring program will be implemented as part of the follow-up program. Private well owners within a 1.5 km radius of the well site will receive a letter from the Town at the time of commissioning providing information in the event they have questions or concerns about their wells and water supplies. If private well owners

complain during future operation of the proposed well, the Ontario Ministry of the Environment Permit to Take Water requires the proponent to investigate and resolve the complaints.

Arsenic levels in private wells and the proposed well will be monitored by the proponent in accordance with the ODWQS. Private wells will be sampled on a minimum of a quarterly basis and analysed with respect to the most recent provincial drinking water standard for arsenic.

### ***Government, Public, and Aboriginal Comments***

Natural Resources Canada provided a review of groundwater quantity. The department was satisfied that the 72-hour groundwater pumping test was close to the steady state groundwater drawdown condition that will occur over the long-term operation of the proposed well.

### ***Agency Conclusions on the Significance of the Residual Environmental Effects***

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on human health taking into account the implementation of the proposed mitigation measures.

## **6.11 Aboriginal Land and Resources Use**

The current use of land and resources for traditional purposes by Aboriginal groups is defined by the proponent as lands and resources of specific social, cultural or spiritual value communities with a focus on current use of land and resources (including terrestrial, freshwater and marine resources) for traditional purposes. No traditional use activities were identified as taking place in the study area.

### *Potential Environmental Effects*

No environmental effects on Aboriginal Land and Resources are expected.

### *Mitigation*

No mitigation measures are required.

### *Government, Public, and Aboriginal Comments*

Federal departments reviewed the information prepared for the assessment by the proponent. No specific concerns were raised about the Project's potential effects on Aboriginal land or resource use by federal departments, the public or Aboriginal stakeholders.

### *Agency Conclusions on the Significance of the Residual Environmental Effects*

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on Aboriginal land and resource use.

## **6.12 Physical and Cultural Heritage**

The location of the new well site is within an area of moderate archaeological potential as determined through a Stage 1 Archaeological Assessment. There is moderate potential of pre and post-contact aboriginal archaeological resources near the road right-of-ways of the study site. The study site also exhibits moderate potential for historical cultural material. No potential heritage resources were identified.

### *Potential Environmental Effects*

Disturbance to buried archaeological resources may occur during the construction phase of the Project.

### *Mitigation*

Artefacts will be removed and preserved properly. A Stage 2 Archaeological Assessment will be conducted.

### *Government, Public, and Aboriginal Comments*

The Ontario Ministry of Tourism, Culture and Sport (MTCS) provided a technical review of information prepared for the assessment by the proponent. No specific concerns were raised about the Project's potential effects on physical and cultural heritage by MTCS, the public, or Aboriginal stakeholders.

### *Agency Conclusions on the Significance of the Residual Environmental Effects*

The Agency concludes that the Project is not likely to cause significant adverse environmental effects on physical and cultural heritage taking into account the implementation of the proposed mitigation measures.

## **6.13 Effects of the environment on the Project**

This section addresses the effects of potential changes in the environment on the Project, as required under the former Act. Environmental factors identified by the proponent that could potentially affect the Project and result in an interruption of service or damage to infrastructure, or that could cause adverse effects to ecosystem components include: seismic activity, drought, winter freezing and ice during operations.

### *Potential Effects*

The Project is not located in a seismic zone and, as a result, potential effects associated with seismic activity are unlikely. The potential effect of drought

is a concern with climate change, which may affect water sources for drinking and irrigation.

Freezing temperatures may cause the water main to freeze and break, and chemicals used during construction or operations may freeze. Icing of roads and ground freezing may also make it difficult for construction and restrict accessibility to the water main.

### ***Mitigation***

No mitigation in the design of the Project as a result of seismic activity is required.

If extended periods of drought begin to affect the capacity of the well, the amount of groundwater extracted from the well may be reduced. The well may also be removed from service if static water levels reach an unsustainable level. If well conditions are affected by drought, Ontario's Ministry of the Environment has the authority to revise or suspend its Permit to Take Water to moderate the water taking of the proposed well.

The water main will be installed at a depth recommended by the Ministry of Environment design guidelines for water main installation in the Shelburne area (approximately 1.8 m) to protect it against the effects of icing and winter weather. Insulation will be used to surround the water main where this depth cannot be achieved. Additional mitigation will include the installation of temporary heaters and insulation, and timing construction to take place outside of winter months.

### ***Government, Public and Aboriginal Comments***

There have been no government, public or Aboriginal comments on the potential effects of the environment on the Project.

### ***Agency Conclusions on the Significance of the Residual Environmental Effects***

The Agency concludes that the effects of the environment on the Project will not likely be significant taking into account the implementation of the proposed mitigation measures.

## 7. Effects of possible accidents or malfunctions

An assessment was conducted to identify potential environmental effects on the study area’s VECs as a result of accidents and malfunctions during the proposed Project. Appendix A summarizes the environmental effects assessment for the Project.

### Potential Effects

The potential environmental effects associated with accidents and malfunctions considered in this assessment have been included in Table 7-1.

