Comprehensive Study Report

Upgrading of the Elora Well System

Prepared For:

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1.0 INTRODUCTION

1.1 Proposed Project

The Corporation of the Township of Centre Wellington, located west of Guelph in the Province of Ontario, has proposed to construct a new municipal groundwater supply well (Well E4) to replace an existing supply well (Well E2) that is groundwater under the direct influence of surface water and interferes with the operation of another existing municipal well (Well E3). The proposed project includes the drilling of a bedrock well (E4), the construction of a pumphouse and ground level reservoir for disinfection treatment and installation of approximately 1.28 km of watermain along Wellington County Road 21 and Cottontail Road. The new supply well will augment the existing well sources (Wells E1 and E3) and will permit the decommissioning of Well E2.

1.2 Federal Environmental Assessment Requirement

The proposed Upgrading of the Elora Well System Project was initiated under the terms of the Canada-Ontario Infrastructure Program (COIP), which is administered by Industry Canada. This program was initiated in 2000 as a partnership between the federal, provincial and municipal governments to improve urban and rural municipal infrastructure in Ontario. In accordance with the terms of the COIP partnership agreement, each party provides an equal financial contribution to approved projects.

The *Canadian Environmental Assessment Act* applies to federal authorities when they contemplate some action in relation to a project that would enable it to proceed in whole or in part. A federal environmental assessment may be required when a federal authority:

(a) is the proponent of a project;
(b) provides financial assistance to the proponent;
(c) makes federal lands available for the project; or
(d) issues certain permits or licences, or other approvals.

A federal environmental assessment is therefore required prior to a decision being made by Industry Canada to fund the proposed project.

Part III, item 10 of the *Comprehensive Study List Regulations* requires that a comprehensive study be conducted for projects proposing an expansion of a facility for the extraction of 200,000 m^3/a or more of ground water. The proposed Upgrading of the Elora Well System involves the construction of a new municipal well supply capable of providing approximately 447,910 m^3/a. Accordingly, a comprehensive study was completed for the proposed project.

No other federal land, funding, or approvals are required for the proposed project.

1.3 Provincial Environmental Assessment Requirement

The proposed project was also subject to a Provincial Class Environmental Assessment developed for municipal infrastructure projects (i.e., roads, water and wastewater projects)

and followed the procedures set out in the *Municipal Engineers Association Class Environmental Assessment* (Class EA) document. With respect to the proposed project, certain project components were considered Schedule B activities (i.e., development of a new ground water supply). Schedule B projects generally include improvements and minor expansions to existing facilities with a potential for some adverse environmental impacts. Projects are approved following the completion of a formal environmental screening process.

The Provincial Class EA for the proposed project was carried out between October 2000 and February 2003 and concluded that the construction of Well E4 at the Cottontail Road site in Elora was preferred over upgrading Well E2. Well E2 was considered groundwater under the direct influence of surface water due to its close proximity to the Grand River and interfered with the operation of Well E3.

Provincial approvals for the proposed project included approvals under the Ontario Water Resources Act (Permit to Take Water) and the Safe Drinking Water Act Part V (Municipal Drinking Water System).

2.0 Scope of the Proposed Project

The scope of the project includes the construction, operation and decommissioning of a new municipal well supply and decommissioning of an existing municipal well, and included:

- drilling of Well E4
- construction of a pumphouse and ground level reservoir for water treatment and distribution
- construction of approximately 1.28 km of watermain to connect the new well to the existing Elora water distribution system
- operating the facility 365 days a year for 15 hours each day for a total annual taking of approximately 447,910 m^3 for a minimum of 5 years when the Permit to Take Water requires renewal
- decommissioning of Well E4 is not expected for 50 to 100 years
- decommissioning of Well E2

The Upgrading of the Elora Well System project has been proposed to address known deficiencies with the existing waterworks, including:

- well interference between Well E2 and Well E3
- poor aesthetic water quality at Well E2 and classification of Well E2 as groundwater under the direct influence of surface water due to its close proximity to the Grand River
- shortage of water supply for the community.

3.0 Description of the Existing Environment

The proposed Well E4 supply is located in the southwest section of the community in an area that is predominantly agricultural in character. The 528 m^2 site is situated on lands described as Cottontail Road on Lot 1, Concession 1 and 2, East of the Grand River (EGR), Geographic Township of Pilkington, Township of Centre Wellington.

The subject property is situated within an agricultural area which includes a number of active farms. The farms lie immediately to the west and east of the site.

Soils in the vicinity of the proposed project are classified as sandy Wentworth till. Natural drainage is to the south and west with discharge of the nearby local drainage ditch (approximately 145 m southeast of the site) to Swan Creek and eventually to the Grand River. It is estimated that local shallow ground water flow in the vicinity of the site is to the southeast. It is estimated that the regional deep groundwater flow in the project area is to the southwest.

The proposed well site is comprised almost entirely of a gravel parking area and disturbed areas naturalized with hydroseeding. The existing tree cover includes several mature maple and oak trees and does not include sensitive species or species at risk. There is also little vegetation on the approach to the site given the previously constructed access road. However, mature trees and scrub apple trees line the access road. Local vegetation includes areas restored by hydroseeding and undisturbed natural areas.

The Elora Well E4 site does not exhibit any cultural heritage features which would be affected by the project. There are also no substantive Aboriginal communities evident within the regional boundary of this project.

Watermain installation will be undertaken within existing road rights-of-way with negligible environmental impacts.

Existing Well E2 is located within a built-up residential area and is approximately 220 m from the Grand River.

4.0 Assessment of Likely Environmental Effects and Mitigation

This comprehensive study report considers the potential adverse environmental effects of the project on the following environmental components:

- Ground water quantity and quality
- Surface water quantity and quality
- Vegetation
- Species at risk
- Migratory birds
- Wildlife
- Noise
- Air quality
- Local land uses neighbourhood and residents
- Worker health and safety
- Public health and safety
- Aesthetics
- Heritage and historical cultural resources

Table 4.1

Upgrading of the Elora Well System
Summary of Environmental Effects

Environmental Component	Potential Project Effects						Residual Effects	
	Potential Adverse Effect?			Potential for Full Impact Mitigation?			Are Effects Significant?	
	Yes	No	Uncertain	Yes	No	Uncertain	Yes	No
Physical and Natural Environment								
Ground Water Quantity	✓				✓			✓
Ground Water Quality	✓			✓				✓
Surface Water Quantity		✓						✓
Surface Water Quality	✓			✓				✓
Fish and Fish Habitat	✓			✓				✓
Vegetation	✓				✓			✓
Species at Risk	✓			✓				✓
Migratory Birds	✓			✓				✓
Wildlife	✓			✓				✓
Noise	✓			✓				✓
Air Quality	✓			✓				✓
Socio-Economic and Cultural Environment								
Adjacent Land Use	✓			✓				✓
Local Neighbourhoods and Residents	✓			✓				✓
Worker Health and Safety	✓			✓				✓
Public Health and Safety	✓			✓				✓
Aesthetics		✓						✓
Heritage and Historical Cultural Resources		✓						✓
Environmental Conditions								
Seismic Activity		✓						✓
Climate Change	✓			✓				✓
Winter	✓			✓				✓

Environmental Component	Potential Project Effects						Residual Effects	
	Potential Adverse Effect?			Potential for Full Impact Mitigation?			Are Effects Significant?	
	Yes	No	Uncertain	Yes	No	Uncertain	Yes	No
Malfunctions and Accidents								
Construction Phase	✓			✓				✓
Operations Phase	✓			✓				✓
Decommissioning Phase	✓			✓				✓
Cumulative Effects								
Future Development Activities	✓			✓				✓

Taking into consideration the implementation of mitigation measures, the review of the potential interactions between the proposed project and these environmental components did not result in the identification of any likely significant adverse environmental effects.

Also assessed were likely effects of the environment on the project, the effects of accidents and malfunctions, and cumulative effects. Where effects were identified, mitigation measures were proposed to avoid, minimize, or compensate for these effects.

5.0 Assessment of Cumulative Effects

An assessment of the potential for the residual effects of the proposed project to result in adverse environmental effects when combined with other projects that have been or will be carried out, was also conducted. The cumulative assessment focused on increased flow to the Elora sewage treatment plant and existing and additional groundwater taking for the Elora well system. No likely significant adverse cumulative effects were identified.

6.0 Public Consultation

The public consultation program for this Comprehensive Study incorporated the following components:

- A public registry was established for the project and listed on the Canadian Environmental Assessment Registry (Reference Number: 05-03-10258)

- A public notice detailing the public consultation period (21 days) for the draft scoping document and notifying the public of the availability of participant funding for participation in the study was published in two local community newspapers on June 24 and June 29, 2005 and was also posted on the Industry Canada and Canadian Environmental Assessment Agency Internet sites. No written or oral comments were received.

- A second public notice detailing a second public consultation period (21 days) and providing the public with the opportunity to submit comments or concerns related to the environmental implications of the proposed project was circulated in two local community newspapers on September 20 and 22, 2006 respectively. One written comment was received that included concerns regarding the ponding of water in the fields near the well site.

The Canadian Environmental Assessment Agency (the Agency) will conduct a public comment period following the completion of the comprehensive study report, at which time, the public will be provided with a 30-day review period to submit written comments on the project to the Agency. Notices detailing the completion of the report and the review periods will be advertised in local community newspapers.

7.0 Monitoring and Follow-up Program

A Follow-up program was designed to verify the accuracy of the EA predictions and to confirm that the mitigation measures identified were effective. The Follow-up program was limited to the potential long-term impacts of the project on ground water quantity and

quality, because standardized construction procedures with well-documented mitigation have been proposed and ground water resources represent the most likely environmental feature to be adversely impacted by project implementation. The Follow-up program will include:

- Monitoring of existing wells in the area, including private wells, to confirm the impacts resulting from the pumping of Well E4. Findings of this monitoring exercise will confirm the validity of the hydrogeologic study work with respect to ground water quantity.
- Ground water quality monitoring will be conducted in accordance with the certificate of approval issued by the provincial MOE. Findings from this monitoring exercise will confirm the validity of the hydrogeological study work with respect to ground water quality.

Monitoring and reporting activities associated with the federal Follow-up Program will be carried out for a period of two (2) years from the time that Well E4 is commissioned. If interference problems are found, remedial measures will be taken to address the identified problems and additional monitoring and reporting will occur, as necessary.

Industry Canada and the Agency will be provided with the data generated from the Follow-up program (as summarized in an annual report). The availability of the findings from the Follow-up program will be made posted on the CEA Registry.

8.0 Conclusions and Recommendations

The environmental effects of the project were considered including the environmental effects of accidents and malfunctions, effects of the environment on the project, alternative means to complete the project, the capacity of renewable resources and cumulative effects. Mitigation measures were identified to address any potential effects of the project. Taking into consideration the implementation of mitigation, Industry Canada has concluded that the construction, operation and decommissioning of the proposed Upgrades to the Elora Well System Project are not likely to result in any significant adverse environmental effects. A Follow-up program has also been designed to ensure the accuracy of this conclusion.

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1.0 INTRODUCTION

1.1 Purpose and Overview of Project

The Corporation of the Township of Centre Wellington, the project proponent, is considering a plan to upgrade the Elora Well System to address the need for additional supply capacity within the community for a 15-year planning period. The project includes the development of a new well supply (Well E4) to replace a well supply (Well E2) that has been designated as groundwater under the direct influence of surface water, has poor water quality and interferes with the operation of Well E3. Also included is the construction of watermain to connect the planned facilities to the existing water distribution system. The new well supply will augment the existing well sources (Well E1 and E3) and will permit the decommissioning of Well E2.

The planned improvements to the existing municipal water system constitute the *Upgrading of the Elora Well System Project.* Project contacts are as follows:

Municipal Contact:

Ken Elder, Director of Public Works
Corporation of the Township of Centre Wellington
1 MacDonald Square
Elora, ON
N0B 1S0
kelder@centrewellington.ca

Consultant Contact:

Christine M. Furlong, P. Eng.
Triton Engineering Services Limited
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Fergus, ON
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1.2 General Description of the Community and the Municipal Water System

The community of Elora, Ontario is a small urban settlement within the boundaries of the Township of Centre Wellington, a constituent municipality of the County of Wellington. Elora is situated along Wellington County Road 7 in the central part of both the Township of Centre Wellington and Wellington County. The village, which has an estimated population of 4942, is predominantly a low-density residential centre that also contains a well-developed commercial sector (servicing local residents and the surrounding agricultural community). Figure No. 1 in Appendix A provides a general location plan of Elora within Centre Wellington Township.

Water is supplied to customers in Elora via a municipal water system first commissioned in 1949. The system, referred to as the Elora Water Works, is currently comprised of three drilled bedrock well supplies (Wells E1 & E3 are active, Well E2 is not in service), three pumphouses, two elevated water tower storage facilities, and a network of distribution watermain. The system provides service to approximately 1922 residential, commercial and institutional customers.

A series of problems have been identified with the existing waterworks including the following:

- Inadequate reserve capacity. The Elora water system requires additional supply to replace Well E2 to achieve a reserve capacity greater than the maximum day demand required for existing, committed and future growth.

- Well E2 Deficiencies. Well E2 has been classified as groundwater under the direct influence (GUDI) of surface water and does not provide adequate treatment to comply with current Provincial treatment regulations. Engineering evaluations and reports carried out in response to the Ontario Drinking Water Protection Regulation (O. Reg. 459/00) resulted in the identification of a number of well upgrades required for Well E2. Prior to committing to the necessary upgrades for Well E2, the Township reviewed alternatives using the Municipal Engineers Association Class Environmental Assessment process.

Through the Provincial Class EA planning process, the proponent selected the construction of a new well (Elora Well E4) as the preferred strategy for resolving the identified problems. The evaluation included the review of impacts on the natural and socio-economic environments of the area, impacts on the operation of other existing municipal and private water supplies, resource quality, sustainability and protection, land availability and proximity to existing distribution system infrastructure.

1.3 Project Description

1.3.1 General

The project involves the development of a new well supply, extension of the existing distribution system and the decommissioning of existing municipal Well E2. A site for the new municipal well supply was selected after consideration of technical investigations, environmental impacts, and potential benefits. The proposed site for Well E4 is located within the unopened road right-of-way of Concession Road 1 (Cottontail Road) in the former Pilkington Township. The distribution system will be extended within the road allowances of Wellington County Road 21 and Cottontail Road for a distance of approximately 1.28 km.

1.3.2 Elora Well E4 Supply

The proposed well supply, referred to as Well E4, is located in an agricultural area on the perimeter of the community of Elora. The well site will be located within the unopened road right-of-way of Cottontail Road to the southwest of Elora. The new site is situated on lands described as Lot 1, Concession 1, East of the Grand River, Geographic Township of Pilkington, Township of Centre Wellington.

The principal features planned for the project are as follows:

- Development of a municipal well supply capable of providing a total supply capacity of 1227 m^3/day.

- Construction of a 189.5 m^3 above grade reservoir/chlorine contact tank.

- Construction of a pumphouse to house pumping and treatment equipment. The pumphouse will be combined with the reservoir to create one structure.

- The extension of watermain along Wellington County Road 21 and Cottontail Road for 1.28 km.

- Decommissioning and abandonment of Well E2.

1.4 Regulatory Context

1.4.1 Federal Environmental Assessment Requirement

The Township of Centre Wellington initiated the Upgrading of the Elora Well System Project under the terms of the Canada-Ontario Infrastructure Program (COIP). This program was initiated in 2000 as a partnership between the federal, provincial and municipal governments to improve urban and rural municipal infrastructure in Ontario. In accordance with the terms of the COIP partnership agreement, each party provides an equal financial contribution to approved projects.

Municipalities proposing infrastructure projects and related activities requiring financial assistance from the Government of Canada must adhere to the environmental assessment requirements prescribed by the *Canadian Environmental Assessment Act* (CEA Act). Pursuant to section 5 of the CEA Act, a federal environmental assessment must be conducted before a decision on the funding allocation can be made by the Government of Canada

With respect to groundwater extraction, Part III, item 10 of the *Comprehensive Study List Regulation*s prescribes that comprehensive studies are required for projects proposing the construction of a facility with a supply capacity exceeding 200,000 m^3 per year. The Upgrading of the Elora Well System Project involves the construction of a new municipal well supply capable of providing approximately 447,910 m^3 per year. Accordingly, completion of a comprehensive study process is required before a decision can be made by Industry Canada to provide federal COIP funding for the proposed works.

1.4.2 Provincial Environmental Assessment Requirement

Municipalities proposing infrastructure projects and related activities must adhere to the environmental assessment requirements prescribed by the *Environmental Assessment Act* of Ontario (EA Act). In general, the intent of the EA Act is to establish a project review process to promote the protection, conservation and effective management of the environment (the context of environment under the EA Act includes the natural, social, cultural, built and economic environments).

The EA Act prescribes two types of environmental assessment planning and approval processes:

Individual Environmental Assessments (Part II). Proponents of projects subject to Part II of the EA Act are required to prepare project-specific Terms of References and carry out individual environmental assessments (subject to Provincial Ministry of Environment (MOE) review and approval).

Class Environmental Assessments (Part II.1). Proponents of projects subject to Part II.1 of the EA Act are required to fulfil the procedural requirements of an approved class environmental assessment process for a specific class of activities. Providing the approved process is followed, the project is deemed to comply with the EA Act.

The proposed improvements to the Elora Well System were subject to the Class Environmental Assessment developed for municipal infrastructure projects (i.e., roads, water and wastewater projects). The study process followed the procedures set out in the *Municipal Class Environmental Assessment* (Class EA) document. Appendix 1 of the Class EA document, entitled "Project Schedules", defines the specific project schedule applying to various roads, water and wastewater activities. With respect to the Upgrading of the Elora Well System Project, certain project components were considered Schedule B activities under the terms of Appendix 1 (e.g., development of new groundwater supplies and decommissioning of existing municipal wells). Schedule B projects generally include improvements and minor expansions to existing facilities with a potential for some adverse environmental impacts. Projects are approved following the completion of a formal environmental screening process.

The Township of Centre Wellington carried out the Schedule B Class EA investigation between October 2000 and February 2003. Triton Engineering Services Limited (Triton) was retained to coordinate the Class EA process on behalf of the Township. A Technical Steering Committee comprised of representatives from the Township, Anderson Geologic Limited (providing hydrogeologic services) and Triton was formed to provide direction to the project.

1.4.3 Local Jurisdiction

The community of Elora was founded in the early 1800's along the banks of the Grand River and Irvine Creek. On January 1st, 1999, the Town of Fergus, the Village of Elora and the Townships of Pilkington, West Garafraxa and Nichol amalgamated to form the Township of Centre Wellington. The new Township has a population of more than 24,260 permanent residents and a land base of approximately 407 km^2. In general, Centre Wellington is comprised of two urban centres (Fergus and Elora) with the remainder of the Township predominantly rural. Elora represents one of the urban settlements in the Township of Centre Wellington, having an estimated population of 4942 persons and a land base of approximately 350 ha. The community is located along Wellington County Road 7 with the Grand River flowing through the centre of the community.

Elora is characterized as a low-density residential community, which incorporates a traditional downtown commercial core and a limited amount of highway commercial development (along the route of County Road 7). The community also contains a number of institutional facilities and benefits from the provision of municipal water and wastewater facilities. In general, the scale and nature of development evident in Elora is consistent with smaller urban communities throughout south western Ontario.

The Township of Centre Wellington functions as the owner and operator of municipal water supply facilities in Elora, as well as the Fergus water system. Accordingly, the Township has the authority to implement the proposed upgrades to the Elora Well System.

1.5 Roles of Federal Agencies

1.5.1 Responsible Authority

Industry Canada, as the federal agency administering COIP, has been identified as the Responsible Authority (RA) for this comprehensive study. Industry Canada is subsequently

responsible for (1) coordinating the consultation and documentation components of the comprehensive study; and, (2) making a recommendation to the federal Minister of the Environment (the Minister) as to whether or not any significant adverse environmental effects associated with the proposed works are likely. The broad mandate of the RA, as defined in Section 11(1) of the CEA Act, is to, "*Ensure that the environmental assessment is conducted as early as is practicable in the planning stages of the project and before irrevocable decisions are made*".

1.5.2 Federal Environmental Assessment Coordinator

The Canadian Environmental Assessment Agency (CEAA) was designated as the federal environmental assessment coordinator (FEAC) for this comprehensive study.

The following represent the key roles of the FEAC:

- Coordinate the involvement of federal authorities in a comprehensive study.
- Ensure that a one-window approach is utilized to assemble and disseminate project information.
- Facilitate coordination and cooperation among federal authorities and other study participants.
- Coordinate the harmonization of the federal and provincial environmental assessment processes, as applicable.

1.5.3 Expert Federal Authorities (FA's)

At the outset of the comprehensive study process, a number of potential expert FA's were identified that could provide expert advice or specialized knowledge for consideration during the environmental assessment. The expert FAs identified for this study included:

- Environment Canada
- Natural Resources Canada
- Health Canada

The expert FA's do not have an EA decision-making responsibility with respect to the project.

1.6 Roles of First Nations

The community of Elora and the surrounding rural area is not a traditional territory for First Nations and no First Nations interest has been identified or declared with respect to this project.

Preliminary details on the proposed project sites were circulated to the Ministry of Culture (Heritage & Libraries Branch, Southwest District) for comment. The Ministry evaluated the proposal taking into consideration its defined screening criteria and its database of known historical sites in the vicinity of the proposed works, including First Nations communities. In correspondence dated March 21, 2006, the Ministry advised that the proposed site does not appear to have the potential to impact upon buried cultural heritage resources.

1.7 Roles of Non-Aboriginal Communities

Non-Aboriginal Communities do not inhabit lands situated within the regional boundary of this project, as defined in section 1.9.1 of this report, and no Non-Aboriginal Community interest has been identified or declared with respect to this project.

1.8 Scope and Timing of the Environmental Assessment

1.8.1 Comprehensive Study Scoping Document and Report to Minister

A *Comprehensive Study Scoping Document* was prepared for this project in June 2005 and was advertised on June 24 and 29, 2005 in two local newspapers. Pursuant to section 21(1) of the CEA Act, a public consultation was completed with respect to the proposed scope of the project for the environmental assessment, the factors to be considered in the assessment, the proposed scope of those factors, and the ability of the comprehensive study to address issues related to the project. The scoping document is included as Appendix B to this report.

Pursuant to section 21(2) of the CEA Act, after this consultation was complete, the scoping document was incorporated into an *Environmental Assessment Track Report* that was submitted to the Minister of Environment (Minister) for a decision on whether to continue the environmental assessment as a comprehensive study, or to refer the project to a mediator or review panel in accordance with Section 29 of the CEA Act.

The Minister's decision to continue the assessment as a comprehensive study was released on August 30, 2006.

1.8.2 Scope of the Project

The scope of the project refers to the various components (i.e. construction, operation, modification, decommissioning) of the undertaking that are considered as part of the project for the purpose of the environmental assessment.