### Mitigation

The contractor will be required to develop plans to manage accidental spills, sedimentation, fire, equipment malfunction, and erosion onsite. The contractor and site operator will implement best management practices to ensure that potential effects from accidents and malfunctions are minimized. Spills will be immediately cleaned and contained in accordance with provincial regulatory requirements.

### Government, Public and Aboriginal Comments

No comments were received about accidents and malfunctions.

### Agency Conclusions on the Significance of the Residual Environmental Effects

The Agency concludes that significant adverse environmental effects are unlikely taking into account the implementation of the proposed mitigation measures.

### 7.1 Effects on capacity of renewable resources

Section 16(2) (d) of the *Canadian Environmental Assessment Act* states that the comprehensive study must “address the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and the future.” The effects of the Project on renewable resources were assessed in detail in the EIS. The proponent assessed effects to

**Table 7-1: Potential Environmental Effects Associated with Accidents and Malfunctions**

Accidents/Malfunctions	Groundwater quality and quantity	Surface water quality and quantity	Soils and terrain	Fish and fish habitat	Vegetation	Wildlife and wildlife habitat	Air quality	Noise	Human health	Aboriginal land and resources use	Physical and cultural heritage
Contaminant spill (fuel, oil, lubricant)	X	X	X	X	X	X	X		X	X	
Sedimentation from rainfall runoff		X		X	X	X				X	
Equipment fire					X	X	X		X	X	
Equipment malfunction							X	X		X	
Erosion from rainfall runoff		X	X	X	X	X				X	

groundwater resources that could result in a reduced capacity to provide drinking water and irrigation to the residents of the Town of Shelburne. The proponent determined that the Project is not likely to cause significant adverse environmental effects on the capacity of the groundwater. The Agency concludes that the Project is not likely to cause significant adverse environmental effects on capacity of renewable resources taking into account the implementation of the proposed mitigation measures.

## **7.2 Cumulative environmental effects**

### *Approach*

Cumulative environmental effects are defined as the effects of a project that are likely to result when a residual effect acts in combination with the effects of other projects or activities that have been or will be carried out. This cumulative effects assessment was guided by the Canadian Environmental Assessment Agency's Operational Policy Statement (Agency 2007) and the Cumulative Effects Assessment Practitioners Guide (Agency 1999).

### *Scoping*

The geographical area considered for cumulative effects was the general Project study area. The temporal boundary of the cumulative effects assessment extends through 2024, the extent of the current planning period for the Town, and includes population growth forecasts. Past, current and foreseeable projects and activities were reviewed within the general Project study area. Developments and activities were identified that, in combination with the construction and operation of the proposed well, pose overlapping type, timing or location effects to the environment. Appendix A summarizes the environmental effects assessment for the Project, including the cumulative environmental effects.

### *Mitigation*

No past projects and activities are anticipated to cause potential cumulative effects. Potential cumulative effects could result from reduced capacity of existing private wells, impacting groundwater quantity and quality. However, the proponent's assessment identified that the proposed well is located a sufficient distance from existing municipal wells, so that no interference or cumulative effects on the ground water system are anticipated. Additionally, the proposed well is located in a deeper bedrock aquifer, further reducing the potential for cumulative effects. There are no reasonably foreseeable projects or activities planned for the Town of Shelburne at this time. If and when a new project is proposed, potential overlapping effects to the environment will be mitigated by performing a cumulative effects assessment that will consider the proposed well.

### *Government, Public and Aboriginal Comments*

No comments were received regarding cumulative environmental effects.

### *Agency Conclusions on Cumulative Environmental Effects*

The Agency concludes that the Project is not likely to cause significant cumulative environmental effects taking into account the implementation of the proposed mitigation measures.

## 8. Follow-up Program

Under the former Act, every comprehensive study must consider the need for, and the requirements of, a follow-up program. The purpose of a follow-up program is to verify the accuracy of an EA and to determine the effectiveness of any measures taken to mitigate the adverse environmental effects of a project. The results of a follow-up program may also support the implementation of adaptive management measures to address previously unanticipated adverse environmental effects.

The VECs identified as requiring a follow-up program are wild life and wildlife habitat, groundwater quantity and quality, and surface water quantity. If construction is required during breeding season, Environment Canada will review a proponent prepared site survey conducted by an ornithologist prior to the start of construction work and provide advice on species specific mitigation for the following SAR species (Bobolink, Eastern meadowlark and Barn swallow). Groundwater requires follow-up monitoring because drawdown may affect the water levels of privately owned wells and may increase levels of arsenic leaching into groundwater. A follow-up monitoring program is necessary to prevent any potential adverse environmental effects due to the uncertainty of how groundwater levels and arsenic from the bedrock will react to long-term pumping of the proposed well. The groundwater drawdown may also decrease surface water quantity, which may affect fish and fish habitat.