Specifically, the scope of the project identified for the environmental assessment of the Elora well system upgrades includes:

- Decommission and abandon well site E2 (includes demolition of the existing pumphouse facility)
- construction of well components capable of providing a supply of approximately 22.7 L/s (1226 m^3/day, 447,417 m^3/yr) at the E4 well site
- construction of a pumphouse to house treatment and pumping equipment, and an in-ground reservoir
- installation of a transmission water main approximately 1275 m in length along existing road allowances to connect the E4 well site to the Elora water distribution system
- construction equipment access, laydown areas
- operation and maintenance of the new well, pumphouse, treatment processes and the transmission watermain
- site rehabilitation
- decommission the E4 well site at the end of the project's operational life

1.8.3 Scope of Assessment

(a) Factors to be Considered

The CEA Act requires that the following factors be considered in the environmental assessment (sections 16(1) and 16(2)):

- 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 from the project in combination with other projects or activities that have been or will be carried out;
- the significance of the effects referred to in the previous paragraph;
- comments from the public that are received in accordance with this Act and its regulations;
- 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 any such alternative means;
- the need for, and the requirements of, any follow-up program in respect of the project; and
- the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.
- Any other matter deemed relevant by a responsible authority such as the need for the project and alternatives to the project

(b) Scope of Factors Considered

The following provides details on the scope of the factors that were considered in the federal environmental assessment.

Physical and Natural Environment

- Ground water quantity and quality
- Surface water quantity and quality
- Fisheries and aquatic resources
- Vegetation, including wildlife habitat and biodiversity
- Species at risk federal and provincial
- Migratory birds, particularly with respect to the potential for disturbance or destruction of migratory birds or their nests
- Wildlife
- Noise
- Air quality – local and downwind airborne emissions (including odours and volatiles)

Socio-Economic and Cultural Environments

- Adjacent land uses (development patterns, downstream effects, potential contamination sources)
- Local neighbourhood and residents
- Worker health and safety

- Public health and safety
- Aesthetics
- Heritage and historical cultural resources

Malfunctions and Accidents

The probability of possible malfunctions or accidents associated with the project during construction, operation, modification, decommissioning, abandonment or other undertaking in relation to the work, and the potential adverse environmental effects of these events, were identified. The assessment included review of the following:

- Accidental spills where applicable.
- Contingency plans and measures for responding to emergencies.

Changes to the Project Caused by the Environment

The environmental hazards that may affect the project were described and the predicted effects of these environmental hazards were documented. The following issues have been addressed in the environmental assessment and the design of the project:

- Seismic activity
- Climate change
- Effects of winter on the project

Cumulative Environmental Effects

The cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out were identified and assessed. Cumulative environmental effects are defined as: *The effect on the environment which results from effects of a project when combined with those of other past, existing and imminent projects and activities.* The cumulative effects assessment focused on:

- increased flow to the Elora sewage treatment plant.
- existing and additional groundwater takings for the Elora Well System

Sustainability of the Resource

Renewable resources that may be significantly affected by the project and the criteria used in determining whether their sustainable use will be affected (including the sustainable use of the ground water system) were considered.

1.9 Spatial and Temporal Boundaries

1.9.1 Spatial Boundaries

The proposed project is located both within and outside of the Elora Community limits. The following describes the spatial boundaries identified for this study:

- The right-of-way includes any land area that is directly disturbed by the construction activities of the project. This includes: the new E4 well site; the E2 well site; the route of the transmission watermain along Wellington County Road 21 and Cottontail Road and any associated construction equipment access routes and lay down areas.

- The corridor includes any area beyond the right-of-way, which could be disturbed by project effects. This includes effects during construction (noise, dust, vehicle emissions, traffic, etc) and would include a proposed area approximately 250 m beyond the right-of-ways. The corridor also includes possible effects, including accidents and malfunctions (for example, failure of the new watermain extension, chemical spills, etc) as it relates to operation of the water system and would include an area of approximately 500 m beyond the right-of-way.

- The regional boundary includes an area beyond the project corridor, this being the greater of one kilometre or the extent of the area affected by the project. This will include the effects of construction activities (noise, dust, vehicle emissions, etc), operational activities (possible negative effects of draw down because of the system's groundwater withdrawal) and effects that the increased system capacity could have on the Elora sewage treatment plant (possible negative effects from increased treatment volumes and decreased surface water quality).

1.9.2 Temporal Boundaries

The following describe the temporal boundaries identified for the EA:

- The short term temporal boundary of the project will last approximately eight months and includes the construction and commissioning phases of the project. This includes activities such as: the construction and commissioning of the new well and pumphouse; the installation of a transmission watermain and its connection to the Elora distribution system; and the decommissioning of Well E2. It also includes activities related to construction equipment access, lay down areas as well as any accidents and malfunctions that may be associated with the construction phase of the project.

- The medium term temporal boundary of the project is to be two years, which is the length of the Federal Follow-up Program, and includes activities such as: the effectiveness of site restoration; possible accidents and malfunctions (for example - chemical spills, watermain failure) as it relates to operation of the water system and possible negative effects of draw down because of the system's groundwater withdrawal.

- The long term temporal boundary for the project will last up to the operational life expectancy of the project which is greater than 50 years and includes activities such as: possible accidents and malfunctions (for example - chemical spills, watermain failure) as it relates to operation of the water system and possible negative effects of draw down because of the system's groundwater withdrawal.

1.10 Design of Follow-up Program

The purpose of the follow-up program is to verify the accuracy of impact predictions and determine the effectiveness of mitigation measures. Elements of the follow-up program are identified in Section 13.

1.11 Study Framework

This report summarizes the study process conducted for the comprehensive study and includes the following principal components:

- Environmental Assessment objectives, approach and the study methodology.
- Identification of alternatives to the project and alterative means of carrying out the project.
- Description of the project components and related activities.
- Identification of the construction plan and construction timetable.
- A summary of the environmental setting.
- An evaluation of the environmental effects of the project and planned mitigation.
- Information on the public consultation program.
- Conclusions regarding the significance of residual environmental effects of the project.
- Details on the need for and requirements of a Follow-up program.

2.0 ENVIRONMENTAL ASSESSMENT OBJECTIVES, GENERAL APPROACH AND METHODOLOGY

2.1 Objectives and General Approach

The broad intent of the EA process is to minimize, or avoid, adverse environmental effects and to incorporate environmental factors into the federal government's decision-making process. To meet this intent and to assess the impact of pumping of Elora Well E4 at a rate of 1363 LPM for 15 hours a day, the following activities were conducted during this comprehensive study process:

- Existing environmental conditions were identified (baseline conditions, inventories);
- Potential environmental effects were described;
- Technically and economically feasible mitigation measures were identified and evaluated;
- Residual effects taking into account the implementation of mitigation were identified; and,
- A prediction regarding the likelihood of significant adverse environmental effects, taking into account the implementation of mitigation measures, was provided.

The identification of baseline conditions and evaluation of potential impacts was completed during the provincial Class EA process. A variety of activities were incorporated into this analysis, including spatial analysis, field reconnaissance, consultation with affected stakeholders, municipal staff and regulatory agencies, and expert opinion from subconsultants.

Valued Ecosystem Components (VEC's) for this project were selected by considering all of the potential interactions between the project components (and their associated activities) and various aspects of the environment. If it was thought that a potential interaction could exist, that environmental factor was included as a VEC. The result was the following list of VEC's:

- Ground water quantity and quality
- Surface water quantity and quality
- Fisheries and Aquatic Resources
- Vegetation
- Species at risk
- Migratory birds
- Wildlife
- Noise
- Air quality
- Adjacent land uses
- Local Neighbourhoods and Residents
- Worker Health and Safety
- Public Health and Safety
- Aesthetics
- Heritage and Historical Cultural Resources

The environmental effects of the project on these VEC's are discussed and evaluated in section 6.0 of this report.

The selection of mitigation measures incorporated an assessment of mitigation requirements and an evaluation of alternative forms of mitigation. This assessment was based on the consideration of three broad approaches to mitigation; avoidance, minimization of negative effects on VEC's and compensation.

The prediction of residual environmental effects involved an impact analysis of the planned works following the application of mitigation. The determination of significant adverse environmental effects involved evaluating any likely residual effects associated with the project with respect to factors such as magnitude, duration, reversibility, frequency and geographic extent.

Comments received through the public consultation process and through consultation with the expert FA's were taken into consideration during the evaluation exercise. Table 13.1 summarizes the comments received through consultation.

2.2 Related Investigations

2.2.1 General

Several specialized evaluations were carried out to assess the environmental effects of the planned works on the defined VEC's. The scope of these evaluations is generally summarized below. The findings of these investigations are described in detail in subsequent sections of this report.

2.2.2 Hydrogeology

Anderson Geologic Limited conducted hydrogeological testing for Well E4 to confirm the sustainability of the bedrock aquifer over the planning period, the quality of water provided by the well supply and the impacts of well operation on the surrounding hydrogeologic environment (i.e., existing well supplies). Existing water well records and aquifer mapping were compiled and reviewed to provide a hydrogeologic interpretation of the Elora area. Ground water level monitoring of existing wells was also conducted as part of the long-term testing procedure. This study was completed during the Provincial Class EA process.

2.2.3 Vegetation Resources

An examination of potential impacts of the planned project on vegetation resources was carried out for the study area. This included a review of background information on terrestrial vegetation, Areas of Natural and Scientific Interest (ANSI's), wetlands and Species at Risk as found on the Grand River Conservation Authority's and Environment Canada's websites.

2.2.4 Wildlife Resources

An examination of the potential impacts of the planned project on wildlife resources was carried out for the study area. This included a review of background information on

terrestrial wildlife, ANSI's, wetlands and species at risk known to exist in the vicinity of the regional boundary as found on the Grand River Conservation Authority's and Species at Risk websites.

2.2.5 Cultural Heritage Resources

A preliminary assessment of cultural resources was conducted by the Ontario Ministry of Culture to examine the potential impacts of the project on cultural heritage resources.

2.2.6 Health and Socio-Economic Impacts

An evaluation of potential impacts of the project was carried out with consideration for several indicators of health and socio-economic conditions including noise pollution, public safety, workers safety, aesthetics, odour and dust levels, vehicular traffic volumes, water quality and land use compatibility. The assessment included an analysis of information obtained from construction design specifications, applicable planning policies and regulations and input from review agencies. Health and socio-economic matters within the regional boundary of the study were considered during this assessment.

2.3 Determination of the Significance of Adverse Environmental Effects

Paragraph 16(1)(a) of the CEA Act prescribes that the significance of the environmental effects of a project including the effects of malfunctions and accidents associated with the project and any cumulative effects likely to occur from the project and other projects that have or will be carried out, must be evaluated.

The nature and significance of residual environmental effects resulting from the project and alternatives to the project were determined through an assessment of the following impact predictors (i.e.**,** impact characteristics).

- Direction (nil, positive, negative).
- Nature (direct, indirect, cumulative).
- Magnitude (level of effect, loss of function).
- Location/ Extent (where effect occurs, number/ volume affected).
- Scale (localized or regional effects).
- Timing (seasonality of effects, immediate or delayed impacts).
- Duration (period of impact).
- Frequency (intermittent or continuous).
- Reversibility (extent of recovery, recovery time).
- Ecological Context (characteristics of population affected, implications for future generations and other trophic levels).
- Socio-economic and cultural context (characteristics of affected community, implications for recovery).

For the purposes of this EA, impact determination criteria developed by Natural Resources Canada has been applied to predict the magnitude of residual effects resulting from the implementation of the project and alternatives to the project. Table 2.1 summarizes the impact criteria.

Table 2.1
Residual Environmental Effects:
Criteria for Impact Determination

Level of Effect	General Criteria
High	Implementation of the project could threaten sustainability of resource (VEC) and should be considered a management concern. Additional remediation, monitoring and research may be required to reduce impact potential.
Moderate	Implementation of the project could result in a resource decline below baseline, but impact levels should stabilize following project completion and into the foreseeable future. Additional management actions may be required for mitigation purposes.
Low	Implementation of the project could have a limited impact upon the resource during the lifespan of the project. Research, monitoring and/or recovery initiatives may be required for mitigation purposes.
Minimal/ Nil	Implementation of the project could impact upon the resource during the construction phase of the project but would have a negligible impact on the resource during the operational phase.

Given the criteria defined in Table 2.1, for this EA determination of the significance of residual effects is based on the following considerations:

- Residual impacts from this project assessed as having a Moderate or High level of effect on a given VEC would be considered significant adverse environmental effects.

- Residual impacts from this project assessed as having a Minimal/ Nil to Low level of effect on a given VEC would not be considered significant adverse environmental effects.

3.0 EVALUATION OF ALTERNATIVES

3.1 Evaluation of Alternatives to the Project

Following the Walkerton tragedy, the Township of Centre Wellington reviewed all of the Elora water supply wells to determine compliance with industry design standards and Ontario Ministry of Environment protocol for source water protection and treatment. During this evaluation, Well E2 was found to be groundwater under the direct influence (GUDI) of surface water due to its close proximity to the Grand River. In addition, the aesthetic water quality at Well E2 has been historically poor (elevated iron and manganese) and its operation resulted in interference with the operation of Well E3 (overlapping drawdown cones). Because of these issues, the Township decided to consider alternative options in lieu of upgrading Well E2. Four alternatives were considered for the project during the Municipal Class Environmental Assessment process. These are described and evaluated in more detail below.

3.1.1 Do Nothing

Well E2 was taken out of operation in 1996 due to operating interference with Well E3. Further, following assessment of Well E2 after the Walkerton Tragedy, E2 was by definition groundwater under the direct influence of surface water since it is a bedrock well located within 500 m of the Grand River. The “Do Nothing” option would neither upgrade nor replace Well E2. This well, which provided a water supply of 2273 m^3/day, would not be replaced under this option and would leave the community with a limited supply to sustain existing development and planned growth. The Do Nothing option would have insignificant impact on the surrounding natural environment since the status quo of the existing conditions would remain intact and no new construction activities would occur.

3.1.2 Increase Use of Existing Wells

This option would require the Township to increase the pumping rate and the total daily volume pumped from existing Wells E1 and E3. This was not deemed a viable option since these wells are known to interfere with surrounding private wells. To reduce these potential interference issues, the Township would be required to extend watermains into the neighbourhoods that are currently on private wells. Works required to complete this would include the excavation and reconstruction of roadways, the installation of distribution system watermains, the provision of water services to individual homes and the decommissioning and abandonment of the existing private wells. With the implementation of appropriate mitigation, this option would not be expected to have a significant environmental impact. However, significant costs would be involved. In addition, the Township would require approval under the Ontario Water Resources Act in order to increase its pumping rates beyond those currently specified in the Permits to Take Water. Based on hydrogeological pump tests, this option would not provide a long term solution to the problem since additional pumping capacity from the two existing wells would not be equivalent to the proposed capacity of Well E4.

3.1.3 Reduce Water Demand Through Water Conservation

It has been estimated that a water conservation program, including the installation of water meters and public education, would result in a 7% to 9% reduction in current demand. This would be insufficient to address future water demands and as a result, this option (on its own) does not address the problem. The Township proactively installed water meters in 2002 to promote water conservation in the community. This option would have a positive impact on the natural environment in a general sense resulting from smaller volumes of water being extracted from the bedrock aquifer and discharged to the sanitary sewer system.

3.1.4 New Supply Well

This option requires the development of a new well. This option is the only alternative that will resolve the water supply issue in both the short and long term. This option has the potential to have the most negative impact on the natural environment of the local area. The severity of impacts on the natural environment is dependent on the selected location for the new well. A review of six (6) alternative locations for a new well was undertaken. Details of the review are provided in Section 3.3 of this report.

3.2 Recommended Alternative

The recommended alternative was a combination of continuing with the current water conservation program and securing a new supply well. This combination addressed long and short term water supply issues in a responsible manner. The construction of a new well would provide immediate and long term relief to the water supply shortage problem and the continued implementation of a water conservation program would contribute to the sustainable use of the resource over the long term by ensuring consumers are aware of the amount of water they use and the sewage they discharge to the sanitary collection system.

3.3 Well Location Alternatives

Once it was determined that the recommended alternative was to involve the construction of a new well supply, alternative sites for the facility were considered. To focus the evaluation of prospective well sites, the following criteria were established:

- Availability of land for future well treatment facilities
- Proximity to a municipal roadway for access and maintenance
- Sites that are approximately 2 km (or more) from existing municipal wells are preferred to reduce interference with existing sites
- Sites that are close to the existing water distribution system to minimize capital and related operating costs
- Sites that are in the direction of future and/or existing fringe-area development
- Sites that are in close proximity to the Grand River or Irvine Creek are discouraged to avoid possible localized impact to the baseflow supplying the watercourses and to avoid possible negative water quality impacts from surface waters (GUDI)
- Sites where there is a considerable thickness of overburden to maximize the level of natural protection from potential surface contamination

Several areas around Elora were considered for test sites including:

- North-northeast of Well E1 along Colbourne Street, Gerrie Road or Sideroad 15 (Area 1)
- Within the Salem settlement area to the northwest of Elora (Area 2)
- Southwest and Northwest of Salem along County Roads 18 and 7 (Area 3)
- East of Elora along Nichol Road 6 (Area 4)
- Southwest of Elora along Middlebrook Road or in the Elora Gorge Park (Area 5)
- South of Elora along County Road 21 or the unopened portion of Concession Road 1 (Cottontail Road) (Area 6)

A drawing of these general areas is provided in Figure 2 of Appendix A.

3.4 Well Location Environmental Impacts and Evaluation

3.4.1 North-Northeast of Well E1 along Colbourne Street, Gerrie Road or Sideroad 15 (Area 1)

The north-northeast area was determined to potentially interfere with Well E1 and is in close proximity to the former Centre Wellington Landfill located on Gerrie Road. As a result, this general area was not preferable. The surrounding area is primarily agricultural and therefore impacts to vegetative and wildlife resources such as removal of habitat and removal of vegetative cover and trees were anticipated to be insignificant. Since Irvine Creek is within 1 km of the area, the potential exists for effects on the aquatic environment through reduction of baseflow to Irvine Creek.

3.4.2 Within the Salem Settlement Area to the Northwest of Elora (Area 2)

Ontario Ministry of Environment test wells from 1975 indicated reasonable aquifer potential in the Salem area. However, wells in this area would also have the potential to interfere with Well E1 and would run the risk of possible surface water influence due to the close proximity of Irvine Creek and the limited available overburden protection against contamination. The proximity to the Creek also increases the potential for impact on fisheries with reduction in baseflow. Since the Salem settlement area is developed, impacts on wildlife, vegetative and cultural resources were not anticipated to be significant.

3.4.3 Southwest and Northwest of Salem along County Roads 18 and 7 (Area 3)

The upland areas southwest and northwest of Salem have improved aquifer protection. However, a new well in this general area would require the installation of approximately 2 km of watermain to connect the facility to the existing distribution system. This area is agricultural, contains feeder streams to Irvine Creek and the Grand River and wooded areas. As a result, installation of a well in this general area was determined to have a potential to negatively impact vegetative, wildlife and aquatic resources with the removal of vegetative cover/wildlife habitat and potentially reduce base flow to the nearby watercourses.

3.4.4 East of Elora along Nichol Road 6 (Area 4)

This general area also has improved aquifer protection. However, a new well in this general area would require the installation of approximately 2 km of watermain to connect the facility to the existing distribution system adding to the overall economic impact of the project. This area is agricultural, contains feeder streams to Swan Creek and wooded areas. As a result, installation of a well in this general area has potential to impact vegetative, wildlife and aquatic resources through the removal of vegetative cover/wildlife habitat and potentially reduce base flow to Swan Creek.

3.4.5 Southwest of Elora along Middlebrook Road or In the Elora Gorge Park (Area 5)

The Middlebrook Road/Elora Gorge Park area is not preferred due to concerns regarding possible surface water influence from the Grand River and limited overburden protection against contamination. This area is agricultural and includes the Elora Gorge Conservation Area (CA). The area contains feeder streams to the Grand River and wooded areas associated with the CA. As a result, installation of a well in this general area has potential to impact vegetative, wildlife and aquatic resources through the removal of vegetative cover/wildlife habitat and potentially reduce base flow to the Grand River.

3.4.6 South of Elora along County Road 21 or the Unopened Portion of Concession Road 1 (Cottontail Road) (Area 6)

The major factors that led to the selection of the area south of Elora and in particular the Cottontail Road area included the following:

- Well records indicate good potential for water quantity from the upper part of the bedrock aquifer
- The distance to the nearest municipal well (Well E3) is approximately 2 km.
- The area has the thickest, low-permeability overburden in the Elora area (20 m to 30 m) which provides a high level of natural protection from potential surface contaminants
- There are relatively few private water supply wells in the area to reduce potential well interference.
- The distance to the existing distribution system is approximately 1.28 km.
- The Cottontail Road right-of-way is a disturbed area which eliminates concerns for cultural resources and reduces the potential for negative impacts on vegetative, wildlife and aquatic resources.

3.5 Recommended Well Location

The area selected for further investigation for a new well was along the unopened portion of Concession Road 1 (Cottontail Road). Well E4 was drilled in January 2002, during the Provincial EA planning process, and water quality at this site was found to meet Ontario Drinking Water Standards. The Hydrogeological Study completed for the well indicated positive results from a hydrogeologic perspective with little potential for well interference.

As part of the Ontario Municipal Engineers Association Class Environmental Assessment for Water and Wastewater projects, a hydrogeological investigation was completed. The

hydrogeologic setting of the area near Well E4 was reviewed and two test well sites, TW4A and TW4B, were established on municipal lands along what is locally called Cottontail Road. Each well was step tested (pumped at various rates for short periods of time). The water quality at TW4A was poor (sulphate above the Ontario Drinking Water Standard aesthetic objective of 500 mg/L and iron above the Ontario Drinking Water Standard aesthetic objective of 0.3 mg/L). TW4B (Elora Well E4) was selected for further assessment since it has better water quality that would not require additional treatment for sulphate and iron removal. A summary of the water quality data for test wells TW4A and TW4B is as follows:

Parameter	ODWS Limit	TW4A	TW4B
Aluminium	0.1	<0.02	<0.02
Barium	1.0	<0.01	0.01
Beryllium		<0.001	<0.001
Boron	5.0	<0.05	<0.05
Bromide		<0.10	<0.10
Cadmium	0.005	<0.002	<0.002
Calcium		413	108
Chloride	250	3.9	7.9
Chromium	0.05	<0.01	<0.01
Cobalt		<0.01	<0.01
Copper	1.0	<0.005	<0.005
Fluoride	1.5	0.41	0.24
Iron	0.3	0.37	0.12
Lead	0.01	<0.01	<0.01
Magnesium		69.5	31.4
Manganese	0.05	<0.01	<0.01
Molybdenum		<0.01	<0.01
Nickel		<0.01	<0.01
Nitrate as N	10.0	<0.10	0.35
Nitrite as N	1.0	<0.10	<0.10
Phosphate-P		<0.30	<0.30
Potassium		1.01	1.02
Silver		<0.001	<0.001
Sodium	20	4.64	12.8
Strontium		12.5	2.99
Sulphate	500	1350	310
Thallium		<0.002	<0.002
Uranium	0.10	<0.01	<0.01
Vanadium		<0.01	<0.01
Zinc	5	0.01	<0.01
Zirconium		<0.01	<0.01
Ammonia		0.11	0.13
DOC	5	<1.0	<1.0
Sulphide	0.05	<0.020	<0.020
TKN	0.15	0.35	0.44

Well E4 is located 1.3 km from the Grand River and 2.3 km from Swan Creek. Furthermore, the overburden depth above bedrock at Well E4 is 23.4 m which provides

adequate protection against surface contamination. As a result, this well is not considered groundwater under the direct influence of surface water.

3.6 Alternative Means of Completing the Recommended Project

Two alternatives were considered for the construction of a water treatment facility along the Cottontail Road right-of-way: installation of a large diameter watermain and construction of a small ground level reservoir complete with high lift pumps for chlorine contact time.

3.6.1 Large Diameter Watermain

The large diameter watermain construction would require the installation of approximately 72 m of 600 mm diameter watermain based on a minimum of 15 minutes of contact time required by Ontario regulations. The watermain would be installed in a serpentine manner to ensure that treated water achieved the required contact time prior to discharge to the distribution system. This option has a higher risk of incurring physical damage with any future excavation in the area or through frost heave. Any damage to the buried large diameter watermain could also result in the release of chlorinated water to the environment, possible backflow of contaminated water from the watermain break into the well or the distribution system and possible disturbance of the annular seal around the well casing. Environmental impacts of this option would include the removal of trees to install the watermain.

3.6.2 Ground Level Reservoir

The construction of a ground level reservoir for treatment consists of a concrete tank including baffle curtains and two high lift pumps. Based upon the supply capacity of Well E4 and the required contact volume of 20.5 m^3 at high lift pump stop, the minimum footprint of the tank would be approximately 66 m^2. To accommodate the high lift pumps, the useable side wall depth of the reservoir would be approximately 2.1 m. The reservoir and pumphouse would be constructed adjacent to the well. The finished floor of the pumphouse would be approximately at the existing elevation of the site. The floor of the reservoir would be approximately 1.7 m below finished grade and the ceiling of the reservoir would be approximately 1.5 m above finished grade.

3.6.3 Environmental Effects Analysis

The potential interactions between the identified alternative chlorine contact facilities and the VEC's identified in section 2.3 of this report were evaluated. The purpose of this evaluation was to determine, in relative terms, the environmental effects of each identified option on the various environmental components prior to mitigation, using the impact criteria described in Table 2.1.

Table 3.1 summarizes the outcome of the environmental effects analysis carried out for the chlorine contact alternatives.

Table 3.1
Alternative Chlorine Contact Facilities
Environmental Effects Analysis

Valued Ecosystem Component	Watermain	Reservoir	Considerations
	Level of Effect		
Ground water quality and quantity	Minimal/Nil	Minimal/Nil	No impacts are expected from the implementation of these options
Surface water quality and quantity	Minimal/Nil	Minimal/Nil	Sediment and erosion impacts may occur during construction. Impacts would be minimized with standard mitigation measures.
Fisheries and Aquatic Resources	Minimal/Nil	Minimal/Nil	No impacts are expected from the implementation of these options
Vegetation	Minimal/Nil	Minimal/Nil	Vegetation will be removed to facilitate each option. Impacts would be minimized with standard mitigation measures (including site restoration).
Species at risk	Minimal/Nil	Minimal/Nil	No impacts are expected from the implementation of these options
Migratory birds	Minimal/Nil	Minimal/Nil	No impacts are expected from the implementation of these options
Wildlife	Minimal/Nil	Minimal/Nil	No impacts are expected from the implementation of these options
Noise	Minimal/Nil	Minimal/Nil	No impacts are expected from the implementation of these options (following construction)
Air quality	Minimal/Nil	Minimal/Nil	No impacts are expected from the implementation of these options (following construction)
Adjacent land uses	Minimal/Nil	Minimal/Nil	No impacts are expected from the implementation of these options
Local neighbourhood & residents	Minimal/Nil	Minimal/Nil	No impacts are expected from the implementation of these options
Worker & public health & safety	Minimal/Nil	Minimal/Nil	No impacts are expected from The implementation of these options

	Watermain	Reservoir	
Aesthetics	Minimal/Nil	Minimal/Nil	No impacts are expected from The implementation of these options
Heritage & historical cultural resources	Minimal/Nil	Minimal/Nil	No impacts are expected from the implementation of these options

3.6.4 Preferred Treatment Facility

Based on a technical review and the environmental effects analysis, it was concluded that the treatment facility would be constructed using a ground level reservoir. There are several factors which justified this choice, including:

- A smaller project footprint would be required to construct a reservoir than a contact watermain
- Presents minimal long-term impacts to vegetation and wildlife
- Since all other water treatment facilities in the Township are constructed with a reservoir, a similar facility design provides operating staff with consistent operating and problem solving strategies throughout the water system.
- Maintenance of a reservoir facility does not require excessive wasting of water to the environment in order to clean the reservoir. To adequately clean and maintain a large diameter watermain, the flushing of water to waste is required during the swabbing and flushing processes and again after superchlorination/disinfection of the main.

4.0 PROJECT COMPONENTS AND ACTIVITIES

4.1 Existing Water Supply Facilities

The Elora well supply system consists of two active drilled bedrock wells (E1 and E3) complete with individual pumphouses and treatment facilities. Treatment includes disinfection using gas chlorination and a reservoir for contact time. A third well (E2) is not in operation since it has poor water quality, has been classified as groundwater under the direct influence of surface water and interferes with the operation of Well E3 (overlapping drawdown cones). The distribution system consists of varied pipe materials and diameters. The system also includes two elevated water storage tanks. One watermain crosses the Grand River to connect the northern and southern portions of the distribution system. The Elora water system was first commissioned with one well (E1) in 1949. Additional wells were added to the system in 1958 (E2) and 1991 (E3). Well E2 was removed from service in 1996.

4.2 Identified Water System Deficiencies

Deficiencies in the Elora water system include:

- well interference between Well E2 and Well E3
- poor aesthetic water quality at Well E2 and classification of Well E2 as groundwater under the direct influence of surface water due to its close proximity to the Grand River
- shortage of water supply for the community.

4.3 Production Capacity and Demand

4.3.1 Existing Water Capacity

The capacity of the Elora water system is controlled by Ontario Ministry of Environment Permit to Take Water licensing requirements. The existing system capacity is summarized in the following table:

Location	Instantaneous Rate	Maximum Daily Pumping
Well E1	1209 LPM	1741 m^3/day
Well E3	1363 LPM	1963 m^3/day
	Total Capacity	3704 m^3/day

4.3.2 Existing Reserve Capacity

The reserve capacity of the Elora water system as of January 2005 and with the addition of Well E4 is summarized as follows:

Reserve Capacity – Elora Water System		Existing	With Well E4
1	Source Capacity (m^3/day)	3704	4931

Reserve Capacity – Elora Water System		Existing	With Well E4
2	Maximum Daily Flow (m^3/day) **	2521	2521
3	Reserve Capacity (m^3/day) (1) – (2)	1183	2410
4	Population Served	4942	4942
5	Serviced Households	1922	1922
6	Average Daily Per Capita Flow (m^3/day) (2) ÷ (4)	0.510	0.510
7	Additional Population (3) ÷ (6)	2319	4725
8	Persons Per Residential Unit (4) ÷ (5)	2.57	2.57
9	Additional Residential Units that Can be Served (7) ÷ (8)	902	1839
10	Committed Residential Unit Development	826	826
11	Reserve Residential Unit Capacity (9) – (10)	76	1013

**2002 adjusted peak flow: 2621 m^3/day
2003 adjusted peak flow: 2416 m^3/day
2004 adjusted peak flow: 2528 m^3/day
Average Peak Flow = 2521 m^3/day

4.3.3 Population and Housing Projections

The population and housing forecasts used in the Township's 2005 Official Plan for the Elora urban centre including the community of Salem are as follows:

Year	2007	2012	2017	2022
Elora & Salem Population Forecast	6685	7725	8775	9855
Housing Forecast	2395	2770	3145	3520

These population projections represent an increase that is slightly less than 3% per year over the 15 year forecast period. For planning purposes, the estimated population of Salem was deemed to be 702 for the entire period**.**

4.3.4 Water Demand Projections

Based on the above population projection, the future water demands for Elora are estimated as follows:

Year	2007	2012	2017	2022
Elora Population	5983	7023	8073	9153
Water Demand Estimate (m^3/day)	3051	3582	4117	4668

The above table indicates that additional water supply for the community of Elora is required between the years 2012 and 2017 considering the existing system capacity is 3704 m^3/day using Wells E1 and E3. The addition of a third well with a capacity of 1227 m^3/day will increase the system capacity to 4931 m^3/day which will provide sufficient

capacity to the community of Elora to beyond 2022 provided the community of Salem is not serviced with municipal water.

4.4 Preliminary Engineering Concept

The Municipal Engineer's Class Environmental Assessment identified the construction of Well E4 as the preferred alternative. The project includes construction of the well, construction of treatment facilities (including primary disinfection by gas chlorination and contact time) and installation of 1.28 km of watermain.

4.5 Proposed Works to be Undertaken

The proposed works will include the development of a well with a Permit to Take Water capacity of 1227 m^3/day. The well will be equipped with a submersible pump that discharges into an above grade reinforced concrete reservoir. Raw water will be treated with chlorine prior to entering the reservoir. The reservoir will have fabric baffles which will provide a minimum chlorine contact time of 20.4 minutes. High lift pumps will pump water from the reservoir to the distribution system. Secondary chlorination will be provided on the high lift pump discharge to ensure the maintenance of a chlorine residual in the distribution system of 0.2 mg/L. The facility will be enclosed in a masonry block structure complete with all electrical monitoring and control equipment.

4.5.1 Location

Well E4 will be located on an unopened portion of Concession Road 1 (Cottontail Road) in the former Township of Pilkington. Refer to Figure 3 in Appendix A for a general location plan. The watermain that will connect the treatment facility to the existing distribution system will be constructed along the unopened portion of Concession Road 1 and along Wellington County Road 21.

Well E2, which is to be decommissioned, is located at the intersection of McNab Street and Metcalfe Street in Elora.

4.6 Construction Phase

4.6.1 Well E4 Treatment Facility

From an environmental perspective, the construction of the treatment facility will require the clearing and grubbing of approximately six (6) trees and the stripping of topsoil. The installation of sediment and erosion control fencing is required and is shown in Figure 4 in Appendix A. Major components of construction include:

- Installation of sediment and erosion control devices
- Clearing and grubbing of trees
- Stripping of topsoil
- Excavation and backfilling of foundations
- Concrete formwork, concrete placement and form removal
- Masonry installation
- Mechanical installation
- Inspection and testing of system

- Site restoration with topsoil, seed and sod

4.6.2 Electrical Power

A three phase hydro service is required at the site which requires the installation of a new pole line from County Road 21 to the well site along the existing Cottontail Road right-of-way. Hydro One is responsible for the complete installation of the new service. The west side of the right-of-way is lined with short scrub apple trees which do not require trimming for the installation of the new service. Components of construction include:

- Installation of poles
- Cable installation
- Inspection and testing of system

4.6.3 Water Distribution System Extension

The extension of the water distribution system requires the installation of new 200 and 300 mm diameter watermain for a distance of approximately 1.28 km along the east side of County Road 21 and the Cottontail road allowance. To protect the natural environment during the construction phase, sediment and erosion control measures such as the installation of silt fencing, straw bale check dams and rock check dams are proposed. Upon completion of the underground works, the surface will be landscaped using hydraulic seed and mulch. Components of construction include:

- Installation of sediment and erosion control measures
- Stripping of topsoil
- Excavation and backfilling of watermain pipe
- Inspection and testing of system
- Site restoration with topsoil, seed and sod

4.6.4 Access Road

The access road is pre-existing. It will be upgraded with additional depths of gravel following the installation of the watermain. All environmental protection measures used for the installation of the watermain extension will be maintained during access road improvements. Components of construction include:

- Place and compact granular material
- Site restoration with topsoil, seed and sod

4.6.5 Operating and Maintenance Phase

From an environmental perspective, the operation and maintenance phase of the project should not have significant impact. Operating staff will follow Ministry of Environment and Township operating protocol. Flushing of chlorinated water from the facility will require the use of portable dechlorination equipment by operating staff to minimize environmental impacts.

4.6.6 Decommissioning Phase

Well E4 will remain in operation for an extended period of time (greater than 50 years). Decommissioning of the facility will follow accepted protocol and Regulations at that time.

4.7 Decommissioning and Abandonment of Well E2

Well E2 will be abandoned in accordance with Ontario Regulation 903 (as amended). The pump will be removed from the well, the well filled with grout and the pumphouse demolished.

5.0 ENVIRONMENTAL SETTING

5.1 Well E4 and Watermain Installation

5.1.1 Hydrogeology

Well E4 is located southwest of the core area of the community of Elora, south of the Grand River. The area surrounding the site is gently sloping to the south towards Swan Creek. There is limited potential for flooding of the well site although water ponds in the spring and fall of the year in the adjacent farm fields. The well will be constructed in accordance with Ontario Regulation 903 (governing the construction of wells) and in accordance with 10 State Standard design guidelines to ensure that surface water cannot contaminate the well. The till overburden depth above bedrock at Well E4 is 23.4 m which provides adequate protection against surface contamination. Soils in the vicinity of the proposed project are classified as sandy Wentworth till. Natural drainage is to the south and west with discharge of the nearby intermittent drainage ditch (approximately 145 m southeast of the site) to Swan Creek and eventually to the Grand River. It is estimated that local shallow ground water flow in the vicinity of the site is to the southeast and that the regional deep groundwater flow in the project area is to the southwest.

5.1.2 Fisheries and Aquatic Resources

Well E4 is located approximately 1.3 km from the Grand River and approximately 2.3 km from Swan Creek. An intermittent drainage ditch exists approximately 145 m to the southeast of Well E4.

Watermain installation will occur along Cottontail Road from Well E4 to County Road 21 and along County Road 21 to its connection point on the distribution system. County Road 21 is approximately 740 m from the Grand River at its closest approach.

The Grand River is a cold water fishery. Identified fish species in this reach of the river include small mouth bass, yellow perch, northern pike and brown trout. Swan Creek is a cool water fishery. Although specific species information is not available for Swan Creek, it is anticipated that many of the species found in the middle reach of the Grand River are also found in this creek. No species at risk are known to exist in either watercourse.

The intermittent drain typically flows during the spring and autumn of each year and serves as an outlet for agricultural tile drains. There are no aquatic resources associated with this drain.

Project information was circulated to the Grand River Conservation Authority (GRCA) during the Municipal Engineer's Association Class Environmental Assessment process. No comments were received from the GRCA regarding any concerns to fish or fish habitat. The GRCA has a level three agreement with the Department of Fisheries and Oceans (DFO). This agreement allows the conservation authority to conduct the initial review of a project to identify any impacts to fish or fish habitat, determine how the proponent can mitigate any potential impacts to fish or fish habitat, and, if necessary, negotiate with the proponent to prepare a fish habitat compensation plan which is then forwarded to DFO for approval and the issuance of an authorization under the *Fisheries Act*.

Since no in-water works are required for the works being completed at the E4 well site and since the installation of the watermain does not require the crossing of any watercourses, no effects to fish or fish habitat are anticipated as a result of these works.

5.1.3 Vegetation Resources

Well E4 is located on Cottontail Road, an unopened road right-of-way, which was disturbed in 2000 to construct an access road for the International Plowing Match. Vegetation resources in the area are limited to scrub brush and maple trees. Terrestrial and vegetation features within the study area are not considered sensitive to development and are commonly found in the local area. None of the vegetation species affected by the work are considered sensitive or rare.

To construct the facility, approximately 6 mature maple trees, located along the fence line of the Cottontail Road right-of-way, need to be removed. The facility is located approximately 150 m west of an 8 hectare deciduous woodlot that contains a significant number of maple trees. Impacts resulting from the removal of the mature maples at Well E4 are not expected to be significant. A review of Environment Canada's species at risk website indicated that American Ginseng and Butternut trees are Schedule 1 species under the *Species at Risk Act* (SARA) that could be found in the area. These species were not identified in the immediate area of Well E4.

5.1.4 Wildlife Resources

A review of Federal and Provincial species at risk indicates that the following wildlife species at risk could inhabit this part of Ontario: Grey Fox, Ontario Eastern Cougar, Henslow's Sparrow, Hooded Warbler, Least Bittern, Northern Bobwhite, Yellow-breasted Chat virens subspecies and Monarch butterfly. Other common wildlife species such as squirrels, chipmunks, skunks, racoons, groundhogs, garter snakes and bird species (robins, blue jays, finches, etc.) are also present in the area of the site. The site for Well E4 is approximately 528 m^2 in size and approximately 6 mature maple trees need to be removed in order to complete the construction of the water treatment facility. The trees will be removed in the fall of the year following the nesting season for migratory birds. Corridors for wildlife movement will not be impacted by the construction or the long term use of the facilities due to the small footprint. As a result, the impact on wildlife species at risk and other common species is not anticipated to be significant.

5.1.5 Cultural Resources

A site description and location was sent to the Ontario Ministry of Culture during the Provincial Municipal Class Environmental Assessment process to determine the site's archaeological and cultural potential. The Ministry indicated that the project site was not archeologically or culturally significant.

5.1.6 Socioeconomic and Land Use

The community of Elora is located in the Township of Centre Wellington. It is a tourist area with limited industrial development and commercial activities concentrated in the downtown and along Wellington County Road 7. The land use surrounding Well E4 is agricultural. Construction of Well E4 and the watermain will occur within existing road allowances. As a

result, environmental effects from the construction are not expected to have an impact on surrounding land use that is agricultural in nature. However, operation of the E4 well site will have some minor impacts on surrounding land use as the farms will not be able to apply nutrients within a 100 m radius of the wellhead, a requirement of the Ontario Nutrient Management Act (2002 as amended). As a result, there may be some decrease in crop yields in the arable fields that fall within this radius. Since there is no crop irrigation or other major farm uses of groundwater from the deep aquifer on nearby farms, it is unlikely there will be negative effects to farm uses of water as a result of commissioning this well.

5.2 Well E2

5.2.1 Hydrogeology

Well E2 is located in the southern part of the downtown core area of Elora, south of the Grand River. The area surrounding the site is gently sloping to the north towards the Grand River. The well record shows approximately 12 m of overburden, overlying the bedrock. The overburden is primarily clay. Surficial geology is mapped as silt till at the site. The well is approximately 122 m deep with the primary water-bearing zone found in the bottom 3 m of the well. It is estimated that local and regional ground water flow in the vicinity of the site is to the north toward the Grand River.

5.2.2 Fisheries and Aquatic Resources

Well E2 is located approximately 220 m from the Grand River. The river is a cold water fishery. Identified fish species in this reach of the river include small mouth bass, yellow perch, northern pike and brown trout. No species at risk are known to exist in the watercourse.

As indicated in Section 5.1.2, project information was circulated to the GRCA during the Municipal Engineer's Association Class Environmental Assessment process. No comments were received from the GRCA regarding any concerns to fish or fish habitat.

Since no in-water works are required for the works being completed at this well site, no effects to fish or fish habitat are anticipated.

5.2.3 Vegetation Resources

Well E2 is located in a built up residential area adjacent to a park at the intersection of Geddes Street and McNab Street. The wellhead is located inside the pumphouse building. Vegetation on the 10 m by 10 m property consists of mowed manicured lawn and scrub cedar trees along the north property line. There are no vegetation resources of any significance at this site.

5.2.4 Wildlife Resources

As indicated previously, a review of the Federal and Provincial species at risk indicates that the following wildlife species at risk could inhabit this part of Ontario: Grey Fox, Ontario Eastern Cougar, Henslow's Sparrow, Hooded Warbler, Least Bittern, Northern Bobwhite, Yellow-breasted Chat virens subspecies and Monarch butterfly. Other common wildlife

species such as squirrels, chipmunks, skunks, racoons, groundhogs, garter snakes and bird species (robins, blue jays, finches, etc.) are also present in the area of the site. Since this site does not contain any significant wildlife habitat, the decommissioning works that will be completed are not anticipated to have an impact on wildlife resources in the area.

5.2.5 Cultural Resources

As discussed previously, the existing Well E2 site is located in a built-up residential area. Since the site was constructed in the 1950's, anything that was of archaeological or cultural significance would likely have been discovered at that time. As a result, the decommissioning activities associated with this component of the project are not expected to impact on archaeological or cultural resources.

5.2.6 Socioeconomic and Land Use

The community of Elora is located in the Township of Centre Wellington. It is a tourist area with limited industrial development and commercial activities concentrated in the downtown. The land use surrounding Well E2 is residential. The decommissioning activities associated with this component of the project are not expected to have any environmental effects that would impact on socioeconomic or land use in the area.

6.0 ENVIRONMENTAL EFFECTS ANALYSIS

6.1 Approach

6.1.1 Defined Valued Ecosystem Components

The identification of Valued Ecosystem Components (VEC) for this study followed an assessment of information gathered from various sources including background reports, specialized studies, public consultation and consultation with government review agencies. The VEC's selected represent those elements which are considered of significance for this project and which could be adversely affected by the construction of the new well supply.

VEC's selected for this project are:

- Ground water quantity and quality
- Surface water quantity and quality
- Fisheries and Aquatic Resources
- Vegetation
- Species at risk
- Migratory birds
- Wildlife
- Noise
- Air quality
- Adjacent land uses
- Local Neighbourhoods and Residents
- Worker Health and Safety
- Public Health and Safety
- Aesthetics
- Heritage and Historical Cultural Resources

6.1.2 Evaluation of Environmental Effects

The following sections of the report provide a summary of the potential environmental impacts of the project on the selected VEC's.

For each VEC, the analysis of effects is arranged in the following framework:

- Potential Environmental Effects
- Measures to Mitigate Effects
- Residual Effects
- Significance of Residual Effects

6.2 Ground Water Quantity and Quality

Well E4 is replacing Well E2 which served as a water supply source in Elora for more than 38 years. In 1996, Well E2 was taken out of operation due to poor aesthetic water quality and its interference with the operation of Well E3. The interference effects also resulted in a lowering of the water table to an extent that private wells in the area were impacted. Following the Walkerton tragedy, an investigation of Well E2 found the well to be

groundwater under the direct influence of surface water due to its close proximity to the Grand River.

6.2.1 Potential Effects on Groundwater Quantity

Well E4 was drilled in December 2001 and preliminary pump testing was completed in February 2002. Aquifer testing activity included variable rate step tests and a long term pumping test to confirm the available supply and to measure drawdown effects. Pump test durations included 30 minutes, 24 hours and 96 hours. Test results indicated that the well could support a flow rate of 22.7 L/s with a static water level of approximately 56 m below ground surface.

Static water levels in several private wells were monitored during the long term testing and the hydrogeological study concluded that no well interference is expected from long term pumping. A copy of the hydrogeological study completed by Anderson Geologic Limited is available through Industry Canada.

The development of Well E4 has the potential to impact upon the capacity of renewable resources with respect to groundwater resources associated with the deep bedrock aquifer in the Elora area. The bedrock aquifer that Well E4 is drilled into is a renowned regional water resource known as the Guelph Amabel Aquifer. This aquifer is on the order of 100 to 130 m thick in the Elora area and it receives recharge from a very broad area, extending many tens of kilometres away from Elora (Groundwater Resources in the Grand River Basin. Sibul, 1980). This water resource has a proven capacity and sustainability in the Elora and Fergus area, with numerous municipal wells easily sustaining pumping rates of 1136 LPM to 1818 LPM (250 to 400 Imperial gallons/minute) for many decades without evidence of significant aquifer mining or water quality deterioration. There is a similar expectation for aquifer sustainability of the renewable resource at Well E4 based on the 2002 pumping test results, noting as well that E4 was strategically located to minimize any overlapping influence with the other Elora municipal wells.