Automated water level recorders will be installed at the Willow Brook Wetland Complex and in a well in proximity to the proposed well. Manual water level measurements will also be taken. The proponent will also respond to and investigate any complaints from owners of adjacent land about their private wells' performances to determine if the changes are a result of the Project. If local

well owners lose water from their private wells, the proponent will provide them with an alternate water supply.

Arsenic levels in private wells and the proposed well will be monitored by the Town of Shelburne in accordance with the ODWQS. Private wells will be sampled on a minimum of a quarterly basis during the first five years of continuous operation of the proposed well and analysed with respect to the most recent provincial drinking water standard for arsenic. If arsenic levels in private wells exceed provincial standards, the proponent will provide them with an alternate water supply.

**The purpose of a follow-up program is to verify the accuracy of an EA and to determine the effectiveness of any measures taken to mitigate the adverse environmental effects of a project.**

## 9. Benefits to Canadians

The Agency, with the assistance of federal and provincial government authorities, assessed the potential effects of the Project on VECs of concern to Canadians. As part of the EA process, the Agency and the proponent invited the public and Aboriginal groups to participate at key points in the EA. No major concerns were raised by the public or Aboriginal groups relating to the potential for the Project to cause adverse environmental effects. The Project design is improved to include mitigation measures, monitoring, and follow-up programs that will maximize environmental benefits and reduce or eliminate adverse effects of the Project on the environment. The Project design includes the following commitments:

- Implementing a groundwater and surface water level monitoring program to confirm the groundwater withdrawals at the proposed well site have no significant effects on groundwater supplies and surface water resources;
- Implementing erosion and sediment control measures (e.g., silt fences, filter bags);
- Ensuring that, during the construction phase, the construction contractor implements a traffic control plan and provide an emergency response and spills plan, as well as a copy of their health and safety policy;
- Reporting spills to necessary regulatory agencies; and
- Referring to DFO Operational Policy Statements during planning for watermain installation at watercourse crossings.

Currently the Town of Shelburne's drinking water meets the current standards for arsenic but is slightly above the potential new standards (25 to 10 µg). Upon receiving funding from INFC, development of the proposed well will allow the Town's drinking water to meet the potential change in the drinking water standards for arsenic. Accordingly, the development of the Project contributes to the support for a healthy

environment and economy; and allows for sustainable development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.

Overall, this project did not receive much benefit from the environmental assessment mainly because it will have limited adverse effects on the environment. This is consistent with the Agency's experience in conducting environmental assessments on other groundwater extraction projects in the past. With the coming into force of the *Regulations Designating Physical Activities* (the Regulations) on October 24, 2013, under the *Canadian Environmental Assessment Act, 2012*, environmental assessments will be focused on those physical activities with the greatest potential to cause significant adverse environmental effects in areas of federal jurisdiction. Given the limited adverse effects posed by groundwater extraction projects, these physical activities have been removed from the Regulations and will not require environmental assessments.

## 10. Conclusion and Recommendations of the Agency

Throughout the EA, the Agency has taken into account the following elements in determining whether or not the Project is likely to cause significant adverse environmental effects:

- documentation submitted by the proponent;
- information, analysis, and conclusions in this CSR;
- the opinions and comments of federal and provincial expert departments, Aboriginal groups and the public; and
- requirements of the follow-up program to be implemented by the proponent.

The environmental effects of the Project have been determined using assessment methods and analytical tools that reflect current best practices of environmental and socio-economic practitioners, including the consideration of cumulative effects and potential accidents and malfunctions.

The Agency concludes that the Project is not likely to cause significant adverse environmental effects, taking into account the implementation of the mitigation measures identified in this report.

Following a public consultation on this report, the Minister of the Environment will decide whether, taking into account the implementation of mitigation measures, the Project is likely to cause significant adverse environmental effects. The Project will then be referred back to INFC for an appropriate course of action in accordance with section 37 of the former Act.

**The Agency concludes that the Project is not likely to cause significant adverse environmental effects, taking into account the implementation of the mitigation measures identified in this report.**



# 11. Appendix

## Appendix A

### Summary of Environmental Effects Assessment and Proposed Mitigation Measures

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
<b>Physical Environment</b>					
Groundwater quantity and quality	<ul style="list-style-type: none"> <li>•Excavation and backfilling for watermain pipe installation;</li> <li>• Inspection and testing of Project components;</li> <li>• Construction of a backup well; and</li> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential effect of groundwater quality from accidental contamination sources due to construction and operation of the well and watermain.</li> <li>• Potential interference with existing private and municipal wells.</li> <li>• Potential connectivity to surface water sources.</li> <li>• Potential for changes in arsenic levels in local wells.</li> </ul>	<ul style="list-style-type: none"> <li>• Implement mitigation measures to protect surface water that could infiltrate through soil to groundwater;</li> <li>• Implement a groundwater and surface water level monitoring program as part of the follow up program.</li> <li>• Ensure sampling of water from nearby private wells is at a minimum on a quarterly basis during the first 5 years of continuous operation from the proposed well. These samples will be analyzed with respect to the most recent provincial drinking water standard for arsenic. If an increase in arsenic concentrations can be correlated to the operation of the proposed well, the Town will replace the water supply of private wells.</li> <li>• Implement Emergency response and spills contingency plan.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

*Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued*

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
Surface water quantity and quality	<ul style="list-style-type: none"> <li>• Stripping of topsoil at the well site and along the watermain route;</li> <li>• Installation of concrete foundation and construction of wellhouse;</li> <li>• Excavation and backfilling for watermain pipe installation;</li> <li>• Inspection and testing of Project components;</li> <li>• Site restoration including topsoil cover and re-vegetation;</li> <li>• Construction of a back-up well; and</li> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> </ul>	<ul style="list-style-type: none"> <li>• Construction activities may cause degradation to surface water quality as a result of increased suspended solids loading from soil erosion, as well as the potential for accidental spills of hazardous materials (i.e. oil, gas, lubricants).</li> <li>• During operations of the well the potential drawdown is expected to extend up to 1.0 km from the proposed well site. The effect of drawdown decreases with increasing distance from the well site. The Amos Drainage Works is located within the outer most portion of the 1.0 km drawdown area.</li> <li>• Potential losses to local surface water features may result in dry conditions of no water flow, or low water flow in the headwater areas may be extended from this loss be 2 to 4 weeks.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize stripping of topsoil and vegetation;</li> <li>• Restore disturbed areas as soon as possible to minimize the duration of soil exposure;</li> <li>• Restore the disturbed areas with seed and mulch that will maintain or enhance the local habitat upon completion of construction,;</li> <li>• Drain all portions of the work properly and efficiently during construction;</li> <li>• Provide temporary drainage and pumping to keep excavation and site free from water;</li> <li>• Control disposal or runoff or water containing suspended materials or other harmful substances in accordance with approval agency requirements;</li> <li>• Provide settling ponds and sediment basins as required;</li> <li>• Ensure water flow is not directed over pavements, except through approved pipes/troughs;</li> <li>• Use of appropriate erosion and sediment control measures (e.g., silt fences, filter bags) should be implemented prior to work and maintained during the work phase and beyond, as necessary to prevent runoff from the construction site and the movement of resuspended sediment;</li> <li>• Protect watercourses, wetlands, catch basins and pipe ends from sediment intrusion;</li> <li>• Complete restoration works following construction; and</li> <li>• Install straw bale check dams in ditchlines following rough grading of ditches.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

**Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued**

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
			<ul style="list-style-type: none"> <li>• Identify suitable locations for designating refueling and maintenance areas (e.g., away from watercourses, storm inlets, and natural areas);</li> <li>• Ensure refuelling or maintaining equipment does not occur within 30 m of watercourse;</li> <li>• Ensure cleaning of equipment does not occur in watercourses or in locations where debris can gain access to sewers or watercourses;</li> <li>• Prepare to intercept, clean-up, and dispose of any spillage which may occur (whether on land or water);</li> <li>• Ensure appropriate spills containment and clean-up materials are available at the site, and contractors are required to develop spill prevention and response procedures;</li> <li>• Train contractors adequately in spill response;</li> <li>• Clean and contain spills immediately in accordance with provincial regulatory requirements (MOE Spill Action Centre: 1 (800) 268-6060); and</li> <li>• Implement all reasonable measures to prevent the emptying of fuel, lubricants or pesticides into sewers or watercourses (e.g., maintain a minimum 30 m separation from all watercourse and drainage systems, do not clean equipment in watercourses).</li> <li>• Implement a surface water level monitoring program to confirm that effects on local surface water resources are in line with predictions.</li> </ul>		

**Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued**

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
Soils and Terrain	<ul style="list-style-type: none"> <li>• Stripping of topsoil at the well site and along the watermain route;</li> <li>• Construction equipment delivery and laydown;</li> <li>• Installation of concrete foundation and construction of well house</li> <li>• Installation of fencing;</li> <li>• Excavation and backfilling for watermain pipe installation;</li> <li>• Site restoration including topsoil cover and re-vegetation;</li> <li>• Construction of a back-up well; and</li> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> </ul>	<ul style="list-style-type: none"> <li>• Construction activities may result in the temporary disturbance and/or removal of soils along the watermain route and in the vicinity of the well site.</li> <li>• Toxic effects to soils could occur as a result from accidental spills or leaks during construction and operations.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize stripping of topsoil and vegetation;</li> <li>• Restore all disturbed with topsoil, hydro seeding or sod upon completion of construction;</li> <li>• Restore the disturbed areas with seed and mulch that will maintain or enhance the local habitat upon completion of construction.;</li> <li>• Ensure all portions of the work are properly and efficiently drained during construction;</li> <li>• Provide temporary drainage and pumping to keep excavation and site free from water;</li> <li>• Control disposal or runoff or water containing suspended materials or other harmful substances in accordance with approval agency requirements;</li> <li>• Provide settling ponds and sediment basins as required;</li> <li>• Avoid direct water flow over pavements, except through approved pipes/troughs;</li> <li>• Use appropriate erosion and sediment control measures (e.g., silt fences, filter bags) prior to work and maintain these measures during the work phase and beyond, as necessary to prevent runoff from the construction site and the movement of resuspended sediment;</li> <li>• Protect watercourses, wetlands, catch basins and pipe ends from sediment intrusion;</li> <li>• Complete restoration works following construction; and</li> <li>• Install straw bale check dams in ditchlines following rough grading of ditches.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
<b>Biological Environment</b>					
Fish and fish habitat	<ul style="list-style-type: none"> <li>• Stripping of topsoil at the well site and along the watermain route;</li> <li>• Excavation and backfilling for watermain pipe installation;</li> <li>• Site restoration including topsoil cover and re-vegetation;</li> <li>• Construction of a back-up well; and,</li> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> <li>• Clearing of riparian vegetation and stripping of topsoil at the watercourse crossings;</li> <li>• Disturbance of the channel bed and banks for the excavation of the watermain trench;</li> <li>• Accidental spills of hazardous materials from the construction equipment.</li> <li>• Clearing of riparian vegetation and stripping of topsoil at the entrance and exit locations for the tunneling equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Construction activities may cause degradation of water quality and habitat as a result of suspended solids loading from soil erosion, as well as potential spills of hazardous materials.</li> <li>• During operation, potential drawdown is expected to extend up to 1.0 km from the proposed well site. Effects on fish and fish habitat are expected to be minimal from drawdown.</li> <li>• Seepage losses could result in extended low flow periods which may have potential effects on fish and fish habitat. However, the system contains intermittent flow (low to no flow in summer) and the seepage losses will not affect the seasonal habitat in these intermittent reaches. There is sufficient storage in the wetland to maintain the permanent aquatic habitat in Reach 2 of the Amos Drain – the productivity capacity and habitat availability within the Amos Drain are not expected to be adversely affected.</li> </ul>	<ul style="list-style-type: none"> <li>• Limit the amount of clearing of riparian vegetation and where possible avoid grubbing the roots of woody vegetation to maintain bank stability.</li> <li>• Re-stabilize and re-vegetate exposed surfaces as soon as possible, using native vegetation.</li> <li>• Comply with the Fisheries and Oceans (DFO) operating statement for <i>Isolated or Dry Open Cut Stream Crossings</i>. Follow the <i>Measures to Protect Fish and Fish Habitat</i>.</li> <li>• Comply with the Fisheries and Oceans (DFO) operating statement <i>Punch and Bore Crossing or High Pressured Directional Drilling</i>. Follow the <i>Measures to Protect Fish and Fish Habitat</i>.</li> <li>• Time the crossings to coincide with the dry channel period. If the channel is not dry and it is necessary to isolate the section to be crossed, undertake a fish rescue operation;</li> <li>• Protect sensitive fish life stages by adhering to fisheries timing window for the protection of spawning fish, developing eggs and fry is March 15-July 15 based on DFO's Operational Statements (DFO 21) for the watercourse crossings (DFO, 2012a);</li> <li>• Re-instate the channel bed and banks to the previous condition (channel profile) using stockpiled channel materials from the excavation;</li> <li>• Implement site specific erosion and sediment control plans;</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> <li>• Residual adverse effects on the Amos Drain Works are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
			<ul style="list-style-type: none"> <li>• Install and maintain silt fences adjacent to watercourses throughout the construction period,</li> <li>• Implement site specific waste management, spill prevention and emergency response plans (construction and operation phases); and</li> <li>• Complete habitat quality assessment to evaluate the need for restoration activities in the event that a spill occurs, and containment and clean-up is not effective before spilled materials dissipate into the environment.</li> </ul>		
Vegetation	<ul style="list-style-type: none"> <li>• Stripping of topsoil at the well site and along the watermain route;</li> <li>• Construction equipment delivery and laydown;</li> <li>• Installation of concrete foundation and construction of wellhouse;</li> <li>• Installation of fencing;</li> <li>• Excavation and backfilling for watermain pipe installation;</li> <li>• Site restoration including topsoil cover and re-vegetation;</li> <li>• Construction of a back-up well; and</li> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> </ul>	<ul style="list-style-type: none"> <li>• Temporary or permanent removal of vegetation along watermain route and vicinity of well site.</li> <li>• Toxic effects from accidental spills or leaks.</li> <li>• Sensitive vegetation is unlikely to be affected by the Project.</li> <li>• Potential indirect effects on vegetation resulting from surface water-related impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• Restrict tree removal and vegetation clearing zones to those identified on the contract drawings and delineated in the field.</li> <li>• Identify vegetation retention zones on contract drawings and delineated in the field.</li> <li>• Empty appropriate vegetation clearing techniques.</li> <li>• Restrict stripping of topsoil and vegetation to designated areas and along right of ways.</li> <li>• Ensure excavate material stockpiles are not placed within drip lines of trees not designated for removal.</li> <li>• Trim damaged branches and roots of trees not designated for removal.</li> <li>• Restore all disturbed areas with topsoil, hydro-seeding or sod as soon as possible.</li> <li>• Implement spill response measures.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> <li>• The vegetation communities identified in the proximity of the Project site are not considered to be rare and are quite common in rural southern Ontario.</li> </ul>

Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
Wildlife and wildlife habitat	<ul style="list-style-type: none"> <li>• Stripping of topsoil at the well site and along the watermain route;</li> <li>• Construction equipment delivery and laydown;</li> <li>• Installation of concrete foundation and construction of well house;</li> <li>• Installation of fencing;</li> <li>• Excavation and backfilling for watermain pipe installation;</li> <li>• Site restoration including topsoil cover and re-vegetation; and</li> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> </ul>	<ul style="list-style-type: none"> <li>• Removal of vegetation during construction activities and installation of fencing may potentially fragment habitat.</li> <li>• Delivery of construction equipment may cause vehicular collisions with wildlife.</li> <li>• Disturbance to wildlife including SAR, may also occur due to noise, dust, and the physical presence of construction equipment.</li> <li>• Wildlife could become trapped in unattended ditches or excavated areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Limit clearing to only those areas absolutely necessary to safely install, maintain and operate the new well site and watermain.</li> <li>• Restrict tree removal to areas designated by the Contract Administrator;</li> <li>• Provide protective measures to safeguard trees from construction activities;</li> <li>• Ensure equipment or vehicles will not be parked, repaired, or refueled near the dripline area of any tree not designated for removal;</li> <li>• Ensure construction activities that could affect nesting migratory birds (e.g. vegetation clearing, site grubbing, site access, excavation and piling of soil/fill) do not take place in migratory bird habitat during the core breeding period, from May 1–July 31; if activities are necessary during this period, a site survey should be conducted by an ornithologist prior to the commencement of construction work. SAR species-specific migration will be outlined in the <i>Information Gathering Form</i> and through negotiations with the Environment Canada.</li> <li>• Install exclusion fences (e.g. silt fences) in advance of work to clearly mark sensitive areas (i.e., riparian areas) and to prevent wildlife from entering the Project site;</li> <li>• Use dust prevention measures (i.e., watering).</li> <li>• Advise the contractor that harassing or harming wildlife is prohibited.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

*Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued*

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
			<ul style="list-style-type: none"> <li>• Ensure wildlife incidentally encountered during construction will not be knowingly harmed;</li> <li>• Restore lands upon completion of the Project with native vegetation, including re-seeding exposed areas.</li> <li>• Inform the contractor that disturbance of all existing culverts should be avoided during the breeding season to protect migratory bird species. Ensure contractor staff receive SAR training and are aware of all regulatory requirements and requirements outlined in the Endangered Species Act permit, should one be required.</li> <li>• Monitor and site check trenches at the end and start of each working day.</li> </ul>		



Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
<b>Atmospheric Environment</b>					
Air Quality	<ul style="list-style-type: none"> <li>• Stripping of topsoil at the well site and along the watermain route;</li> <li>• Construction delivery and laydown;</li> <li>• Installation of concrete foundation and construction of well house;</li> <li>• Installation of fencing;</li> <li>• Installation of pump system and components;</li> <li>• Installation of water treatment facilities;</li> <li>• Excavation and backfilling for watermain pipe installation;</li> <li>• Site restoration including topsoil cover and re-vegetation;</li> <li>• Construction of a backup well; and</li> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential for degradation of air quality as a result of increased emissions and dust from construction activities.</li> <li>• During operations, if a power loss occurs the standby diesel generator may be used. The potential effects from the standby diesel generator will be temporary.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure all construction equipment is in good working condition.</li> <li>• Ensure all staff is adequately trained in the proper use of the construction equipment.</li> <li>• Use appropriate dust suppression materials and measures.</li> <li>• Minimize the use of the standby diesel generator.</li> <li>• Minimize the use of the generator at the new well by operating other wells during emergency situations.</li> <li>• Implement a traffic management plan.</li> <li>• Cover or wet down dry materials and rubbish to prevent blowing dust and debris;</li> <li>• Avoid the use of chemical dust control products adjacent to watercourses;</li> <li>• Avoid excavation and other construction activities with potential to release airborne particulates, during windy and prolonged dry periods;</li> <li>• Cover or otherwise contain loose construction, materials that have potential to release airborne particulates during their transport installation or removal;</li> <li>• Spray water to minimize the release of dust from gravel, paved area and exposed soils. Use chemical dust suppressants only where necessary on problem areas; and</li> <li>• Use water to suppress dust during any concrete cutting.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

**Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued**

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
Noise and vibration	<ul style="list-style-type: none"> <li>• Stripping of topsoil at the well site and along the watermain route;</li> <li>• Construction equipment delivery and laydown;</li> <li>• Installation of concrete foundation and construction of well house;</li> <li>• Installation of fencing;</li> <li>• Installation of pump system and components;</li> <li>• Installation of water treatment facilities;</li> <li>• Excavation and backfilling for watermain pipe installation;</li> <li>• Site restoration including topsoil cover and re-vegetation.</li> <li>• Construction of a backup well;</li> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> <li>• Inspection and testing of project components;</li> <li>• Construction of watercourse crossing.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential effects on noise and/or vibration levels as a result of construction vehicles and equipment.</li> <li>• Under normal operating conditions, the well and watermain route activities will not have an effect on noise and/or vibration levels.</li> <li>• The standby diesel generator could be used in case of emergency and during maintenance/ testing, which will increase noise and/or vibration levels.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure equipment is in good working condition and operating quietly prior to accessing the site;</li> <li>• Maintain equipment regularly during the construction phase;</li> <li>• Minimize use of portable standby generator during power failures;</li> <li>• Operate equipment only during daylight hours in order to be in compliance with noise by-laws 45-2004, 43-2004 and 31-2002 from the Town of Shelburne, Township of Amaranth and Township of Melancthon, respectively; and</li> <li>• Investigate any noise complaints during construction and operation and a commitment to work with the complainant to try to resolve the issue.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
<b>Socio-Economic Environment</b>					
Human Health	<ul style="list-style-type: none"> <li>• Not applicable</li> </ul>	<ul style="list-style-type: none"> <li>• Potential indirect human health effects relate to water quality, noise and/or vibration and air quality effects.</li> </ul>	<ul style="list-style-type: none"> <li>• Apply mitigation measures for effects on groundwater quality and quantity (that include constructing a deeper well(s) if arsenic levels in private wells exceed provincial standards or connect private well owners to the Town's public water supply) to ensure adverse effects on human health are minimized.</li> <li>• Apply mitigation measures for effects on noise and/or vibrations (that include operating equipment only during daylight hours and minimizing the use of a generator during power failures) to ensure that adverse effects on human health are minimized.</li> <li>• Apply mitigation measures for effects on air quality (that include dust suppression measures such as watering or using a dust cover, and using vehicular equipment that are in good working order) to ensure that adverse effects on human health are minimized.</li> <li>• Implement a groundwater and surface water level monitoring program as part of the follow up program.</li> <li>• Ensure sampling of water from nearby private wells is undertaken at a minimum on a quarterly basis during the first five years of continuous operation. Analyze these samples with respect to the most recent provincial drinking water standard for arsenic. Replace the water supply in private wells. If an increase in arsenic concentrations can be correlated to the operation of the proposed well.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

**Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued**

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
Aboriginal land use and resource use	<ul style="list-style-type: none"> <li>• Stripping of topsoil at the well site and along the watermain route;</li> <li>• Construction equipment delivery and laydown;</li> <li>• Installation of concrete foundation and construction of well house</li> <li>• Installation of fencing;</li> <li>• Excavation and back filling for watermain pipe installation;</li> <li>• Site restoration including topsoil cover and re-vegetation;</li> <li>• Construction of a backup well;</li> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> <li>• Inspection and testing of Project components;</li> <li>• Construction of watercourse crossing.</li> </ul>	<ul style="list-style-type: none"> <li>• Although the Project is located in traditional Aboriginal lands, no adverse effects on land claims, treaty, title rights or on the use of land for traditional purposes is likely to result from the Project.</li> </ul>	<ul style="list-style-type: none"> <li>• Apply mitigation measures described for effects on physical environment, biological environment and atmospheric environment to ensure that effects on Aboriginal land use and resources use are minimized.</li> </ul>	<ul style="list-style-type: none"> <li>• No residual adverse effects on land claims, treaty, title rights or on the use of land for traditional purposes is expected.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

**Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued**

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
Physical and cultural heritage (archaeological)	<ul style="list-style-type: none"> <li>• Stripping of topsoil at the well site and along the watermain route;</li> <li>• Construction equipment delivery and laydown;</li> <li>• Installation of concrete foundation and construction of well house</li> <li>• Installation of fencing;</li> <li>• Excavation and back filling for watermain pipe installation;</li> <li>• Site restoration including topsoil cover and re-vegetation;</li> <li>• Construction of a backup well;</li> <li>• Construction of watercourse crossing.</li> </ul>	<ul style="list-style-type: none"> <li>• A Stage 1 Archaeological Assessment determined the new well site is within an area of moderate archaeological potential.</li> <li>• Potential for construction activities to disturb buried archaeological resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Remove and preserve artefacts.</li> <li>• Conduct further assessment (i.e., Stage 2 Archaeological Assessment, and if necessary Stage 3 Archaeological Assessment and Stage 4 Archaeological Assessment).</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
<b>Malfunctions and Accidents</b>					
Malfunctions and accidents	<ul style="list-style-type: none"> <li>• Contaminant spill/ accident involving construction or operator equipment or transported materials (e.g., fuel oil and lubricants).</li> <li>• Sedimentation resulting from rainfall and runoff at the Project site.</li> <li>• Erosion resulting from rainfall and runoff.</li> <li>• Equipment fire.</li> <li>• Equipment malfunction.</li> </ul>	<ul style="list-style-type: none"> <li>• Potential effect on groundwater quality in shallow and deep aquifer.</li> <li>• Potential effect on surface water quality in nearby watercourses.</li> <li>• Obstruction to flow as a result of sedimentation.</li> <li>• Potential effect on soil quality.</li> <li>• Potential effect in fish and fish habitat in nearby watercourses.</li> <li>• Potential destruction of fish and fish habitat.</li> <li>• Potential damage or destruction of native vegetation species.</li> <li>• Potential damage or destruction of native wildlife species and habitat.</li> <li>• Potential deterioration of air quality neat the Project site.</li> <li>• Potential increase in noise levels on the construction site.</li> <li>• Potential effect on water quality in shallow and deep aquifer.</li> <li>• Potential deterioration of air quality near the Project site.</li> </ul>	<ul style="list-style-type: none"> <li>• Require contractors to develop and implement accidental spills management plan in-line with the Town of Shelburne’s Emergency Response Plan.</li> <li>• Ensure spills are cleaned and contained immediately in accordance with provincial regulatory requirements (MOE Spills Action Centre: 1 (800) 268-6060).</li> <li>• Require contractors to develop and implement sediment control plan.</li> <li>• Require contractors to develop and implement erosion control plans.</li> <li>• Develop and implement Contingency Plan for the construction and operation phases, including equipment fire procedures.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

**Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued**

<b>Environmental Component</b>	<b>Project-Environmental Interaction(s)</b>	<b>Potential Effect(s)</b>	<b>Proposed Mitigation Measure(s)</b>	<b>Residual Effect (After Mitigation)</b>	<b>Agency Significance</b>
<b>Cumulative Effects</b>					
Cumulative effects on groundwater quantity	<ul style="list-style-type: none"> <li>• Activities adjacent to the well site.</li> <li>• Sectorial projects that affect groundwater extraction and use.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced capacity or existing private wells.</li> <li>• Potential to lower groundwater levels from pumping of both privately owned wells and the Town's well.</li> <li>• Potential effects on human health from depleting groundwater resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor and plan to ensure Shelburne is adequately serviced with safe drinking water. Procedures and contingency plans for the operations phases briefly describe some of the procedures in place to ensure the Town is adequately managing the SWSS.</li> <li>• Continue to carry our servicing reviews to ensure that new demands for drinking water are met.</li> <li>• Respond and address any concerns from the public (including adjacent private well users) relating to drawdown in the study area from the well.</li> <li>• Monitor groundwater level on a quarterly basis during the first five years of continuous operation.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>
<b>Effects of the Project on the Environment</b>					
Seismic activity	<ul style="list-style-type: none"> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> </ul>	<ul style="list-style-type: none"> <li>• Damage to Project infrastructure in the event of a seismic activity.</li> </ul>			
Climate change	<ul style="list-style-type: none"> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> </ul>	<ul style="list-style-type: none"> <li>• Increased temperatures resulting from climate change could influence groundwater quantity thereby affecting operation of the proposed well.</li> <li>• Potential limited availability of drinking water as sources are threatened by drought.</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce the amount of groundwater extracted from the well in order to keep it in operation;</li> <li>• Remove the well from service if the static water levels reach an unsustainable level;</li> <li>• Investigate a new groundwater source (i.e., new groundwater or surface water source, or connect into another municipal water system); and</li> <li>• Implement mandatory conservation programs.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>

**Appendix A: Summary of Environmental Effects Assessment and Proposed Mitigation Measures continued**

Environmental Component	Project-Environmental Interaction(s)	Potential Effect(s)	Proposed Mitigation Measure(s)	Residual Effect (After Mitigation)	Agency Significance
Ice and winter operations	<ul style="list-style-type: none"> <li>• All construction activities.</li> <li>• Routine operations and maintenance at the well site and along the watermain route.</li> </ul>	<ul style="list-style-type: none"> <li>• Freezing temperatures may cause the watermain to freeze and break, and chemicals used during construction or operations may also freeze.</li> <li>• Icing of roads and ground freezing may also make it difficult for construction and restrict accessibility to the watermain.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure the watermain is installed at a depth recommended by the MOE design guidelines for watermain installation in the Shelburne area (approximately 1.8 m). Where this depth cannot be achieved insulation surrounding the watermain will be used.</li> <li>• Install a tracer wire to assist with locating the watermain if a break occurs;</li> <li>• Ensure construction occurs prior to the winter months and ground freezing;</li> <li>• Ensure the pumphouse has suitable insulation in its design to prevent freezing within the treatment facility. Provide heating within the facility; and</li> <li>• Use temporary heating during construction to avoid the freezing of chemicals.</li> </ul>	<ul style="list-style-type: none"> <li>• With mitigation measures, residual adverse effects are not likely.</li> </ul>	<ul style="list-style-type: none"> <li>• Significance effects are not likely.</li> </ul>