Decommissioning of Well E2 will not result in a reduction of water volume pumped from the aquifer since the Permit to Take Water (PTTW) for the facility is combined with Well E1 and the two (2) wells together are allowed to pump 2273 m^3/day. When Well E1 pumps at its full capacity, Well E2 is only permitted to pump 532 m^3/day. This volume is below the capacity of Well E4, which is 1227 m^3/day. As a result, the net increase in system capacity is 695 m^3/day for the community of Elora.

Construction of the connecting watermain from Well E4 to the existing distribution system is not expected to have any impacts on groundwater quantity.

6.2.2 Potential Effects on Groundwater Quality

Well E4 is located in an agricultural area remote from any potential industrial contamination sources. The aquifer in the area is protected by a thick low-permeability till deposit (23.5 m). These conditions reduce the potential for contamination of the aquifer by surface influences and through operation of the well. Well E4 is not considered groundwater under the direct influence (GUDI) of surface water. A detailed hydrogeological assessment was completed for Well E4 by Anderson Geologic Limited. During the long term testing procedure, water samples were collected for general chemical analysis at times of 1 hour,

24 hours, 48 hours, 73 hours and 96 hours. In June 2002, water samples were collected and analyzed for all parameters listed in the Ontario Drinking Water Standards (ODWS).

The following summarizes the major findings of the water quality analysis:

- No E. coli or total coliforms were detected
- All health related chemical parameter concentrations are below the maximum acceptable concentrations of the ODWS
- The low nitrate, chloride and volatile organic compound concentrations measured during the testing programs indicate that there has been little anthropogenic impact upon the ground water quality of the Well E4 aquifier

The following tables outline the water quality analysis for Well E4:

Table 6.1
Chemical/Physical Standards and Objectives
All units of measurement mg/L unless otherwise noted.

Parameter	MAC (mg/L)	IMAC (mg/L)	AO (mg/L)	MW #E4 (mg/L)	Date Sampled (year/month)
Alachor		0.005		<0.0001	2002, 06
Aldicarb	0.009			<0.0009	2002, 06
Aldrin + Dieldrin	0.0007			<0.00004	2002, 06
Arsenic		0.025		0.001	2002, 06
Atrazine + N-dealkylated metabolites		0.005		<0.0002	2002, 06
Azinphos-methyl	0.02			<0.0001	2002, 06
Barium	1.0			0.02	2002, 06
Bendiocarb	0.04			<0.0001	2002, 06
Benzene	0.005			<0.0005	2002, 06
Benzo(a)pyrene	0.00001			<0.00001	2002, 06
Boron		5.0		0.06	2002, 06
Bromoxynil		0.005		<0.0002	2002, 06
Cadmium	0.005			<0.0001	2002, 06
Carbaryl	0.09			<0.0001	2002, 06
Carbofuran	0.09			<0.0001	2002, 06
Carbon Tetrachloride	0.005			<0.0005	2002, 06
Chloramines	3				
Chlordane (Total)	0.007			<0.0003	2002, 06
Chlorpyrifos	0.09			<0.0001	2002, 06
Chromium	0.05			<0.001	2002, 06
Cyanazine		0.01		<0.0001	2002, 06
Cyanide	0.2			<0.002	2003, 04
Diazinon	0.02			<0.0001	2002, 06
Dicamba	0.12			<0.0002	2002, 06
1,2-Dichlorobenzene	0.2		0.003	<0.0005	2002, 06
1,4-Dichlorobenzene	0.005		0.001	<0.0005	2002, 06
Dichlorodiphenyltrichloroethane	0.03			<0.0004	2002, 06
1,2-dichloroethane		0.005		<0.0005	2002, 06
1,1-Dichloroethylene(vinylidene chloride)		0.014		<0.0005	2002, 06

Parameter	MAC (mg/L)	IMAC (mg/L)	AO (mg/L)	MW #E4 (mg/L)	Date Sampled (year/month)
Dichloromethane	0.05			<0.0005	2002, 06
2-4-Dichlorophenol	0.9		0.0003	<0.0005	2002, 06
2,4-Dichlorophenoxy acetic acid (2,4-D)		0.1		<0.0002	2002, 06
Diclofop-methyl	0.009			<0.0001	2002, 06
Dimethoate		0.02		<0.0001	2002, 06
Dinoseb	0.01			<0.0002	2002, 06
Dioxin and Furan		0.00000001		ND	2003, 04
Diquat	0.07			<0.007	2002, 06
Diuran	0.15			<0.015	2002, 06
Fluoride	1.5			0.26	2003, 04
Glyphosate		0.28		<0.028	2002, 06
Heptachlor + Heptachlor Epoxide	0.003			<0.0002	2002, 06
Lead	0.01			<0.001	2002, 06
Lindane (total)	0.004			<0.0001	2002, 06
Malathion	0.19			<0.0001	2002, 06
Mercury	0.001			<0.0001	2002, 06
Methoxychlor	0.9			<0.0001	2002, 06
Metolachlor		0.05		<0.0001	2002, 06
Metribuzin	0.08			<0.0001	2002, 06
Monochlorobenzene	0.08		0.03	<0.0005	2002, 06
Nitrate (as Nitrogen)	10.0			<0.10	2003, 04
Nitrite (as Nitrogen)	1.0			<0.10	2003, 04
Nitrate + Nitrite (as Nitrogen)	10.0			<0.20	2003, 04
Nitrilotriacetic Acid (NTA)	0.4			<0.05	2003, 04
Nitrosodimethylamine (NDMA)		0.000009		<0.000002	2003, 04
Paraquat		0.01		<0.001	2002, 06
Parathion	0.05			<0.0001	2002, 06
Pentachlorophenol	0.06		0.03	<0.0005	2002, 06
Phorate		0.002		<0.0001	2002, 06
Picloram		0.19		<0.0002	2002, 06
Polychlorinated Biphenyls (PCB)		0.003		<0.00006	2002, 06
Prometryne		0.001		<0.0001	2002, 06
Selenium	0.01			<0.005	2002, 06
Simazine		0.01		<0.0001	2002, 06
Temephos		0.28		<0.0001	2002, 06
Terbufos		0.001		<0.0001	2002, 06
Tetrachloroethylene(perchloroethylene)	0.030			<0.0005	2002, 06
2,3,4,6-Tetrachlorophenol	0.1		0.001	<0.0005	2002, 06
Triallate	0.23			<0.0001	2002, 06
Trichloroethylene	0.05			<0.0005	2002, 06
2,4,6-Trichlorophenol	0.005		0.002	<0.0005	2002, 06
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	0.28		0.02	<0.0002	2002, 06
Trifluralin		0.045		<0.0001	2002, 06
Trihalomethanes	0.100			<0.002	2002, 06
Turbidity	1.0		5.0	0.3	2002, 06
Uranium	0.10			<0.005	2002, 06
Vinyl Chloride	0.002			<0.0005	2002, 06

Table 6.2
Microbiological Standards – Health Related

Parameter	MAC (/100 mL)	MW #E4	Date year/month
Total Coliforms	0	0	2002, 06
Escherichia coli	0	0	2002, 06
Background	200	0	2002, 06

Table 6.3
Radionuclides

Parameter	MAC Bq/L	MW #E4 Bq/L	Date year/month
Gross Alpha-Hivols-RPL	0.1	<0.1	2002, 06
Gross Beta-Hivols-RPL	0.5	<0.1	2002, 06
Tritium	7000	<1000	2002, 06

Table 6.4
Chemical/Physical Objectives - Not Health Related

Parameter	Objective (mg/L)	Type of Objective	MW #E4	Date of Sample
Alkalinity (as CaCO3)	30-500	OG	217	2002, 06
Aluminum	0.10	OG	<0.01	2002, 06
Chloride	250	AO	7.4	2003, 04
Colour	5 TCU	AO	<1	2002, 06
Copper	1.0	AO	<0.001	2002, 06
Dissolved Organic Carbon (DOC)	5.0	AO	1.1	2002, 06
Ethylbenzene	0.0024	AO	<0.0005	2002, 06
Hardness (as CaCO3)	80-100	OG	**475**	2002, 06
Iron	0.3	AO	0.18	2002, 06
Manganese	0.05	AO	0.004	2002, 06
Organic Nitrogen	0.15	OG	0.08	2002, 06
pH	6.5-8.5	OG	7.6	2002, 06
Sodium	20 or 200	AO	14.6	2002, 06
Sulphate	500	AO	230	2003, 04
Sulphide (Hydrogen Sulphide)	0.05	AO	<0.02	2002, 06
Toluene	0.024	AO	<0.0005	2002, 06
Total Dissolved Solids	500	AO	**960**	2002, 06
Xylenes	0.30	AO	<0.0015	2002, 06
Zinc	5.0	AO	0.011	2002, 06

AO = Aesthetic Objective
OG = Operational Guideline
TCU = True Colour Units

Construction of the connecting watermain from Well E4 to the existing distribution system is not expected to have any impacts on groundwater quality.

Since Well E2 is a bedrock well and is within 500 m of the Grand River, it is classified as

groundwater under the direct influence of surface water. Decommissioning of Well E2 will reduce the potential of contaminating the community's drinking water aquifer with chemicals and bacteria found in the Grand River.

6.2.3 Conclusions Regarding Potential Effects on Groundwater Quantity and Quality

The following are the conclusions drawn regarding the potential effects on groundwater quantity and quality:

- Well E4 is capable of producing 22.7 L/s (1961 m3/d) for a potable water supply with a drawdown of approximately 56 m below ground surface.
- Long term testing indicates that pumping Well E4 will have negligible impacts on surrounding private and municipal wells.
- The overall quality of water pumped from Well E4 is considered satisfactory for a municipal water supply and meets all health related Ontario Drinking Water Quality Water Standards.
- Well E4 is not considered to be under the direct influence of surface water.
- Well E2 is considered to be under the direct influence of surface water.
- Abandonment of Well E2 will eliminate interference issues with Well E3 and significantly reduce the potential for contamination of the municipal of supply by a GUDI well.

6.2.4 Measures to Mitigate Effects on Groundwater

6.2.4.1 Standard Construction Mitigation

Table 6.5 summarizes a series of standard mitigation measures which will be incorporated into the contract specifications of the project. Implementation of these measures serves to minimize the adverse effects of the project on ground water resources, as well as other identified VEC's (as discussed throughout this section of the report).

Table 6.5
Standard Construction Mitigation Measures

Activity	Impact Mitigation
Refuelling and Maintenance	- Identify suitable locations for designated refuelling and maintenance areas (e.g., away from watercourses, storm inlets, and natural areas). - Refuelling or maintaining equipment will not occur within 30 m of a watercourse. - Cleaning of equipment is not to occur in watercourses or in locations where debris can gain access to sewers or watercourses. - Prepare to intercept, clean-up, and dispose of any spillage which may occur (whether on land or water). - Appropriate spills containment and clean-up materials are to be available at the site, and contractors are required to develop spill

Activity	Impact Mitigation
	prevention and response procedures. - Immediately clean and contain spills in accordance with provincial regulatory requirements (MOE Spills Action Centre: 1 (800) 268-6060).
Traffic Control	- The Contractor shall prepare and submit a traffic plan to the Project Engineer for review and acceptance. - Traffic flow should be maintained at all times during construction for private access. If it is necessary to detour traffic, the Contractor will coordinate the routing and provide adequate signage and barricades. - At the end of each working day, a minimum of one lane of traffic, controlled by barricades, delineators, etc. shall be maintained for emergency vehicles.
Disposal	- All demolition debris and other material that is unsuitable for reuse is to be disposed of at an approved facility. - 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 watercourses and drainage systems, do not clean equipment in watercourses).
Pesticides	- Coordinate the use of pesticides and herbicides with affected landowners and the local pesticide control officer.
Drainage and Water Control	- All portions of the work should be properly and efficiently drained during construction. - Provide temporary drainage and pumping to keep excavation and site free from water. - Control disposal or runoff or water containing suspended materials or other harmful substances in accordance with approval agency requirements. - Provide settling ponds and sediment basins as required. - Do not direct water flow over pavements, except through approved pipes/ troughs.
Dust Control	- Cover or wet down dry materials and rubbish to prevent blowing dust and debris. - Avoid the use of chemical dust control products adjacent to watercourses. - Hours of construction are to be limited to reduce the impact of dust, etc on surrounding land uses - Avoid excavation, and other construction activities with potential to release airborne particulates, during windy and prolonged dry periods. - Cover or otherwise contain loose construction materials that have potential to release airborne particulates during their transport, installation or removal. - Spray water to minimize the release of dust from gravel, paved areas and exposed soils. Use chemical dust suppressants only where necessary on problem areas. - Use water to suppress dust during any concrete cutting
Site Clearing	- Protective measures shall be taken to safeguard trees from construction operations. - Equipment or vehicles shall not be parked, repaired, refuelled near the dripline area of any tree not designated for removal. Construction

Activity	Impact Mitigation
	and earth materials shall also not be stockpiled within the defined dripline areas. - Restrict tree removal to areas designated by the Contract Administrator. - Minimize stripping of topsoil and vegetation. - Restore disturbed areas as soon as possible to minimize the duration of soil exposure - Upon completion of construction, the disturbed areas will be restored with seed and mulch that will maintain or enhance the local habitat
Sedimentation/ Erosion Control	- Use of appropriate erosion and sediment control measures (silt fences, filter bags, etc.) should be implemented prior to work and maintained during the work phase and beyond, as necessary to prevent run off from the construction site and the movement of re-suspended sediment. - Protect watercourses, wetlands, catch basins and pipe ends from sediment intrusion. - Complete restoration works following construction. - Install straw bale check dams in ditchlines following rough grading of ditches.
Noise Control	- Site procedures should be established to minimize noise levels in accordance with local by-laws and the Occupational Health and Safety Act - Provide and use devices that will minimize noise levels in the construction area. - Maintain equipment in proper working order and minimize idling to reduce noise impacts - Hours of construction are to be limited to reduce the impact of noise on surrounding land uses - Night time or Sunday work shall not be permitted, except in emergency situations.

6.2.4.2 Operational Mitigation Measures

The PTTW for Well E4 includes a requirement for monitoring and reporting interference with other wells in the area. The Township is required under the PTTW to rectify any well interference issues that may occur. Mitigation measures can include drilling new wells, lowering pumps in existing wells, deepening existing wells or providing municipal water to the impacted property owner. In addition, the Township may also consider pumping the well at a lower rate or for a shorter duration to reduce any interference impacts that may occur.

Water quality tests, taken during the pump tests from Well E4, meet the requirements of the Ontario Drinking Water Standards. During operation of the facility, Township staff is required by the *Safe Drinking Water Act* and its associated Regulations to sample for various water quality parameters at various frequencies. Any incidence of adverse water quality requires investigation and resolution prior to the well being placed back into service. Well E4 is constructed in accordance with Ontario Regulation 903 under the Ontario Water Resources Act which requires sealing of the annular space between the well casing and

the surrounding ground. Therefore, the potential for groundwater contamination from surface influence is minimized.

Measures to mitigate the effects of the project on ground water quantity and quality during the Operational Phase include:

- Monitor and report on all water takings in accordance with Permit to Take Water requirements which includes:
    - Daily recording of water takings; and
    - Weekly recording of static water levels.
- Rectify all well interference issues as required. This may include any of the following:
    - Modify the pumping strategy to minimize / eliminate interference issues;
    - Lower the pumps in the affected wells;
    - Increase the depth of the affected wells;
    - Drilling of new wells to replace the affected wells; or
    - Connect the affected property owner to the municipal water system.
- Conduct groundwater testing throughout the operational phase of the project in accordance with Provincial MOE requirements (as summarized in Table 8.3).
- Inspect and maintain well to ensure the groundwater source is not adversely affected (as summarized in Table 8.3).

6.2.5 Residual Effects

Based on the foregoing discussion, the project has the potential to generate residual effects on the groundwater aquifer. Specifically, the result of the project is a net increase in water taking capacity from the bedrock aquifer of 695 m^3/day. This increase is not expected to have a significant impact on groundwater resources throughout the life of the project. The potential to increase the protection of the drinking water aquifer from surface water contamination and further protect human health by decommissioning Well E2 is a significant positive effect that should provide the Township and its population with additional confidence in the security of their water supply.

6.2.6 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up and any necessary adaptive management, implementation of the project is not expected to have a significant adverse environmental effect on ground water quantity and quality. In this regard, the anticipated residual effect of this project on ground water quantity would be considered Low in magnitude based upon the impact criteria presented in Table 2.1. The anticipated residual effect of this project on ground water quality would be considered Minimal/ Nil in magnitude based upon the impact criteria presented in Table 2.1.

6.3 Surface Water

6.3.1 Potential Effects on Surface Water Quality and Quantity

The greatest impacts to surface waters will occur during the construction phase of the project when bare ground is exposed to weather conditions which have the potential to increase erosion and sediment movement. The construction contract includes the

installation and maintenance of sediment and erosion control measures including silt fence and straw bale check dams around the watermain and well construction sites to minimize off site impacts. Since the well site has an area of approximately 528 m^2, has relatively flat topography, and since sensitive surface waters are more than 1.0 km away from the site (approximately 1.3 km from the Grand River and approximately 2.3 km from Swan Creek), no significant impacts on surface waters from construction activities are expected.

The shallow hydrogeological setting in the area around Well E4, in particular the low-permeability and considerable thickness (20 to 30 m) of the overburden till deposits, indicates that a poor hydraulic connection exists between the local water table zone and the deep bedrock aquifer. There is no expectation that the local water table levels will decline due to deep aquifer pumping. As a result, water levels in the nearby watercourses to the east/southeast of Well E4 (Figures 1 and 3 of 2002 Hydrogeological Investigation report) are not predicted to decline.

The more 'regional' water courses in the area include the Grand River and Swan Creek, located about 1.3 km to the west/northwest and 2.3 km to the southeast, respectively. Both are located beyond the zone of significant deep aquifer drawdown from Well E4 (see Figure 4 of 2002 Hydrogeological Investigation report). There is no expectation that a significant change to the magnitude of the upward vertical hydraulic gradients which create groundwater discharge along these watercourses will occur. As a result, no detrimental impact to the baseflow of either watercourse is predicted.

The 2002 Hydrogeological Investigation report concluded that Well E4 does not have a hydraulic connection to a surface water source. As a result, construction and operation of the well is not expected to have a significant impact on surface water quantity or quality.

Although not anticipated immediately as a result of this project, increased water taking because of community growth will result in additional flows to the Elora sewage treatment plant (STP), which provides secondary treatment, and subsequently increased discharges, along with its associated contaminant loadings, to the Grand River. Discharge quantity and quality is regulated by the Ontario Ministry of Environment. Community growth is dependent on upgrading of the STP and therefore, increased flows to the STP are not expected to occur until upgrading of the STP is complete.

The Township is currently completing a Schedule C Provincial Class Environmental Assessment for the STP. Increased discharge from the STP can only occur with approval from the Ontario Ministry of Environment (MOE). The MOE will likely require that the upgraded STP effluent be treated to a tertiary level which would be consistent with other municipal wastewater treatment plant upgrade projects that have been occurring along the Grand River. This requirement would likely result in the total contaminant loadings to the Grand River being reduced.

Due to the lack of baseline data for Well E2, it is uncertain what impact, if any, the decommissioning of Well E2 will have on base flows to the Grand River. However, any possible impacts should already have occurred as the well has not been in service since 1996. Decommissioning of E2 is not anticipated to have any impact on the quantity or quality of water in the Grand River.

6.3.2 Measures to Mitigate Effects on Surface Water

Measures to mitigate the effects of the project on surface water quantity and quality during the Construction Phase include those for sediment and erosion control, and refuelling and maintenance (as summarized in Table 6.5). In addition, the sites are to be stabilized as soon as possible with hydroseeding and mulch following completion of construction.

6.3.3 Residual Effects

Due to the long distance from local surface waters and planned use of sediment and erosion control measures, no residual effects to surface water quantity and quality are anticipated. Impacts on flows to the Grand River from the Elora STP during the operational phase of the project are also expected to be insignificant.

6.3.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up and any necessary adaptive management, implementation of the project is not expected to have a significant adverse environmental effect on surface water quantity and quality. In this regard, the anticipated residual effect of this project on surface water quantity would be considered Minimal/Nil in magnitude based upon the impact criteria presented in Table 2.1. The anticipated residual effect of this project on ground water quality would be considered Minimal/Nil in magnitude based upon the impact criteria presented in Table 2.1.

6.4 Fisheries and Aquatic Resources

6.4.1 Potential Effects on Fisheries and Aquatic Resources

The impacts to fisheries and aquatic resources are the same as those mentioned previously for surface waters. The greatest potential for impacts will occur during the construction phase of the project when bare ground is exposed to weather conditions which could result in erosion and sediment movement. The construction contract includes the installation and maintenance of sediment and erosion control measures including silt fencing around the well site to minimize off-site impacts. Since the well site has an area of approximately 528 m^2, has relatively flat topography and sensitive surface waters are more than 1.0 km away from the site (approximately 1.3 km from the Grand River and approximately 2.3 km from Swan Creek), no significant impacts on fisheries and aquatic resources are expected.

The shallow hydrogeological setting in the area around Well E4, in particular the low-permeability and considerable thickness (20 to 30 m) of the overburden till deposits, indicates that a poor hydraulic connection exists between the local water table zone and the deep bedrock aquifer. There is no expectation that the local water table levels will decline due to deep aquifer pumping. As a result, the water levels in the nearby intermittent field drain, approximately 200 m to the southeast of Well E4, (Figures 1 and 3 of 2002 Hydrogeological Investigation report) are not predicted to decline and therefore, impacts on fisheries and aquatic resources are anticipated to be insignificant.

The more 'regional' water courses in the area include the Grand River and Swan Creek, located about 1.3 km to the west/northwest and 2.3 km to the southeast, respectively. Both are located beyond the zone of significant deep aquifer drawdown from Well E4. There is no expectation that a significant change to the magnitude of the upward vertical hydraulic gradients that create groundwater discharge along these water courses will occur. As a result, no detrimental impact to the baseflow of either watercourse is predicted and impacts on fisheries and aquatic resources are anticipated to be insignificant.

As noted in Section 5.1.2 and 5.2.2, project information was circulated to the Grand River Conservation Authority (GRCA) during the Municipal Engineer's Association Class Environmental Assessment process. No comments were received from the GRCA regarding any concerns to fish or fish habitat.

The decommissioning activities at Well E2 will have no impacts on fisheries and aquatic resources.

6.4.2 Measures to Mitigate Effects on Fisheries and Aquatic Resources

Measures to mitigate the effects of the project on fisheries and aquatic resources during the Construction Phase include those for sediment and erosion control, and refuelling and maintenance (as summarized in Table 6.5). In addition, the sites are to be stabilized as soon as possible with hydroseeding and mulch following completion of construction.

6.4.3. Residual Effects

Due to the long distance from local surface waters and with the planned implementation of sediment and erosion control measures, no residual effects on fisheries and aquatic resources are anticipated .

6.4.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up and any necessary adaptive management, implementation of the project is not expected to have a significant adverse environmental effect on fisheries and aquatic resources. In this regard, the anticipated residual effect of this project on fisheries and aquatic resources would be considered Minimal/Nil in magnitude based upon the impact criteria presented in Table 2.1.

6.5 Vegetation, Species at Risk, Migratory Birds, and Wildlife

The buildings for Well E4 will be constructed in a 528 m^2 area within a 20 m wide unopened road right-of-way that was disturbed in 2000 for the International Plowing Match. The right-of-way was used for a period of approximately three months to move equipment and supplies to the Plowing Match site. Trees were trimmed as needed and gravel placed over a 10 m width in the centre of the right-of-way to ensure safe access for workers and visitors to the site. Traffic was significant for the month of September 2000 which would have created noise impacts along the entire Cottontail Road right-of-way. The clearing of approximately six maple trees along the east side of the right-of-way to construct treatment facilities at Elora Well E4 is not expected to have significant impact on birds

since the trees will be cleared and trimmed in the fall of the year when migratory birds have completed nesting.

Construction of the watermain extension and decommissioning of Well E2 are not expected to have significant impacts on vegetation, wildlife, birds and species at risk. The watermain will be constructed within the right-of-way of Wellington County Road 21 and Well E2 is an existing facility that has been in operation for several decades.

6.5.1 Vegetation

6.5.1.1 Potential Effects on Vegetation

As discussed in Section 5.1.3 of this report, terrestrial and vegetative features within the study area are not considered sensitive to development and are commonly found in the local area. None of the vegetation species affected by the work are considered sensitive or rare. Construction-related activities will result in the permanent removal of approximately six maple trees and temporary removal of ground cover vegetation. Some other trees will require trimming.

6.5.1.2 Measures to Mitigate Effects on Vegetation

In order to minimize the adverse environmental effects of the project on vegetation, standard construction mitigation measures (site clearing restrictions) will be employed during the construction phase (Table 6.5 summarizes these measures).

In addition, the construction contract documents will include the following protective measures:

- Tree removal restricted to those trees identified for removal on the contract drawings.
- Stripping of topsoil and vegetation will be restricted to designated areas.
- Operations shall not cause damage to trees or result in flooding or sediment deposition in areas where trees are not designated for removal.
- Excavated material stockpiles shall not be placed within driplines of trees not designated for removal.
- Damaged branches and roots of trees not designated for removal shall be cut back cleanly.
- All disturbed areas shall be restored with topsoil, hydroseeding or sod as soon as possible.

6.5.1.3 Residual Effects

Construction of this project requires the stripping of a 528 m^2 area within a recently disturbed unopened road right-of-way and the permanent removal of six mature maple trees. Due to the small footprint of the Well E4 project, the proximity of the footprint to the property lines and the need for access to properly maintain the facility, planting of trees to

replace those removed is not planned.

6.5.1.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up and any necessary adaptive management, implementation of the project is not expected to have a significant adverse environmental effect on vegetation. In this regard, the anticipated residual effect of this project on vegetation would be considered Minimal/Nil in magnitude based upon the impact criteria presented in Table 2.1.

6.5.2 Species at Risk

6.5.2.1 Potential Effects on Species at Risk

The Species at Risk Act (SARA) was promulgated in June 2003. Schedule I to the SARA registry lists all species that are considered to be endangered, threatened or of special concern. An evaluation of the impacts on species at risk that have been identified for the Elora area follows:

Grey Foxes inhabit deciduous forests and marshes. Their dens are usually located in an area of dense brush, fairly close to a water source. Since habitat of this type is not located in the area defined by the range and corridor of this project, the Grey Fox is not likely to inhabit the project area or be affected by the project.

Ontario Eastern Cougar - Information provided by the National Heritage Information Centre (NHIC) indicates that the Ontario Ministry of Natural Resources (MNR) considers the species to be facing imminent extinction or extirpation in Ontario. The species is actively tracked (i.e. occurrence data is actively gathered) by the NHIC, and is generally thought to have fewer than 100 recent occurrences in Ontario and its presence has not been verified for as long as 20 - 40 years. As a result, the Ontario eastern cougar is not likely to inhabit the project area or be affected by the project.

Henslow's Sparrows occupy open fields and prefers undisturbed areas with dense living grasses and a dense thatch of dead grasses, and may occupy hayfields. Since habitat of this type is not located in the area defined by the range and corridor of this project, the Henslow's sparrow is not likely to inhabit the project area or be affected by the project

Hooded Warblers nest in mature hardwood forests with tall trees and a well-closed canopy. The species is considered area-sensitive, meaning that it requires large areas of forest. The bird occupies small clearings with low dense shrubby vegetation. Since habitat of this type is not located in the area defined by the range and corridor of the project, the Hooded Warbler is unlikely to inhabit the project area or be affected by the project.

Least Bitterns nest in freshwater marshes more than 5 ha in area, where dense tall aquatic vegetation is interspersed with clumps of woody vegetation and open water. They are most strongly associated with cattails. Since habitat of this type is not located in the area defined by the range and corridor of the project, the Least Bittern is unlikely to inhabit the project area or be affected by the project.

The Northern Bobwhite mainly occurs in cultivated areas with grain or corn, or on weedy

abandoned farms near brushy patches or edges. It prefers areas where half the ground is exposed and the remainder contains upright growth of herbaceous and woody vegetation. The Northern Bobwhite is unlikely to inhabit the project area or be affected by the project since disruption of this type of habitat located in the area defined by the range and corridor to the project is limited to a small footprint and movement of the species will not be impeded.

The Yellow-breasted Chat breeds in dense thickets around wood edges, riparian areas, and in overgrown clearings. The Ontario population is very dependent on secessional habitats of thick shrubbery. These habitats are the result of vegetative growth in forest openings created by storms, fire, or abandoned fields. Since habitat of this type is not located in the area defined by the range and corridor of the project, the Yellow-breasted Chat, virens subspecies is unlikely to inhabit the project area or be affected by the project.

Monarchs, in Canada, exist primarily wherever milkweed and wildflowers (such as Goldenrod, asters, and Purple Loosestrife) exist. This includes abandoned farmland, along roadsides, and other open spaces where these plants grow. The eastern population of the Monarch is limited by loss of habitat to logging, human disturbance, and predation, especially while wintering in Mexico. Widespread and increasing use of herbicides in North America is another significant threat, which kills both the milkweed needed by the caterpillars and the nectar-producing wildflowers needed by the adults. The Monarch butterfly is unlikely to be impacted by the project since the area defined by the range and corridor of the project will be allowed to return to the same vegetation conditions present prior to construction and the use of herbicides and pesticides will not be permitted within 100 m of Well E4.

6.5.2.2 Measures to Mitigate Effects on Species at Risk

In order to minimize the adverse environmental effects of the project on species at risk, standard construction mitigation measures (site clearing restrictions, noise control) will be employed during the construction phase (Table 6.5 summarizes these measures).

In addition, the following mitigation measure will be implemented:

- Should a species or its critical habitat be encountered, measures are to be implemented to avoid destruction, injury or interference with the species, its residence and/or its habitat (e.g., through siting, timing or design changes). If species at risk are encountered, the proponent should contact Environment Canada, Environmental Policy & Assessments Division, Great Lakes & Corporate Affairs Office, Ontario Region P.O. Box 5050, 867 Lakeshore Road, Burlington, Ontario L7R 4A6, (905) 336-4950 to discuss management options to minimize, reduce or control adverse effects or compensatory mitigation and environmental effects monitoring.

6.5.2.3 Residual Effects

Given the minimal interaction between the project and identified species at risk, the project is not anticipated to generate any residual effects on this valued ecosystem component.

6.5.2.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up and any necessary adaptive management, implementation of the project is not expected to have a significant adverse environmental effect on species at risk. In this regard, the anticipated residual effect of this project on species at risk would be considered Minimal/Nil in magnitude based upon the impact criteria presented in Table 2.1.

6.5.3 Migratory Birds

6.5.3.1 Potential Effects on Migratory Birds

The proposed sites are in previously disturbed areas and are not considered to be prime habitat for migratory birds for the following reasons:

- The Well E4 project site is surrounded by similar vegetative and terrestrial species which minimizes the impact of removing the six mature maple trees.

- The limited amount of vegetation found at all sites provides minimal habitat value and incorporates species that are not considered sensitive or rare and are commonly found throughout the community.

- The project requires a relatively small land area.

6.5.3.2 Measures to Mitigate Effects on Migratory Birds

In order to minimize the adverse environmental effects of the project on migratory birds, standard construction mitigation measures (site clearing restrictions and noise controls) will be employed during the construction phase (Table 6.5 summarizes these measures).

In addition, the following mitigation measures will be implemented:

- Construction, maintenance and decommissioning activities with the potential to destroy migratory birds, such as vegetation clearing, will not take place in migratory bird nesting habitat during the core breeding season, which is generally defined to be May 1 to July 31 for most species in this region of Ontario.

- The Contractor will be advised that harassing or harming a migratory bird is prohibited.

6.5.3.3 Residual Effects

Given the minimal interaction between the project and migratory birds, the project is not anticipated to generate any residual effects on this VEC.

6.5.3.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring and any adaptive management, implementation of the project is not expected to have a significant adverse environmental effect upon migratory birds. In this regard, the anticipated residual effect of this project on this VEC would be considered Minimal/Nil in magnitude based upon

the impact criteria in Table 2.1.

6.5.4 Wildlife

6.5.4.1 Potential Effects on Wildlife

Construction related activities will result in the disturbance of an area approximately 528 m^2 in size at the E4 well site and along the road right of way (approximately 3.0 m wide by 1.28 km long) during the watermain installation. The areas temporarily and permanently affected by construction provide limited habitat value to species that are not sensitive to development and are commonly found in the local area.

6.5.4.2 Measures to Mitigate Effects on Wildlife

In order to minimize the adverse environmental effects of the project on wildlife habitat, standard mitigation measures (site clearing restrictions, noise controls) will be employed during the construction phase (Table 6.5 summarizes these measures).

6.5.4.3 Residual Effects

Given the minimal interaction between the project and wildlife, the project is not anticipated to generate any residual effects on this VEC.

6.5.4.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring and any necessary adaptive management, implementation of the project is not expected to have a significant adverse environmental effect upon wildlife. In this regard, given the limited scale of the project and the non-sensitive nature of the affected habitat, the anticipated residual effect of this project on wildlife resources would be considered Minimal/Nil in magnitude based upon the impact criteria in Table 2.1.

6.6 Noise

6.6.1 Potential Effects by Noise

Noise impacts during the drilling and construction of Well E4 are not anticipated to be significant due to the site's remote location. Noise resulting from the construction equipment used to install the watermain extension is not anticipated to result in significant impacts since it will be constructed along Wellington County Road 21 and the single home along the watermain route is acclimatized to traffic noise.

During construction, noise impacts are not expected to significantly impact the area surrounding Well E4 since the site is remotely located. In addition, limited access to the site does not allow for a concentration of construction vehicles at any one time. The construction site will only permit an excavator and one truck at a time during excavating and backfilling operations and only one truck and a concrete pump during concrete pouring operations. During construction of the watermain, construction vehicle noise in the near and far fields are expected to be insignificant since vehicles travelling along Wellington County Road 21 are already contributing similar background noise on a daily basis.

Noise generated during operation of the E4 Well site will be limited to that generated by exhaust fans used for ventilating the building. The nearest home is located approximately 500 m to the south of Well E4 (Refer to Figure 3 in Appendix A). Due to the remote area in which the facility is located and the infrequent operation of the fans, noise impacts will not be significant. However, during emergencies, the facility can be powered with a portable diesel generator. Noise estimates from the portable diesel generator are expected to range between 80 dBa and 100 dBa within 10 m of the generator set. Use of a generator is not expected to be significant as power outages are normally limited to less than two hours due to the good quality hydro infrastructure in the area and the elevated water towers in the distribution system can provide water for approximately 24 hours. Since Wells E1 and E3 are also equipped for emergency operation during power outages, they would typically be operated under emergency conditions due to their closer proximity to the water towers. This will allow the municipality to minimize operation of a portable diesel generator at the E4 well site.

6.6.2 Measures to Mitigate Effects of Noise

In order to minimize the adverse environmental effects of noise, standard construction mitigation measures (noise controls) will be employed during the construction phase (Table 6.5 summarizes these measures).

During the Operational Phase of the project, the following additional mitigation measures will be implemented:

- Regular maintenance of equipment during construction and operation of facility
- Minimize use of the portable standby power generator at Well E4 during power failures.

6.6.3 Residual Effects

Given the foregoing discussion, the project is not anticipated to generate any residual effects on this VEC.

6.6.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring and any necessary adaptive management, implementation of the project is not expected to have a significant adverse environmental effect upon noise levels in the area. In this regard, the anticipated residual effect of this project on noise levels would be considered Minimal/Nil in magnitude based upon the impact criteria in Table 2.1.

6.7 Air Quality

6.7.1 Potential Effects on Air Quality

During normal operation of Well E4, there will be no greenhouse gas emissions from the facility. All equipment at the facility uses electricity to operate. However, during emergencies, the facility can be powered with a portable diesel generator. Use of a generator is not expected to have significant air quality impacts as the other supply wells in Elora would typically be operated under emergency conditions.

The municipality uses chlorine gas to disinfect the water supply. Gas leaks are a rare occurrence and the facility is equipped with alarms to notify operating staff of a gas leak. Gas leaks are ventilated to the atmosphere in accordance with Ontario Ministry of Labour design guidelines which do not require the use of scrubbers on the exhaust system.

During construction, vehicle emissions are not expected to significantly impact air quality in the near or far fields at Well E4 since the project covers a limited area and limited access at the site does not allow for a concentration of construction vehicles at any one time. The construction site will only permit an excavator and one truck at a time during excavating and backfilling operations and only one truck and a concrete pump during concrete pouring operations. During construction of the watermain, construction vehicle emissions in the near and far fields are expected to be insignificant since vehicles travelling along Wellington County Road 21 are already contributing greenhouse gas emissions on a daily basis.

6.7.2 Measures to Mitigate Effects on Air Quality

In order to minimize the adverse environmental effects to air quality, the following mitigation measures will be employed during the construction and operation phases of the project:

- During construction activities, contractors are to maintain their equipment in proper working order and minimize idling to reduce air quality impacts on the surrounding environment.

- Minimize use of generator at Well E4 during emergency conditions by operating Wells E1 and E3 in lieu of Well E4.

- Ensure operating staff are adequately trained in the use and operation of chlorine gas equipment.

6.7.3 Residual Effects

Given the foregoing discussion, the project is not anticipated to generate any residual effects on this VEC.

6.7.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring and any necessary adaptive management, implementation of the project is not expected to have a significant adverse environmental effect upon air quality in the area. In this regard, the anticipated residual effect of this project on air quality levels would be considered Minimal/Nil in magnitude based upon the impact criteria in Table 2.1.

6.8 Socio-Economic and Cultural Environments

6.8.1 Adjacent Land Uses

6.8.1.1 Potential Effects on Adjacent Land Uses

The area surrounding Well E4 is agricultural. Location of a municipal well at this site will impact the application of nutrients (sewage sludge, fertilizer, manure, etc.) within 100 m of the municipal well (Refer to Figure 3 in Appendix A). Regulations to Ontario's *Nutrient Management Act* (2002 as amended) do not allow farmers to apply nutrients within this buffer zone. As a result, there may be some a minor decrease in crop yields in the arable fields that fall within this radius. A 100 m radius around Well E4 is equivalent to 3.1 hectares. This area is divided between two land owners and the Cottontail Road right-of-way. Nutrient application will be limited on approximately 1.05 hectares of land for the west landowner and 1.2 hectares for the landowner to the east. The land to the east is shaded by the trees along the right-of-way and is relatively wet throughout the year. As a result, production to the east is already limited by existing conditions.

Since there is no crop irrigation or other major farm uses of groundwater from the deep aquifer on these nearby farms, there will be no adverse effects from a socio-economic and land use perspective with the commissioning of Well E4.

Commissioning of the new well will increase the reserve capacity of the Elora water system and subsequently, growth within the urban limits of Elora would be allowed to occur in accordance with the Township of Centre Wellington's Official Plan. There are no anticipated effects to adjacent land uses with the abandonment of Well E2 or the construction of the watermain extension along Wellington County Road 21.

Upon adoption of an amendment to the Wellington County Official Plan, which would implement a groundwater management and protection strategy, land use within the Well Head Protection Area will be limited by the guidelines set out in the amendment.

6.8.1.2 Measures to Mitigate Effects on Adjacent Land Uses

Measures to mitigate impacts on land use may include any or all of the following:

- The purchase of land within a 100 m radius of Well E4 by the proponent;
- The use of alternative tillage practises by farmers within the 100 m radius of Well E4; and
- Require the completion of studies prior to development of surrounding lands to ensure that the E4 well site and the water supply are not adversely impacted (in accordance with the Wellington County Official Plan).

6.8.1.3 Residual Effects

Based on the above discussion, the project has the potential to generate residual effects on adjacent land uses. Specifically, the project could cause a minor reduction in crop yields within a 100 m radius of the Well E4 wellhead.

6.8.1.4 Significance of Residual Effects

Based on the above discussion, adjacent land uses is not expected to have an impact on this project in a manner that could result in significant adverse environmental effects. As a result, the anticipated residual effect of adjacent land uses on the project would be considered Minimal/Nil in magnitude based on the impact criteria presented in Table 2.1.

6.8.2 Local Neighbourhoods and Residents

6.8.2.1 Potential Effects on Local Neighbourhoods and Residents

The nearest home is located 500 m to the south of Well E4 and 200 m south of the transmission watermain at its closest point. Due the significant distance between these facilities and the closest residence, the construction and operation of Well E4 and the transmission watermain is not anticipated to have a significant impact to adjacent homes and residents.

Well site E2 is located in a residential area. The most likely effects related to the decommissioning activities at this site are noise related from the use of construction vehicles and equipment. These effects will be short term and will occur only during the construction period.

6.8.2.2 Measures to Mitigate Effects on Local Neighbourhoods and Residents

In order to minimize the adverse environmental effects of the project on local neighbourhoods and residents, standard construction mitigation measures (noise and dust controls) will be employed during the construction phase (Table 6.5 summarizes these measures).

6.8.2.3 Residual Effects

Given the minimal interaction between the project and local neighbourhoods and residents, the project is not anticipated to generate any residual effects on this VEC.

6.8.2.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up, and any necessary adaptive management, environmental effects from this project is not expected to impact on local neighbourhoods and residents in a manner that could result in significant adverse environmental effects. As a result, the anticipated residual effect of this project to local neighbourhoods and residents would be considered Minimal/Nil in magnitude based on the impact criteria presented in Table 2.1.

6.8.3 Worker Health and Safety

6.8.3.1 Potential Effects on Worker Health and Safety

During construction, worker health and safety is regulated by the Ontario Occupational Health and Safety Act (OHSA) and its Regulations. Typical hazards will exist during the

construction phase of the project (for example from excavation activity, building construction and the need for traffic control). The constructor (as defined under OHSA) is required to ensure that all workers are adequately trained to reduce the risk of injury. Construction contract documents require the contractor to install and maintain construction signs in accordance with Ministry of Transportation traffic sign installation manuals and OHSA requires workers to wear reflective clothing to make them more visible to traffic.

The facility is designed in accordance with Ontario Ministry of Labour and Building Code requirements. The treatment system and equipment at this site are similar to all of the other well sites in the Township of Centre Wellington which improves operator familiarity with operating strategies and improves worker safety. Operating personnel are trained in the safe handling of chlorine gas. The facility is equipped with chlorine gas monitoring equipment to warn operators not to enter the facility if a gas leak has occurred.

6.8.3.2 Measures to Mitigate Effects on Worker Health and Safety

The Contractor will be required to obey health and safety protocols dictated by existing legislation and requirements of the Contract specifications. Measures to mitigate effects to worker health and safety include:

- Ensure adequate training and supervision is provided during both the construction and operational phases of the project
- Provision of the necessary first aid items and equipment prescribed under the First Aid Regulations of the Worker's Compensation Act
- Adherence to the regulations issued by the Ontario Ministry of Labour under the Occupational Health and Safety Act.

6.8.3.3 Residual Effects

Based on the above discussion and provided workers are adequately trained, the project is not anticipated to generate any residual effects on this VEC.

6.8.3.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up, and any necessary adaptive management, effects from this project are not expected to impact on worker health and safety in a manner that could result in significant adverse environmental effects. As a result, the anticipated residual effect of this project to worker health and safety would be considered Minimal/Nil in magnitude based on the impact criteria presented in Table 2.1.

6.8.4 Public Health and Safety

6.8.4.1 Potential Effects on Public Health and Safety

Well E4 will replace Well E2 which was classified as groundwater under the direct influence (GUDI) of surface water. The commissioning of Well E4 will provide a more secure supply than that provided by Well E2 which in turn will benefit public health and safety.

During operation of Well E4, failure of the disinfection system has the potential to have an adverse effect on the safety of the water supply and subsequently, public health. However, as required by Provincial Regulations, the facility design includes automatic continuous monitoring equipment to stop operation of the facility and notify operators that a malfunction has occurred. In the event of chlorine gas leaks, the facility monitoring system will notify system operators to take corrective action and the Township will implement its Emergency Measures Plan to resolve any potential problems at the site. The emergency plan includes notification of emergency services, Ministry of Environment Spills Action Centre and if necessary, evacuation of nearby homes and businesses.

During construction of the watermain extension, public safety may be impacted by construction activities along Wellington County Road 21.

6.8.4.2 Measures to Mitigate Effects on Public Health and Safety

Measures to mitigate environmental effects that could impact public health and safety during construction of the watermain extension are as follows:

- Implementation of a traffic management plan (includes the installation of signs and provision of traffic control in accordance with the Ontario Traffic Manual by contractors). This will ensure that travellers are adequately warned of the construction activities occurring in the area.

Measures to mitigate effects that could impact public health and safety during operation of the new treatment facility include:

- Continuous monitoring of the new treatment facility operation (to notify operators of adverse conditions).

- Implementation of the Emergency Measures Plan (including notification of the public) as required.

6.8.4.3 Residual Effects

Based on the above discussion and provided that Well E4 treatment facility is continuously monitored for operational malfunctions, the project is not anticipated to generate any residual effects on this VEC.

6.8.4.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up, and any necessary adaptive management, effects from this project are not expected to impact on public health and safety in a manner that could result in significant adverse environmental effects. As a result, the anticipated residual effect of this project to public health and safety would be considered Minimal/Nil in magnitude based on the impact criteria presented in Table 2.1.

6.8.5 Aesthetics

6.8.5.1 Potential Effects on Aesthetics

The exterior of the proposed facility will be decorative masonry block. The site will be fenced to prevent vandalism. The aesthetics of the facility are similar to other well sites in the municipality that are located in residential neighbourhoods. Due to the remote nature of the site aesthetics are not a concern.

6.8.5.2 Measures to Mitigate Effects on Aesthetics

Since methods to address aesthetics concerns are already incorporated into the design of the facility, no additional mitigation is necessary.

6.8.5.3 Residual Effects

Given the minimal interaction between the project and aesthetics, the project is not anticipated to generate any residual effects on this VEC.

6.8.5.4 Significance of Residual Effects

Based on the above discussion, aesthetics is not expected to impact on this project in a manner that could result in significant adverse environmental effects. As a result, the anticipated residual effect of aesthetics on the project would be considered Minimal/Nil in magnitude based on the impact criteria presented in Table 2.1.

6.8.6 Heritage and Historical Cultural Resources

6.8.6.1 Potential Effects on Heritage and Historical Cultural Resources

The project involves development of a well site on lands which, although disturbed, have not been heavily impacted by construction. Development on these lands therefore has the potential to impact upon buried cultural heritage resources. In order to evaluate this matter further, additional information regarding the E4 Well site was circulated to the Ministry of Culture (Heritage & Libraries Branch, Southwest District) for consideration. The Ministry evaluated the proposal taking into consideration its defined screening criteria and its database of known historical sites in the vicinity of the project site.

The Ministry advised that project did not appear to have the potential to impact upon buried heritage resources. No further investigations were required to assess the direct cultural heritage impacts of the project.

In addition, there are no known heritage or historical cultural resources in the vicinity of the project sites which would be indirectly affected by the operational activities of the project.

6.8.6.2 Measures to Mitigate Effects on Heritage and Historical Cultural Resources

The construction plan requires that the proponent must notify the Ministry if deeply buried archaeological resources are encountered during construction (including human remains).

Appropriate actions, as required by the Ministry, will be taken to mitigate any effects.

6.8.6.3 Residual Effects

Given the foregoing, the project should not generate any residual effects upon heritage and historical cultural resources.

6.8.6.4 Significance of Residual Effects

Implementation of the project is not expected to have a significant adverse environmental effect upon heritage and historical cultural resources. In this regard, the anticipated residual effect of the project on this VEC would be considered Minimal/Nil in magnitude based upon the impact criteria presented in Table 2.1.

7.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

7.1 Seismic Activity

7.1.1 Potential Effects of Seismic Activity

The Elora well upgrade project is not located in a seismic zone. The Ontario Building Code indicates that the Elora area is located in Earthquake Zone 0 (Zonal Velocity Ratio: 0.05).

7.1.2 Measures to Mitigate Effects of Seismic Activity

Since the project does not have to account for the possible effects of seismic activity, no mitigation in the design of this project with respect to this parameter is required.

7.1.3 Residual Effects

Given the forgoing, seismic activity is not expected to generate residual effects on the project.

7.1.4 Significance of Residual Effects

Based on the above discussion, seismic activity is not expected to impact on this project in a manner that could result in significant adverse environmental effects. As a result, the anticipated residual effect of seismic activity on the project would be considered Minimal/Nil in magnitude based on the impact criteria presented in Table 2.1.

7.2 Climate Change

7.2.1 Potential Effects of Climate Change

Extended periods of drought that impact recharge of the bedrock aquifer may impact the capacity of the well. The well is equipped with a variable speed submersible pump that will permit the Township to reduce flows from the well in order to keep it in operation. If static water levels drop to a very low level, the well may have to be taken out of service.

The E4 well site is not located in a flood plain. In addition, the well is constructed in accordance with Ontario Regulation 903 which protects the aquifer from surface water contamination. Because of these factors, there is no expectation that Well E4 will be impacted by rain or snowmelt events.

7.2.2 Measures to Mitigate Effects of Climate Change

If extended periods of drought begin to impact the capacity and demand of Well E4, mitigation may include any of the following:

- reduce the amount of groundwater removed from the well in order to keep it in operation;
- remove the well from service if static water levels in the well are very low;

- provide the water system with drinking water from a new source (for example a new ground or surface water source, or connection to another municipal water system); and,
- mandatory conservation measures.

7.2.3 Residual Effects

Given the foregoing, climate change is not expected to generate any residual effects on the project.

7.2.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up, and any necessary adaptive management, climate change is not expected to impact on this project in a manner that could result in significant adverse environmental effects. As a result, the anticipated residual effect of climate change on the project would be considered Minimal/Nil in magnitude based on the impact criteria presented in Table 2.1.

7.3 Winter

7.3.1 Potential Effects of Winter

Winter temperatures are not expected to significantly affect the construction and operation of the project. There is the potential for the watermain to freeze and break, and for chemicals products at the treatment building site to freeze during construction and operation of the facility.

7.3.2 Measures to Mitigate Effects of Winter

Mitigation measures to protect against the impacts of winter temperature include:

- ensuring the transmission watermain is buried to a depth of 2.0 m, which is below the 1.8 m depth of bury recommended by the Ministry of Environment design guidelines for watermain installation in the Elora area;
- installation of tracer wire to assist with locating the watermain if a break occurs;
- The pumphouse is to incorporate adequate insulation in its design to prevent freezing within the treatment facility. Radiant heating will be provided inside the facility; and,
- use of hoarding and temporary heating during construction of the new treatment facility to prevent chemical products from freezing.

7.3.3 Residual Effects

Based on the foregoing, impacts from winter temperatures during the construction and operation are not expected to generate any residual effects on the project.

7.3.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up, and any necessary adaptive management climate change is not expected to impact on this project in a manner that could result in significant adverse environmental effects. As a result, the anticipated residual effect of winter on the project would be considered Minimal/Nil in magnitude based on the impact criteria presented in Table 2.1.

8.0 MALFUNCTIONS AND ACCIDENTS

8.1 Construction Phase

Contract documents for construction of the proposed works include the installation of sediment and erosion control measures and require the contractor to report all spills of chemicals and other regulated substances to the necessary regulatory bodies. Spills are to be reported to the Ontario Ministry of Environment Spills Action Centre at 1-800-268-6060. The Ontario Ministry of Labour dictates the safety requirements for the construction phase.

8.1.1 Potential Environmental Effects

An assessment was conducted to identify the potential effects of accidents malfunctions and adverse conditions to the identified VEC's during the construction phase. The assessment involved a review of potential problems which could arise during the implementation of the construction plan, as well as an evaluation of the potential environmental effects resulting from the identified problems. Table 8.1 summarizes the results of this analysis.

Table 8.1
Construction Phase Malfunctions and Accidents
Environmental Effects Analysis

Valued Ecosystem Component	Incident	Environmental Effect
Ground water quality and quantity	- Contaminant spill/accident involving construction equipment or transported materials	- Adverse water quality in shallow/deep aquifer
Surface water quality and quantity	- Contaminant spill/accident - Sedimentation resulting from rainfall and runoff	- Adverse water quality in nearby watercourses
Fisheries and Aquatic Resources	- Contaminant spill/accident - Sedimentation resulting from rainfall and runoff	- Adverse water quality in nearby watercourses - Damage/destruction of species and habitat
Vegetation	- Contaminant spill/accident - Equipment fire - Sedimentation	- Damage/destruction to native species and habitat
Species at risk	- Contaminant spill/accident - Equipment fire - Sedimentation	- Damage/destruction to identified species and habitat*
Migratory birds	- Contaminant spill/accident - Equipment fire	- Damage/destruction to native species and habitat
Wildlife	- Contaminant	- Damage/destruction to

Valued Ecosystem Component	Incident	Environmental Effect
	spill/accident - Equipment fire - Sedimentation	native species and habitat
Noise	- Equipment malfunction (eg failed exhaust pipe)	- Elevated noise levels near the construction site
Air quality	- Contaminant spill/accident - Equipment fire - Equipment malfunction	- Deteriorated air quality near the project site
Adjacent land uses	- Contaminant spill/accident - Sedimentation	- Damage to adjacent lands
Local neighbourhood and residents	- Contaminant spill/accident - Equipment fire	- Deteriorated air quality near the project site
Worker and public health and safety	- Contaminant spill/accident - Equipment fire	- Deterioration of air quality near the project site
Aesthetics	- None anticipated	- Not applicable
Heritage and historical cultural resources	- None anticipated	- Not applicable

*In accordance with the Species at Risk Act, any effects to a Species at Risk occurring as a result of the construction, operation or decommissioning of this project must be reported as prescribed by the Act. In this regard, no person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild of Canada. Moreover, no person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species.

8.1.2 Mitigating Plans

A number of mitigating plans will be developed to address the potential environmental effects which could occur during the construction phase (the nature and content of these plans are summarized below). The Contractors will be required to adhere to the identified plans to ensure that the construction phase of the project does not have significant adverse environmental effects on the identified VEC's.

8.1.2.1 Emergency Response and Spills Contingency Plan

The Contractor will be required to provide emergency response and spill contingency protocols mandated within the contract specifications. Contract specifications will include the following requirements:

- Provide procedures for the retention, clean-up and disposal of spills
- Keep all materials required for spill clean-up at the site
- Report all spills to the Ministry of Environment Spills Action Centre

- Keep adequate first aid equipment at the site as required by the Occupational Health and Safety Act

8.1.2.2 Traffic Management Plan

The Contract specifications will require the Contractor to set-up and maintain adequate traffic control measures during the construction period in accordance with Book 7 of the Ontario Traffic Manual. This is particularly important for the installation of the watermain extension on County Road 21.

The following will be incorporated into traffic management:

- Provision of standard traffic signs identifying construction work and lane restrictions
- Provision of barriers delineating the construction area and lane restrictions
- Provision of flagpersons or temporary traffic lights to direct traffic
- Requirements to keep impacted roads and private access open at all times during construction

8.1.2.3 Health and Safety Management Plan

The Contractor will be required to obey health and safety protocols dictated by existing legislation and requirements of the Contract specifications. Requirements will include:

- Provision of necessary first aid items and equipment required by the Occupational Health and Safety Act and Ministry of Labour.
- Submission of a Clearance Certificate from the Workplace Safety and Insurance Board.

8.1.2.4 Hydrostatic Pressure Testing Plan

Contract documents will include requirements for the Contractor to complete hydrostatic testing of the watermain and piping internal to the treatment facility. Components of the testing protocol will include the following:

- Testing shall be completed under the supervision of Township staff
- A test section shall be either a section between two valves or the complete watermain. Test sections will be filled slowly with water and all air shall be removed from the pipe. The water shall be supplied through a temporary connection which shall include a backflow control device.
- Swabbing of the pipe is required prior to pressure testing. A minimum of two swabs must be passed through each section of the pipe to ensure there is no blockage or debris.
- Test procedures will be in accordance with the applicable Ontario Provincial Standard Specifications (OPSS) and Township requirements. The test sections will be tested at the specified pressure for a period of two hours.
- Measured leakage shall be compared with the allowable leakage as calculated for the test section. If the measured leakage exceeds the allowable limit, leaks will be located and repaired and the test section retested until a satisfactory result is obtained.
- When pressure test results are satisfactory and all other testing requirements have been met, the municipality will approve connection to the existing distribution system.

The Contract Administrator must be present on site during the removal of the temporary connection and until the connection to the existing system is complete.

8.2 Operational Phase

Water pumped from the facility will be continuously monitored by a supervisory control and data acquisition system. This system has the capability to stop discharging water should a malfunction occur. In addition, operating staff are called to the site through an alarm system to address operating problems. The Township uses chlorine gas to disinfect its water supplies. Well E4 is equipped with chlorine gas detection equipment which alarms and calls operators to the site to investigate and resolve the issue. Chlorine gas leaks are evacuated from the building through the operation of a high rate ventilation system. In addition, operators are trained in the use of self-contained breathing devices that allow them to enter the building in the presence of chlorine gas. The Township has an Emergency Measures Plan in place to address malfunctions and accidents at the facility including chlorine gas leaks. The Plan includes evacuation of nearby homes and businesses if necessary and notification of regulatory authorities.

Watermain breaks may also occur during operation of the system. Repairs will be completed in accordance with Township protocol and requirements of the Ontario Ministry of Environment to ensure the continued safety of the water distribution system.

8.2.1 Potential Environmental Effects

An assessment was completed to identify potential effects of accidents, malfunctions and adverse conditions on the identified VEC's during the operations phase of the project. The assessment involves analysis of potential problems which could arise during the operation of the planned waterworks, as well as an evaluation of the potential environment effects resulting from the identified problems. Table 8.2 summarizes the findings of this analysis.

Table 8.2
Operating Phase Malfunctions and Accidents
Environmental Effects Analysis

Valued Ecosystem Component	Incident	Environmental Effect
Ground water quality and quantity	-Contaminant spill/accident involving on-site chemicals or operator vehicles - Low water levels	- Adverse water quality in shallow/deep aquifer - Water shortages
Surface water quality and quantity	- Contaminant spill/accident - Sedimentation resulting from rainfall and runoff	- Adverse water quality in nearby watercourses
Fisheries and Aquatic Resources	- Contaminant spill/accident	- Adverse water quality in nearby watercourses - Damage/destruction of species and habitat

Valued Ecosystem Component	Incident	Environmental Effect
Vegetation	- Contaminant spill/accident - Equipment fire	- Damage/destruction to native species and habitat
Species at risk	- Contaminant spill/accident - Equipment fire	- Damage/destruction to identified species and habitat
Migratory birds	- Contaminant spill/accident - Equipment fire	- Damage/destruction to native species and habitat
Wildlife	- Contaminant spill/accident - Equipment fire	- Damage/destruction to native species and habitat
Noise	- Equipment malfunction (eg failed exhaust pipe)	- Elevated noise levels near the construction site
Air quality	- Contaminant spill/accident - Equipment fire - Equipment malfunction	- Deteriorated air quality near the project site
Adjacent land uses	- Contaminant spill/accident - Low water levels	- Damage to adjacent lands - Water shortages
Local neighbourhood and residents	- Contaminant spill/accident - Equipment fire - Low water levels	- Deteriorated air quality near the project site - Water shortages
Worker and public health and safety	- Contaminant spill/accident - Equipment fire	- Deterioration of air quality near the project site
Aesthetics	- None anticipated	- Not applicable
Heritage and historical cultural resources	- None anticipated	- Not applicable

8.2.2 Mitigation Plans

Formal plans have been developed to address the potential environmental effects which could occur during the operations phase. These plans are summarized in Table 8.3. The Town will adhere to these plans to ensure that the operations phase of the project does not have significant adverse effects on the identified VEC's.

8.2.2.1 Operations Plan

An operating and maintenance manual/plan will be prepared for Well E4 to provide operations personnel with documentation for system operation and maintenance as well as protocols to address emergency situations such as accidents, spills and malfunctions. The manual will include a general overview of system equipment and procedural activities as well as requirements of Regulation 170 and the Certificate of Approval issued by the MOE.

Table 8.3 provides a summary of procedural requirements that will be included in the Operations Plan. The purpose of these requirements is to operate the well within MOE standards, particularly with respect to defined requirements for water quality.

Table 8.3
Operations Plan
Summary of Procedures

Component	Procedures
Water Treatment, Disinfection and Monitoring	• Pressure differential across a rate of flow control valve will result in a vacuum to draw chlorine gas from 150 pound cylinders. • Raw water will be mixed with the chlorine gas to create a superchlorinated water solution. • Superchlorinated water will be mixed with raw water prior to entering the baffled contact chamber/reservoir. • The owner is responsible to ensure that the chemicals used in the process meet American Water Works Association, American National Standard Institute and National Sanitation Foundation criteria. • The facility will be equipped with a free chlorine residual analyzer to provide continuous monitoring of treated water entering the distribution system. The analyzer will be connected to an alarm system to notify operators of operating concerns. Both non-emergency and emergency conditions will be alarmed. Non-emergency concerns will allow operators to react to possible process problems prior to system shutdown under an emergency condition. Non-emergency free chlorine alarms will be set above 0.5 mg/L and emergency low levels will be set between 0.3 mg/L and 0.4 mg/L. High free chlorine levels greater than 1.8 mg/L will also be alarmed. • The gas chlorination system will include automated control of the gas cylinders to ensure switchover from an empty cylinder to a full cylinder. Alarms will be sent whenever a cylinder becomes empty. • Water discharged to the distribution system must meet the requirements set out in the Procedure for Disinfection of Drinking Water in Ontario ensuring that the proper treatment equipment is supplied and the disinfection facilities are operated and maintained to all necessary requirements.
Discharge to Distribution System	• Records must be maintained of the maximum flow and volume of water pumped from the well and to the distribution system. Any exceedance of the permitted amounts must also be recorded and reported. This is accomplished automatically by the control system and all entries are time and date stamped. • Water quality in the distribution system must be monitored according legislative requirements. The following represent

Component	Procedures
	key sampling and testing parameters and testing frequencies: Parameter — Sampling Fequency Free Chlorine Residual — Daily E.coli — Weekly Trihalomethanes — Quarterly Lead — Quarterly Nitrates and Nitrites — Quarterly Inorganics — Every three years Organics — Every three years Sodium — Every five years Fluoride — Every five years • If any sample result from the organic, inorganic or lead testing exceeds half of the maximum allowable concentration (MAC), testing frequency must be increased to quarterly. • Records must be kept for all samples tested. Records must be maintained for a minimum of five years • The Township will continue its flushing and hydrant maintenance program.
Well Maintenance	To ensure the well will be maintained in a suitable condition from the standpoint of water quality, the following inspection tasks will be completed and documented. Visual Inspection: • Ensure will cap is securely in place and gasket is present • Ensure all connections and openings (electrical, piping, etc are sealed • Ensure the well vent screen is in place and is not blocked Raw Water Quality: • Follow MOE sampling and testing requirements • Check results of raw water quality tests as they become available • Re-test raw water upon adverse test results • Implement correctional measures as required and as directed by MOE and local Health Unit Down Hole Inspection: • Complete a video inspection of the well and well casing when the well pump is removed for maintenance or every ten years after the first video inspection. Record inspection on video tape. All work on the well is to be completed by personnel licensed under Ontario Regulation 903 (as amended).
Pumphouse Monitoring	A regular preventative maintenance plan will be implemented including a record of all maintenance checks and equipment repairs completed on the facility.

Component	Procedures
	Daily inspections will include the following: • Inspect for security breach • Ensure heat is turned on during cold weather • Check all fittings and piping for leaks Other maintenance checks will include: • Exercise and lubricate valves monthly • Calibrate flow meters as recommended by the manufacturer or as a minimum annually • Clean and calibrate continuous monitoring devices as recommended by the manufacturer Whenever maintenance is performed on equipment in the pumphouse that is in direct contact with the water, all regulatory requirements will be followed.

8.2.2.2 Contingency Plan

The Contingency Plan will outline appropriate actions to address problems and emergencies related to the operation of the project. The Township, as the operating authority, is required to abide by the procedures in the Contingency Plan.

The Contingency Plan provides appropriate courses of action to mitigate the adverse effects for the following general conditions:

- Supply and treatment problems (e.g. adverse water quality test results, failed chlorinator, etc.)
- Distribution system problems (e.g. critical watermain break, damaged hydrant, etc.)
- Storage facility problems (e.g. loss of storage, structural failure, etc.)
- Emergency conditions (e.g. breach of security, fire or explosion, etc.)

There are different types of corrective actions depending upon the nature of the occurring problem. In general, the Contingency Plan sets out response procedures to assess the scope of the situation, define steps to mitigate or isolate the problem, determine necessary contacts and support agencies, notify the public (as required), determine if the problem poses a health and safety risk, undertake appropriate remedial action and monitor the outcome. Where necessary, the response protocol includes adherence to an established notification procedure which requires an immediate report to the local health unit and the MOE Spills Action Centre.

Table 8.4 summarizes the most predictable environmental problems that could be encountered during the operational life of the water system, as set out in the Contingency Plan.

Table 8.4
Potential Environmental Changes

Component	Environmental Change	Triggers
Water Quantity	Low water levels	- Well level during pumping is below normal values - Pumping rate is decreasing as noted by metering - Observation - Telephone call - Storage decreasing - Loss of pressure - Alarms
	Excessive consumption	- System pressure is dropping below recommended levels - Customer complaints - Elevated tank levels are dropping to below recommended levels
Water Quality	Bacteriological contamination	- Routine analysis - Observation
	Foreign matter in well supply	- Routine analysis - Observation
Climatic Conditions	Frozen watermain	- Customer complaint - Loss of service to an area - Lower than normal pressures
	Power failure	- Observation in pumphouse - Power failure alarm - Telephone call regarding loss of pressure - Pump alarm
	Flooding	- Weather report - Flood warning - Telephone call
Other Natural Problems	Watermain breaks	- Observation - Loss of pressure - Public input
	Structural failure	- Observation - Telephone call
	Fire or explosion	- Observation - Phone call - Alarm

The Contingency Plan provides remedial actions to mitigate potential impacts. In general, most of the described procedures are short term measures designed to protect public health and to resolve the identified problem in an expeditious manner (e.g. contact required personnel, consult with the general public, procure all necessary materials and services, undertake necessary repairs). Additional action strategies are provided for those problems considered more long term in nature, particularly reductions in both water quantity and

quality. The plan proposes additional measures in these circumstances, including the provision of additional monitoring and the procurement of alternate water sources.

The implementation of the corrective measures set out in the Contingency Plan will address environmental hazards occurring in the short term (e.g. spills, frozen watermains, etc). These measures should minimize any negative impacts associated with immediate environmental problems. In the long term, the monitoring procedures associated with the operations plan will identify trends of concern (e.g. gradual reductions in groundwater levels, increasing contaminant levels, etc). The Contingency Plan can be subsequently implemented, as needed, to mitigate any identified concerns. Remediation of potential long term hazards will minimize any prolonged effects resulting from systemic problems with the water system (e.g. increased contaminant concentrations in the well water, etc).

8.3 Decommissioning Phase

8.3.1 Potential Environmental Effects

An assessment was completed to identify the potential effects of accidents, malfunctions and adverse conditions on the identified VEC's during the decommissioning phase of the project. The assessment involved a review of potential problems which could arise during the abandonment of the planned works, as well as an evaluation of the potential environmental effects resulting from the identified problems. Table 8.5 provides a summary of this assessment.

Table 8.5
Decommissioning Phase Malfunctions and Accidents
Environmental Effects Analysis

Valued Ecosystem Component	Incident	Environmental Effect
Ground water quality and quantity	- Contaminant spill/accident involving construction equipment or transported materials	- Adverse water quality in shallow/deep aquifer
Surface water quality and quantity	- Contaminant spill/accident - Sedimentation resulting from rainfall and runoff	- Adverse water quality in nearby watercourses
Fisheries and Aquatic Resources	- Contaminant spill/accident	- Adverse water quality in nearby watercourses - Damage/destruction of species and habitat
Vegetation	- Contaminant spill/accident - Equipment fire - Sedimentation	- Damage/destruction to native species and habitat
Species at risk	- Contaminant spill/accident - Equipment fire - Sedimentation	- Damage/destruction to identified species and habitat

Valued Ecosystem Component	Incident	Environmental Effect
Migratory birds	- Contaminant spill/accident - Equipment fire	- Damage/destruction to native species and habitat
Wildlife	- Contaminant spill/accident - Equipment fire - Sedimentation	- Damage/destruction to native species and habitat
Noise	- Equipment malfunction (eg failed exhaust pipe)	- Elevated noise levels near the construction site
Air quality	- Contaminant spill/accident - Equipment fire/malfunction	- Deteriorated air quality near the project site
Adjacent land uses	- Contaminant spill/accident	- Damage to adjacent lands
Local neighbourhood and residents	- Contaminant spill/accident - Equipment fire	- Deteriorated air quality near the project site
Worker and public health and safety	- Contaminant spill/accident - Equipment fire	- Deterioration of air quality near the project site
Aesthetics	- None anticipated	- Not applicable
Heritage and historical cultural resources	- None anticipated	- Not applicable

8.3.2 Mitigation Plans

No formal decommissioning plan has been prepared for the waterworks and transmission watermain associated with this project. Decommissioning of the project will be carried our in accordance with applicable regulations and municipal requirements in effect at that time.

A number of mitigating plans will be developed to address the potential environmental effects which could occur during the decommissioning phase of the project (the nature and content of these plans are summarized below). The Contractors will be required to adhere to the identified plans to ensure that the decommissioning phase of the project does not have significant adverse environmental effects on the identified VEC's. Any plans pertaining to the decommissioning of Well E4 may require amendments to the plans presented below since the well will not be decommissioned for several decades into the future.

Completion of the decommissioning activities in this manner should ensure that this phase of the project does not have significant adverse environmental effects on the identified VEC's.

8.3.2.1 Emergency Response and Spills Contingency Plan

The Contractor will be required to provide emergency response and spill contingency protocols mandated within the contract specifications. Contract specifications will include the following requirements:

- Provide procedures for the retention, clean-up and disposal of spills
- Keep all materials required for spill clean-up at the site
- Report all spills to the Ministry of Environment Spills Action Centre
- Keep adequate first aid equipment at the site as required by the Occupational Health and Safety Act

8.3.2.2 Traffic Management Plan

The Contract specifications will require the Contractor to set-up and maintain adequate traffic control measures during the decommissioning period in accordance with the Book 7 of the Ontario Traffic Manual.

The following will be incorporated into traffic management:

- Provision of standard traffic signs identifying construction work and lane restrictions
- Provision of barriers delineating the construction area and lane restrictions
- Provision of flagpersons or temporary traffic lights to direct traffic
- Requirements to keep impacted roads and private access open at all times

8.3.2.3 Health and Safety Management Plan

The Contractor will be required to obey health and safety protocols dictated by existing legislation and requirements of the Contract specifications. Requirements will include:

- Provision of necessary first aid items and equipment required by the Occupational Health and Safety Act and Ministry of Labour.
- Submission of a Clearance Certificate from the Workplace Safety and Insurance Board.

8.4 Residual Effects

Given the foregoing discussion for the construction, operation, and decommissioning phases, malfunctions and accidents are not expected to generate any residual effects on the project.

8.5 Significance of Residual Effects

Based on the above discussion, malfunctions and accidents are not expected to impact on this project in a manner that could result in significant adverse environmental effects. As a result, the anticipated residual effect of malfunctions and accidents on the project would be considered Minimal/Nil in magnitude based on the impact criteria presented in Table 2.1.

9.0 Cumulative Environmental Effects

9.1 Considerations

Cumulative effects represent the combined impacts of successive actions upon an environmental setting. Within the context of the environmental assessment processes, cumulative impact analyses are conducted to ensure that the incremental effect of the planned work does not facilitate a significant environmental effect action given existing and planned activities in the affected area. In general, cumulative impacts occur between environmental elements (VEC's). The magnitude of these impacts can equal the sum of the individual effects (i.e. additive effects) or can be an increased effect (i.e. synergistic effects).

The following represent the potential methods by which cumulative effects can occur:

- Physical-chemical transport: a physical or chemical constituent is transported away as a result of the proposed action (e.g. air emissions)
- Nibbling loss: land and habitat is gradually disturbed and lost due to a series of combined actions (e.g. incremental forest clearing)
- Spatial and temporal crowding: development activities gradually intensify the use of land beyond an accepted threshold. Spatial crowding occurs when impacts associated with these activities converge in a manner that can adversely impact upon VEC's (e.g. overlapping of noise pollution and chemical emission). Temporal crowding occurs if effects from different activities overlap before a VEC can recover from an introduced action.
- Growth inducing potential: new actions can induce "spin-off" effects which can augment existing cumulative effects (e.g. improved road access to sensitive natural areas)

9.2 Assessment Methodology

The following procedures were carried out to evaluate the nature and magnitude of these cumulative impacts within the context of the existing environmental setting and future community development:

- Assessment of existing land use activities, infrastructure, natural features and socio-economic characteristics in the study area (i.e., environmental scoping).
- Review of proposed project and related works (including an evaluation of recommendations from related studies).
- Identification of VEC's that may be affected by the proposed work (i.e., identification of residual effects).
- Evaluation of other actions in the project area (past, present and future) that may impact upon the identified VEC's.
- Assessment of the incremental additive effects of the proposed works on the identified VEC's (i.e., analysis of cumulative effects).
- Consideration and selection of measures to mitigate adverse cumulative effects.
- Prediction of whether VEC's will be significantly impacted by the proposed works (assuming mitigation measures and monitoring programs are implemented, as planned).
- Evaluation of the significance of residual effects from the proposed work.

9.3 Parameters

For the purpose of this analysis, the following parameters and assumptions were established to define relationships between the project and existing and future actions:

- The spatial boundary of the impact assessment was defined as the Elora urban service area. The scope of the analysis was largely centred in the vicinity of the new well supply and the linear watermain routes, although the assessment did examine impacts dispersed throughout the larger hydrogeologic setting.

- The temporal boundary of the assessment extended from the existing conditions (i.e., baseline conditions) through the construction period to the end of the operational life of the project. Impacts associated with construction and commissioning of the project were expected to have a short-term temporal boundary (i.e., approximately one year). Site restoration activities and initial operational problems were anticipated to have a medium-term temporary boundary (i.e., two to three years). Given the operational plan associated with the new well supply, the long-term temporal boundary was assumed to extend for a continual basis throughout the operational life of the facilities (with increased usage during high water demand periods).

- The sectoral impacts of the project are largely restricted to those related to resource extraction and municipal infrastructure (addressing both construction, operation and decommissioning activities).

- Future actions in the vicinity of the project site will be consistent with the land use patterns designated within the local Official Plan. The implementation of this development pattern is considered to be a reasonably foreseeable action.

9.4 Identification of Potential Cumulative Effects

Sections 6.0 and 7.0 of this report identified that the project has the potential to generate residual effects upon the following VEC's:

- Ground Water Quantity and Quality
- Vegetation

Based upon a review of the planned works, in conjunction with an assessment of the local environmental setting and other projects being carried out or considered in the defined regional boundary, the following potential cumulative effects were identified for this project:

- Cumulative effects of the project with other developments planned in Elora.

The potential cumulative impacts of past, present and future development projects, in combination with the implementation of the Well E4 project, were evaluated in relation to the identified VEC's. The findings of this review are summarized below.

9.5 Evaluation of Potential Cumulative Effects

9.5.1 Existing Development Pattern

The community of Elora is characterized as a low-density residential community which incorporates a well developed downtown commercial core and a small amount of industrial development. Elora has an approximate population of 4942 which is small relative to most urban centres in southwestern Ontario, although its average annual growth rate of slightly less than 3% exceeds most small urban settlements in the region over the past 30 years. This is primarily due to the proximity of the community to regional growth centres, particularly the Region of Waterloo, City of Guelph and the Greater Toronto area.

There is no evidence that the existing development pattern in Elora has adversely impacted upon significant or sensitive natural features in the area or the integrity and capacity of ground water resources.

9.5.2 Future Development Activities

The development potential of Elora is considered to be promising but controlled given growth management policies incorporated into the Official Plan, as well as existing economic and demographic conditions and recent growth projections. Currently, the Elora urban area is being considered for several residential development plans which could create between 500 to 550 equivalent residential building lots in the next five years (subject to *Planning Act* approvals). Approximately, 450 residential units are planned in six developments in the Elora urban centre servicing area and 80 residential units are planned for fringe development along County Road 18 between Elora and Fergus. There are currently no significant non-residential development plans or any significant road construction projects planned for Elora.

In accordance with municipal development policies, new developments within the Elora urban area are required to connect to the municipal water and sanitary sewage systems. Long-term growth in the community will therefore be facilitated through the development of Well E4 and any subsequent municipal wells needed to accommodate future water demands and the provision of adequate sewage treatment capacity. There may be some existing private well supplies within the defined regional boundary which could experience adverse impacts from the construction of one, or more, additional large capacity municipal wells (e.g., increased drawdown, mutual interference effects). Most new development activities will also occur on undisturbed lands (i.e., greenfield sites), which will likely result in the permanent removal of vegetation and wildlife habitat.

Given existing land use controls in agricultural areas (e.g., restrictions on farm severances, requirements for full municipal servicing for multiple lot developments), there are no significant development plans proposed or anticipated in the rural component of the regional boundary. Future development activities in these rural areas are therefore not expected to adversely impact upon ground water resources or natural heritage features.

9.6 Measures to Mitigate Effects

9.6.1 Groundwater Resources

As discussed in section 4.3.4, it is anticipated that the capacity of Well E4, in combination with existing municipal well supplies will be capable of accommodating future water demands in the service area over a 15-year planning period However, the adequacy of the supply capacity will be routinely monitored and evaluated as part of the water system operations plan and reserve capacity calculations. The Municipality will also carry out servicing reviews of new development proposals to ensure that the available well supply can accommodate the estimated water demands of these projects. If, through these monitoring and review processes, it is determined that additional supply capacity is needed to meet system demands, the Municipality will need to explore a range of alternatives to address the situation (e.g., limit community development, upgrade existing wells, augment existing supplies). Any decision to increase the total supply capacity would require the completion of additional hydrogeologic investigations to confirm that existing well supplies would not be adversely impacted by the development of a new municipal well supply and/ or the upgrading of existing municipal wells.

9.6.2 Vegetation

The potential impacts of new development proposals on the natural environment will be evaluated as part of the *Planning Act* approvals process. Projects which are anticipated to have adverse effects on vegetation resources typically do not proceed without substantial mitigation (including avoidance of sensitive features and areas).

9.7 Residual Effects

Given the existing environmental setting and the established land use development controls, the development of Well E4, in combination with past, present and imminent projects, is not expected to represent an action which will generate any residual cumulative effects upon the defined regional boundary.

9.8 Significance of Residual Effects

Provided that new development activities are carried out in accordance with established planning policies, the development of Well E4, in combination with past, existing or imminent projects in the Elora area, is not expected to have significant adverse cumulative environmental effects upon the identified VEC's. In this regard, the anticipated residual effect of this project, in combination with past, existing or imminent projects within the defined regional boundary, would be considered Minimal/Nil in magnitude based upon the impact criteria presented in Table 2.1.

10.0 SUSTAINABLE USE OF THE RESOURCE

The bedrock aquifer that Well E4 is drilled into is a renowned regional water resource known as the Guelph Amabel Aquifer. This aquifer is on the order of 100 to 130 m thick in the Elora area and it receives recharge from a very broad area, extending many tens of kilometres away from Elora (Groundwater Resources in the Grand River Basin. Sibul, 1980). This water resource has a proven sustainability in the Elora and Fergus area, with numerous municipal wells easily sustaining pumping rates of 1136 LPM to 1818 LPM (250 to 400 Imperial gallons/minute) for many decades without evidence of significant aquifer mining or water quality deterioration. There is a similar expectation for aquifer sustainability at Well E4 based on the 2002 pumping test results, noting as well that E4 was strategically located to minimize overlapping influence from the other Elora municipal wells.

The Hydrogeological Study completed for Well E4 indicated that the well can be pumped at a sustainable rate of 1363 LPM. The Ontario Ministry of the Environment issued a Permit to Take Water for a period of 5 years. Provided climatic conditions do not change significantly over the next 5 years and that monitoring requirements of the Permit do not indicate any adverse impacts, it is anticipated that the Ministry of Environment will renew the Permit for an additional 5 year period.

In addition, the Township of Centre Wellington is implementing a water conservation program. In 2002, water meters were installed across the Township and every summer water use restrictions are issued. These measures assist with ensuring sustainable use of the resource.

It is important to note that the County of Wellington and its member lower tier municipalities, including the Township of Centre Wellington, are working on an Official Plan Amendment to implement a groundwater management and protection strategy to ensure a safe and clean drinking water supply, provide for the sustainable use of the groundwater resource and sustain stream flows and valued ecosystem components where these are maintained by groundwater discharge. The proposed amendments will add new policies to protect groundwater resources and municipal supply wells from high risk land use activities based on the recommendations of the County's Groundwater Protection Study. New Schedules to the County Official Plan will identify Well Head Protection Areas for each municipal supply well in the County including Elora Well E4. The amendments will include limitations on land use activities in sensitive areas as well as impose siting studies for new developments in Well Head Protection Areas.

11.0 CONSULTATION

11.1 Public Information Distribution and Consultation Responses

11.1.1 Comprehensive Study Process

A Notice of Commencement was posted on April 7, 2005 on the Canadian Environmental Assessment Registry (CEAR) for the project (registry number 05-03-10258).

A public notice was prepared detailing the public consultation period for the draft scoping document and notifying the public of the availability of project funding for participation in the study. The notice was posted to CEAR on June 24, 2005 and published in the Wellington Advertiser and Fergus/Elora News Express on June 24 and June 29, 2005 respectively. The notice was also posted to the COIP and CEAA websites. Copies of the draft scoping document were made available electronically on the Industry Canada and CEAA websites, with hard copies made available at the Township's municipal office and the public library in Elora. A 21-day review period was provided for comments. No written or oral comments were received.

A second public notice was prepared detailing a second public consultation period and provided the public with the opportunity to submit comments or concerns related to the environmental implications of the proposed project. The notice was published in the Wellington Advertiser and Fergus/Elora News Express on September 20 and September 22, 2006 respectively. One written comment was received during the response period which closed on October 13, 2006. The respondent raised concerns regarding the ponding of water in the fields near the site and the potential for contamination and surface water influence on the well. This comment was addressed in section 5.1.1 and sections 6.2.2 and 6.2.4 which states that the aquifer is protected by a 23.5 m thick low-permeability till deposit and that the well was constructed in accordance with provincial Regulation 902 (as amended).

A public comment period will be provided following the completion of the Comprehensive Study Report. The public will be provided with a 30-day review period to submit written comments on the project to the Canadian Environmental Assessment Agency. All comments received from the public will be distributed to the expert federal authorities and CEAA for consideration.

11.1.2 Provincial Class EA Investigation

During Phases 1 and 2 of the provincial Class EA process, consultation was undertaken to obtain input from the general public and review agencies that might have an interest in the project. In general, the consultation program involved the preparation of information describing the defined problem, the identified alternatives and the preferred alternative under consideration. Comments obtained through the various consultation methods described in this section of the report were incorporated into the evaluation of alternatives phase of the investigation.

The key components of the provincial Class EA public consultation program were as follows:

- An initial public notice was issued in November 2002 announcing the initiation of the Class EA investigation and outlining the initiation of the hydrogeological exploration program and the need to prepare a long-term water supply strategy. The notice also served to advertise a public open house held November 27, 2002 at the Township Municipal Office. The notice was published in the November 20 and 27, 2002 editions of the local newspaper. Fourteen members of the public attended the open house. Two comment forms were returned after the meeting indicating that the public did not have serious objections to the project.

- A Notice of Completion was issued in February 2003 to identify the selection of a preferred alternative and to summarize the planned works. One objection was received resulting in a request for a Part II Order. However, the Provincial Minister denied the request.

11.2 First Nations Consultation

As noted earlier in Section 1.6, the community of Elora and the surrounding rural area was not considered a First Nations territory during the Provincial Class EA. As a result of this and a provincial review which indicated there were no known historical sites, including First Nations, located in the vicinity of the planned works, it was determined that consultation with First Nations was not necessary in order to complete the CSR.

11.3 Government

11.3.1 Provincial Class EA Consultation

Input into the study process was solicited from government review agencies by way of direct mail correspondence. Agencies that might have an interest in the study were sent letters providing details about the project, study contacts, open houses and procedures to forward comments and obtain information. Letters were circulated to five provincial and municipal government agencies in November 2002 and February 2003. No comments were received from the review agencies in relation to the planned works.

11.3.2 Correspondence Submitted to Industry Canada and the Canadian Environmental Assessment Agency

Table 11.1 summarizes the comments received from the Expert FA's following circulation of project information and an initial draft of the Comprehensive Study Report.

Table 11.1
Comprehensive Study Public Consultation Program:
Summary of Comments Received from Federal Authorities

Canadian Environmental Assessment Agency		
Date of Correspondence	Summary of Comments	Consideration/Action
January 17, 2007	- Provide more details regarding construction activities. - Provide greater detail to describe the required mitigation - Clear statements are required to identify whether or not there are residual effects in each section of the Assessment of the Environmental Effects section. - A discussion on the capacity of renewable resources is required in sections on hydrogeology or groundwater quantity and quality. - Provide an opinion on whether any cumulative effects identified are likely to be significant. - Additional information should be provided so that the conclusion drawn that any of the species at risk would not likely be affected by the project is more defendable. - The mitigation section for migratory birds should state that construction, maintenance or decommissioning activities with the potential to destroy migratory birds, such as vegetation clearing, will not take place in migratory bird nesting habitat during the core breeding season.	- Supply additional details throughout the report.

11.3.3 Agency and First Nations Site Tour and Meeting

An agency and First Nations site tour and meeting was not scheduled for this project, given the limited scope of the new well supply project.

12.0 Summary of Environmental Effects

Table 12.1 summarizes the potential environmental effects, impact mitigation, and residual impacts associated with this project.

Taking into consideration the implementation of mitigation measures, the review of the potential interactions between the proposed project and these environmental components did not result in the identification of any likely significant adverse environmental effects.

Table 12.1
Upgrading of the Elora Well System
Summary of Environmental Effects

Environmental Component	Potential Project Effects						Residual Effects	
	Potential Adverse Effect?			Potential for Full Impact Mitigation?			Are Effects Significant?	
	Yes	No	Uncertain	Yes	No	Uncertain	Yes	No
Physical and Natural Environment								
Ground Water Quantity	✓				✓			✓
Ground Water Quality	✓			✓				✓
Surface Water Quantity		✓						✓
Surface Water Quality	✓			✓				✓
Fish and Fish Habitat	✓			✓				✓
Vegetation	✓				✓			✓
Species at Risk	✓			✓				✓
Migratory Birds	✓			✓				✓
Wildlife	✓			✓				✓
Noise	✓			✓				✓
Air Quality	✓			✓				✓
Socio-Economic and Cultural Environment								
Adjacent Land Use	✓			✓				✓
Local Neighbourhoods and Residents	✓			✓				✓
Worker Health and Safety	✓			✓				✓
Public Health and Safety	✓			✓				✓
Aesthetics		✓						✓
Heritage and Historical Cultural Resources		✓						✓
Environmental Conditions								
Seismic Activity		✓						✓
Climate Change	✓			✓				✓
Winter	✓			✓				✓

Environmental Component	Potential Project Effects						Residual Effects	
	Potential Adverse Effect?			Potential for Full Impact Mitigation?			Are Effects Significant?	
	Yes	No	Uncertain	Yes	No	Uncertain	Yes	No
Malfunctions and Accidents								
Construction Phase	✓			✓				✓
Operations Phase	✓			✓				✓
Decommissioning Phase	✓			✓				✓
Cumulative Effects								
Future Development Activities	✓			✓				✓

13.0 FOLLOW-UP PROGRAM

13.1 Need for Follow-Up

A follow-up program is required to verify the accuracy of impact predictions and to determine the effectiveness of mitigation measures. Since all construction activities associated with the proposed project are standardized construction procedures with well documented mitigation techniques, Industry Canada has determined that the follow-up program will be limited to an assessment of the long-term impacts of the project on ground water quantity and quality. Ground water resources were selected for further monitoring as they represent the most likely environmental features to be adversely impacted by project implementation.

13.2 Requirements of the Follow-Up Program

The follow-up program for this project will consist of the following activities:

- Additional monitoring of existing wells in the area, including private wells, to confirm the impacts resulting from the pumping of Well E4. Findings of this monitoring exercise will confirm the validity of the hydrogeological study work with respect to ground water quantity.
- Ground water quality monitoring will be conducted in accordance with the Certificate of Approval issued by the Provincial MOE. Findings from this monitoring exercise will confirm the validity of the hydrogeological study work with respect to ground water quality.

The Permit to Take Water (PTTW) issued by the Ontario Ministry of Environment requires metering of the volume of water pumped and a monitoring program for all of the wells in the Elora water system. Further, the Permit requires the municipality to restore the water supplies of those impacted by the operation of Well E4. Monitoring and reporting required by the PTTW will be undertaken as long as the PTTW remains valid.

Monitoring and reporting activities associated with the follow-up program required by this Comprehensive Study Report will be required for a period of 2 years following the commissioning of Well E4. If any problems are found during that time, remedial measures will be taken to address the problems and additional monitoring and reporting will occur, as necessary. Industry Canada and the Canadian Environmental Assessment Agency will be provided with the data generated from the monitoring process (as summarized in an annual report). The availability of the findings from the follow-up program will be posted on the CEA Registry.

14.0 CONCLUSIONS AND RECOMMENDATIONS

In its analysis of the environmental effects of the Elora Well Supply Upgrading Project, Industry Canada, as the Responsible Authority under the CEA Act, has taken into consideration the information provided by the Municipality of the Township of Centre Wellington in their application for funding under COIP. Industry Canada also considered advice provided by the expert Federal Authorities (Environment Canada, Health Canada and Natural Resources Canada) and results of feedback acquired through the public consultation process.

The environmental effects of the project were evaluated with respect to accidents and malfunctions, effects of the environment on the project, alternative means, the capacity of renewable resources and cumulative effects. Mitigation measures and a follow-up program were also developed to address potential effects of the project. Industry Canada has concluded that, with the implementation of the mitigation measures specified in this CSR, and with the provincial requirements regarding the construction, operation and decommissioning of the water system, the project will not likely result in any significant adverse environmental effects. Notwithstanding the above conclusion, comments received during the public review of this CSR will be used to verify that stakeholder concerns are being addressed and that the environmental effects of this project are acceptable.

References

10 State Standard Design Guidelines

Anderson Geologic Limited, Hydrogeological Investigation Elora Test Well 4B (Cottontail Rd.), 2002.

Background studies completed during Municipal Class EA process

County of Wellington Official Plan

Environment Canada, Species at Risk Website, http://www.speciesatrisk.gc.ca/default_e.cfm

Municipal Engineers Association, Municipal Class Environmental Assessment, June 2000

Ontario Building Code Act

Ontario Drinking Water Quality Standards

Ontario Ministry of Environment, Terms of Reference – Hydrogeological Study to Examine Groundwater Sources Potentially Under Direct Influence of Surface Water, October 2001

Ontario Ministry of Labour, Engineering Data Sheet 4-05, Storage and Use of Chlorine

Ontario Ministry of Natural Resources, Species at Risk Website, http:www.mnr.gov.on.ca/mnr/speciesatrisk

Ontario Ministry of the Environment, Procedure for Disinfection of Drinking Water in Ontario, June 2003

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Ontario Occupational Health and Safety Act

Ontario Water Resources Act, Ontario Regulation 903

Sibil, Groundwater resources in the Grand River Basin, 1980

Township of Centre Wellington Emergency Measures Manual

Township of Centre Wellington Official Plan

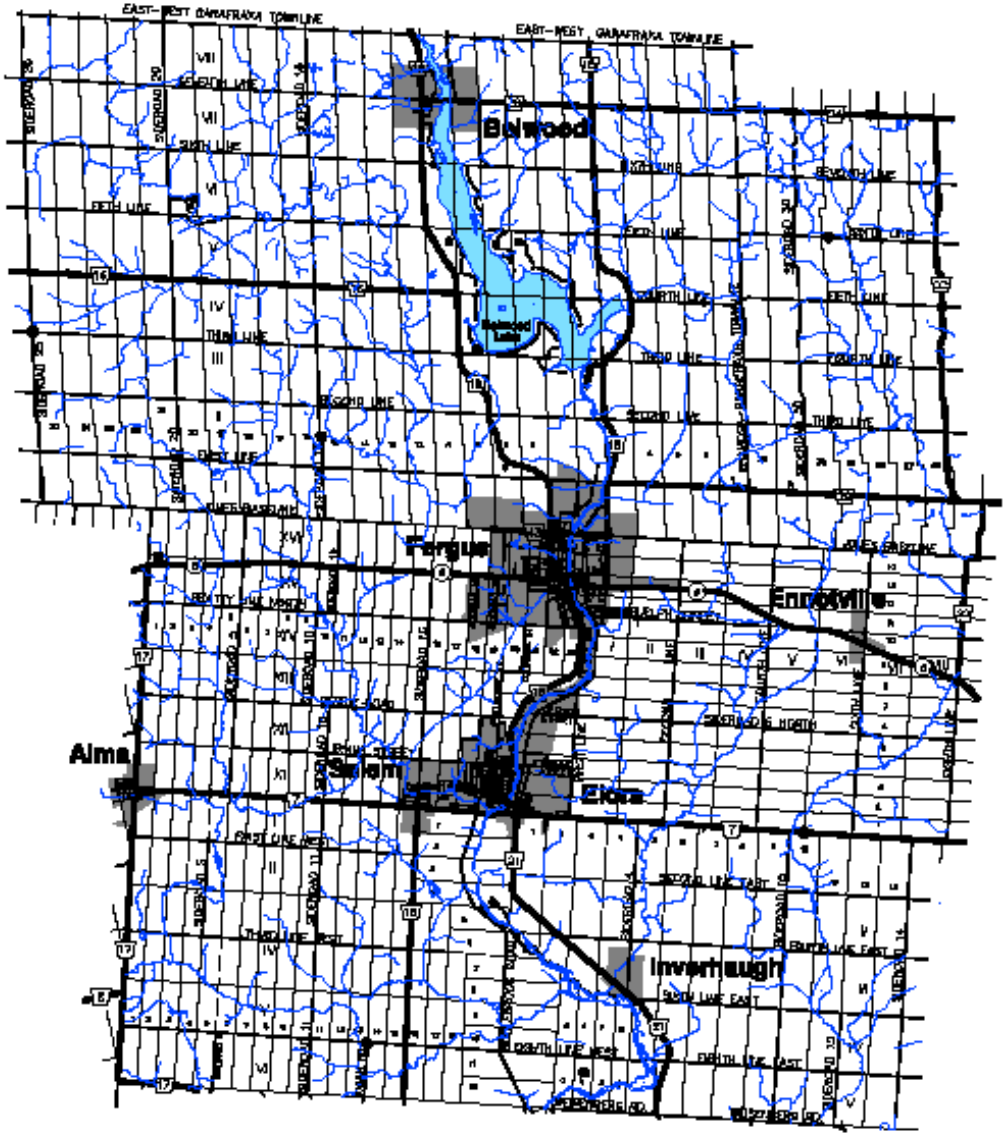
Triton Engineering Services Limited, Engineer's Report, Fergus and Elora Water Systems, 2000.

Triton Engineering Services Limited, Township of Centre Wellington, Elora Well Exploration, Class EA Project File, 2003.

Corporation of the Municipality of West Perth, Comprehensive Study Report, Mitchell Well Supply Upgrading Project, March 23, 2007.

APPENDIX A

FIGURES

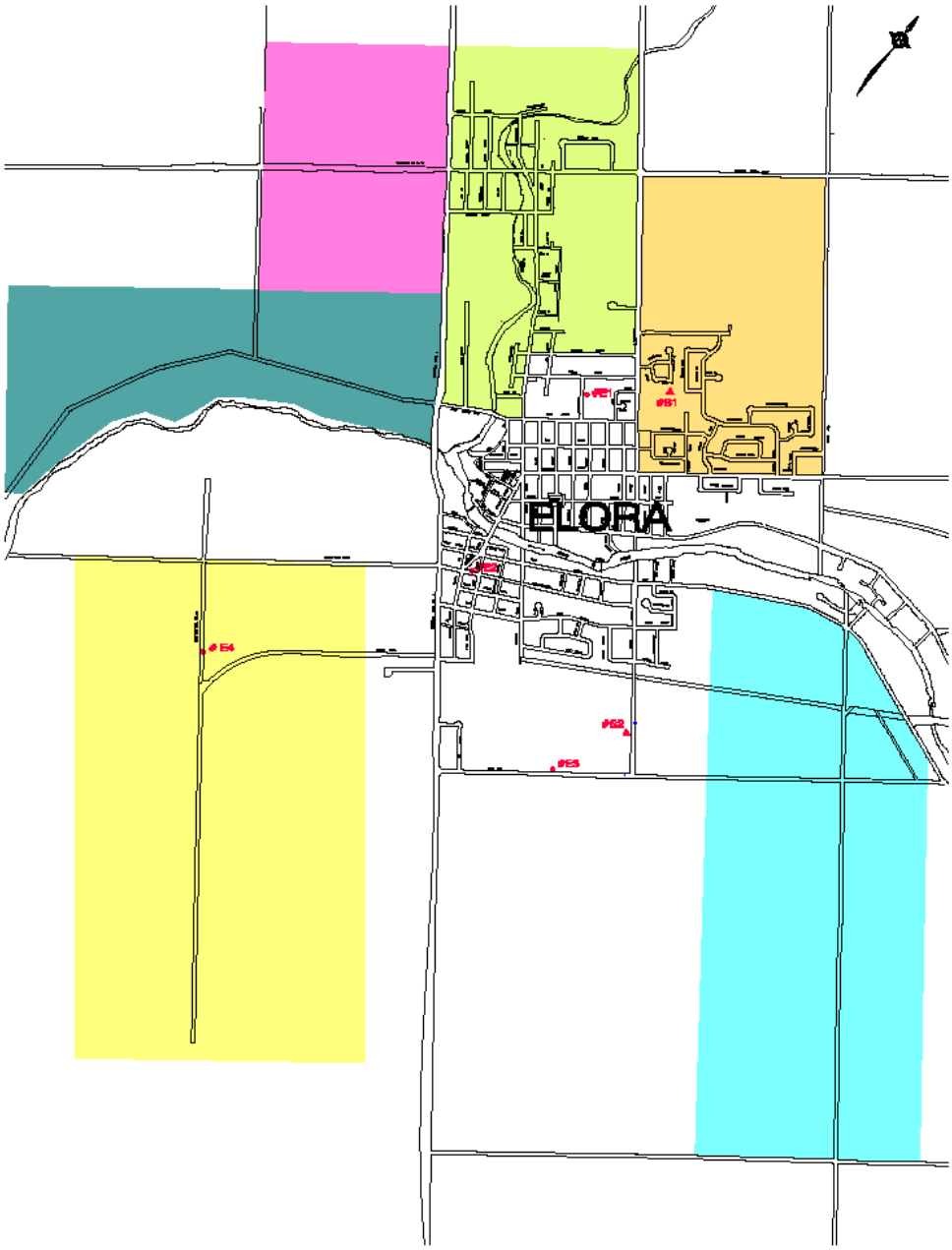


GENERAL LOCATION OF ELORA
WITHIN THE TOWNSHIP OF
CENTRE WELLINGTON

Figure 1

NOT TO SCALE

TRITON ENGINEERING SERVICES LIMITED



LEGEND

#E1 MUNICIPAL WELL & RESERVOIR

#S1 ELEVATED WATER TOWER

AREA 1 AREA 4

AREA 2 AREA 5

AREA 3 AREA 6

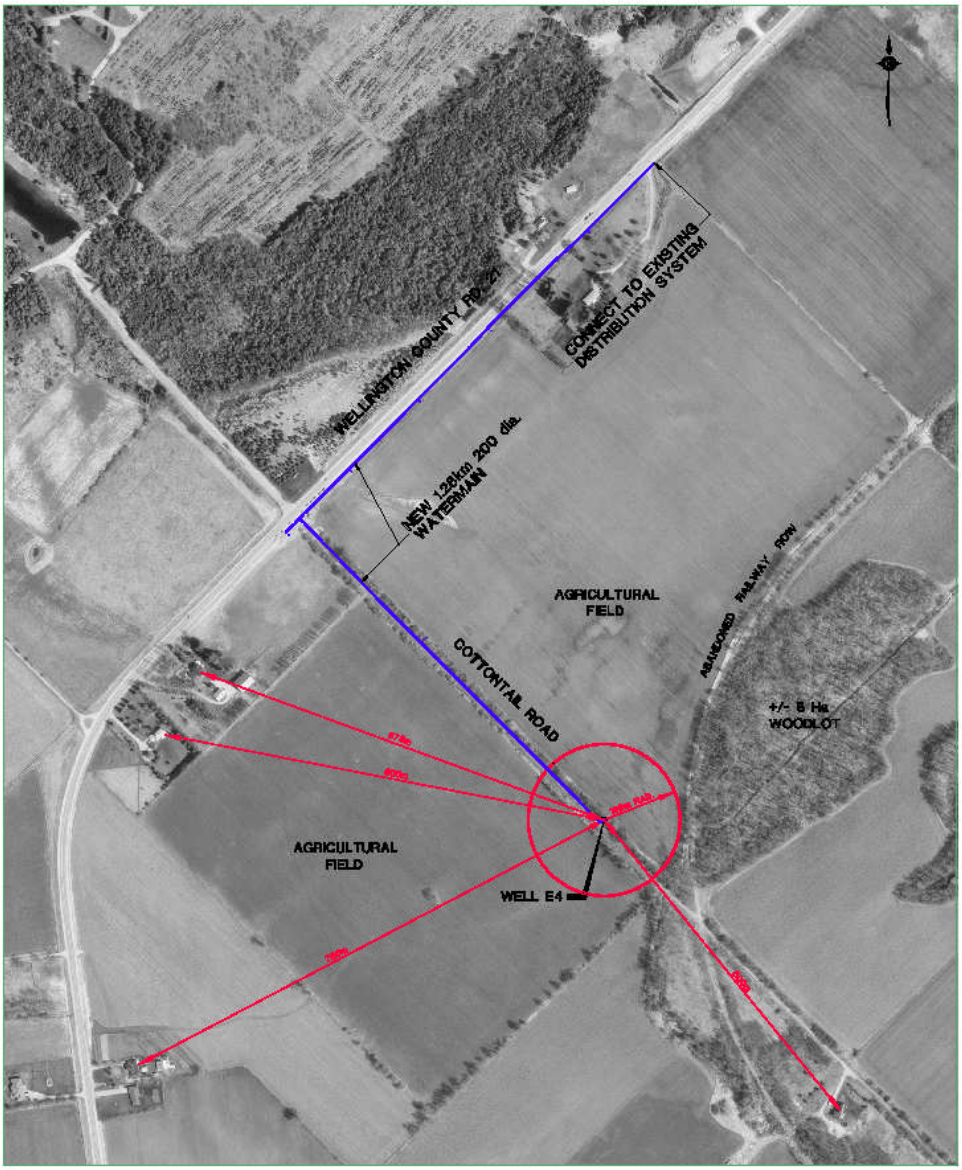
GENERAL WELL LOCATION ALTERNATIVES

Figure 2

SCALE 1:20,000

TRITON ENGINEERING SERVICES LIMITED

Consulting Engineers

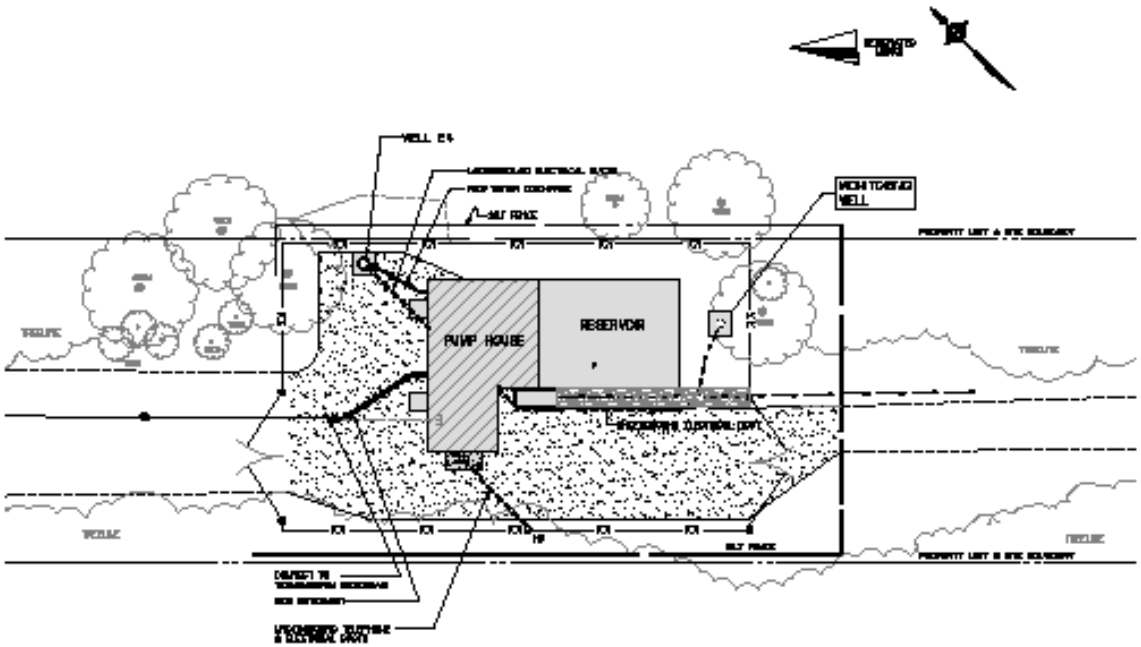


WELL E4 GENERAL LOCATION PLAN

Figure 3

SCALE 1:5,000

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers



WELL E4
SITE PLAN

Figure 4

TRITON

APPENDIX B

COMPREHENSIVE STUDY SCOPING DOCUMENT

Comprehensive Study Scoping Document

Township of Centre Wellington: Upgrading of the Elora Well System

1.0 INTRODUCTION

1.1 Purpose of the Scoping Document

Industry Canada is considering whether to provide funding to enable the proposed upgrading of the Elora well system (the Project). Pursuant to section 5 of the Canadian Environmental Assessment Act, an environmental assessment under that Act must be conducted before a funding decision can be made. As such, Industry Canada has determined that it is a responsible authority for the project, and therefore must ensure that the environmental assessment is conducted as early as is practicable in the planning stages of the project and before irrevocable decisions are made.

The Canadian Environmental Assessment Agency, as the federal environmental assessment coordinator, has determined that there is no other responsible authority that is required to conduct an environmental assessment for this project. However, Environment Canada, Natural Resources Canada, and Health Canada will provide expert advice in relation to the project.

This document describes the proposed scope of the project for the purposes of the environmental assessment, the factors proposed to be considered in the environmental assessment and the proposed scope of those factors. This document is intended to provide information to assist the public in commenting on this proposed approach to the environmental assessment as described in this document (see section 3.0 for further details).

1.2 Environmental Assessment Process

The upgrading of the Elora well system is subject to a comprehensive study under the Canadian Environmental Assessment Act, pursuant to paragraph 10 of the Comprehensive Study List Regulations.

Industry Canada has initiated the environmental assessment and, pursuant to section 21(2) of the Act, must provide a report to the Minister of the Environment, following public consultation, and recommend whether the environmental assessment should be continued by means of a comprehensive study, or the project should be referred to a mediator or review panel.

The report from the responsible authority to the Minister of Environment must include:

- the scope of the project, the factors to be considered in the assessment and the scope of those factors;
- public concerns in relation to the project;
- the project's potential to cause adverse environmental effects; and
- the ability of the comprehensive study to address issues relating to the project.

After considering the responsible authority's report and recommendation, the Minister of the Environment will decide whether to refer the project back to the responsible authority so that it may continue the comprehensive study process, or refer the project to a mediator or review panel.

If the Minister of Environment determines that the environmental assessment may continue as a comprehensive study, the responsible authority will provide the public with an additional

opportunity to participate in the comprehensive study process. Further, on completion of the comprehensive study report, the Canadian Environmental Assessment Agency (the Agency) will seek public comments on the comprehensive study report. The Agency will also provide participant funding in order to assist the public in participating in the comprehensive study process.

If the Minister decides to refer the project to a mediator or a review panel, the project will no longer be subject to the comprehensive study process under the Act. The Minister, after consulting the responsible authority and other appropriate parties, will set the terms of reference for their review, and appoint the mediator or review panel members. The public will have an opportunity to participate in the mediation or the panel review, and participant funding will be provided.

1.3 Project Background

Project Overview

Elora, in the Township of Centre Wellington, is located on Wellington County Road 18 approximately five kilometres west of Fergus. Elora is located on the Grand River, which flows through Elora in an east to west direction. The proposed project is located partially within Elora at the E2 well site, westerly beyond the community boundary along Wellington County Road 21 to Cottontail Road, and south along Cottontail Road to the new well site. The project sites, which are the subject of this study, are shown in Appendices 1 and 2.

To address the need for additional supply capacity within the community for a 10-year planning period, the Township of Centre Wellington, the project proponent, submitted a proposal to upgrade the Elora well system.

The proposed project involves the construction of a new well (E4), the construction of a treatment and pumphouse building, the installation of approximately 1 275 m of transmission watermain to connect the new well site to the Elora distribution system, and the decommissioning of the E2 well site in Elora.

Background

The Elora well supply is an integrated well system that consists of three drilled bedrock wells, each with its own pumphouse and treatment facility, a distribution system, and two elevated storage tanks. There is one watermain crossing of the Grand River, at Metcalf Street, which provides a connection between the northern and southern portions of the distribution system.

The Elora water system was first commissioned with one well (E1) in 1949. Additional wells were added to the system in 1958 (E2) and 1991 (E3). Well E2, which is located approximately halfway between the Well E1 and E3 sites, was removed from service in 1996 and its disinfection system removed.

Well E1 is a duty well. The site is located adjacent to a residential area near the northern boundary of Elora. There are no existing industries in the area. The well is located outside of its pumphouse. Raw water is disinfected, using chlorine gas, prior to being pumped to distribution. The Engineer's Report, Fergus and Elora Water Systems, prepared in 2000, indicated that this site did not meet provincial water treatment requirements because it did not provide sufficient disinfection time prior to distribution. This was rectified with upgrades to the site that were completed in 2003. The permitted capacity for this well is 1 741 m^3/d.

The E2 well site is located south of the core area of the village. The site is located in a residential area adjacent to several roads that have adequate storm water control. This site is the closest of the three wells to the Grand River, it being approximately 220 m south of the river. Because of the well's location relative to the Grand River, it is deemed to be groundwater under the influence of surface water. There are no readily apparent potential sources of contamination immediately adjacent to the wellhead. However, there are potential sources of contamination from several industries located within the well's capture zone. The site is currently not in use and its disinfection system has been removed. When this well was in use, it was known to have interference effects with Well E3. Although the well is not in use, its permit to take water is still valid with an allowable withdrawal value of 2 273 m^3/d.

Well E3 is also a duty well. The well site is located on the north side of First Line Road, the southern boundary of the community. The site is relatively flat. Lands to the east and south of the site are primarily agricultural. New industrial development has taken place directly north of the site and residential development has occurred 500 m to the west. Well E3 is inside of a masonry and brick pumphouse and treatment facility. Raw water is disinfected, using chlorine gas, prior to being pumped to distribution. The Engineer's Report, Fergus and Elora Water Systems, prepared in 2000, indicated that this site did not meet provincial water treatment requirements because it did not provide sufficient disinfection time prior to distribution. This was rectified with upgrades to the site that were completed in 2003. The well has a permitted capacity of 1 963 m^3/d.

The new well, E4, will be located along an unopened road right-of-way that is locally known as Cottontail Road on Lot 1, Concession 1 and 2, EGR, Pilkington Township, Centre Wellington. The right-of-way was disturbed in 2000 in order to provide an access road to the International Ploughing Match. Land use around this site is agricultural in nature. The capacity of this well will be 1 963 m^3/d.

Overall, the Elora well system services 1 922 households, as well as a number of industrial, commercial, and institutional operations. The existing system has a permitted treatment capacity of 3 704 m^3/d and produces approximately 2 521 m^3/d of treated water (average 2002 - 2004). Because of the interference effects of Well E2 on Wells E1 and E3, the combined daily withdrawal rate from Wells E1 and E2 is limited to 2 273 m^3/d and Well E3 is limited to 1 963 m^3/d. Based on population projections, including existing committed residential development, and other usage assumptions, peak demand is expected to increase from the 2002 – 2004 levels to 3 704 m^3/d at the 2015 planning horizon.

The proposed project will require the construction of physical works and includes: the construction of a new well with a production capacity of approximately 22.7 L/s; the construction of a treatment building to house pumping, treatment, and monitoring and control equipment; the construction of approximately 1 275 m of transmission watermain to connect the new well to the Elora distribution system; and, the decommissioning of the E2 well site. Other ancillary works will also be required. In the completion of this project, no watercourse crossings will be required and no works will occur within 200 m of a watercourse.

Project Schedule

It is anticipated that the project will take eight months to bring into service following the start of construction.

This schedule is largely dependent on: the completion of the design for the new Well #4, treatment facility and associated works; and, receipt of the Certificate of Approval for the proposed works

from the Provincial Ministry of Environment.

Environmental Assessment Schedule

The responsible authority expects to submit its report and recommendation to the Minister of Environment late in the summer of 2005 on whether the environmental assessment should continue by means of a comprehensive study or be referred to a mediator or review panel. If the comprehensive study process continues, the public will have an opportunity to provide additional input into the comprehensive study process. The responsible authority proposes to submit the comprehensive study report to the Agency in the winter of 2006. The Agency is required to have a public comment period on the comprehensive study report. The final comprehensive study report is expected to be presented to the Minister of the Environment late in the winter of 2006 for the environmental assessment decision statement.

2.1 SCOPE

2.1 Scope of the Project

The proposed scope of the project refers to the various components of the proposed undertaking that are considered as part of the project for the purpose of the environmental assessment. The scope of the project includes undertakings in relation to the physical works or physical activities related to the construction and operation of the proposed new well site.

Specifically, the scope of the project for the environmental assessment of the Elora well system upgrades is:

- decommission and abandon the E2 well site (this may include the demolition of the existing pumphouse facility);
- construction of well components capable of providing a supply of approximately 22.7 L/s (1 963 m^3/d, 716 495 m^3/a) at the E4 well site;
- construction of a pumphouse (approximately 50 m^2 in size) to house treatment and pumping equipment, and an in-ground reservoir (approximately 178 m^3 in size);
- installation of a transmission water main approximately 1 275 m in length along existing road allowances to connect the E4 well site to the Elora distribution system;
- construction equipment access, laydown areas;
- operation and maintenance of the new well, pumphouse, treatment processes, and the transmission watermain;
- site rehabilitation; and
- decommission the E4 well site at the end of the project's operational life.

2.2 Scope of assessment

2.2.1 Factors to be Considered

The CEA Act requires that the following factors be considered in the environmental assessment (sections 16(1) and 16(2)):

- *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 from the project in combination with other projects or activities that have been or will be carried out;*
- *the significance of the effects referred to in the previous paragraph;*

- *comments from the public that are received in accordance with this Act and its regulations;*
- *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 any such alternative means;*
- *the need for, and the requirements of, any follow-up program in respect of the project; and*
- *the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.*

2.2.2 Scope of Factors to be Considered

The following provides details on the proposed scope of the factors to be considered in the environmental assessment.

Physical and Natural Environment
- ground water quantity and quality;
- surface water quantity and quality;
- vegetation, including wildlife habitat and biodiversity;
- wetlands, if applicable, and their functions;
- species at risk;
- migratory birds, particularly with respect to the potential for disturbance or destruction of migratory birds or their nests;
- wildlife;
- noise;
- air quality - local and downwind airborne emissions (including odours and volatiles).

Socio-Economic and Cultural Environments
- adjacent land uses;
- local neighbourhood and residents;
- worker health and safety;
- public health and safety;
- aesthetics;
- heritage and historical cultural resources.

Malfunctions and Accidents
The probability of possible malfunctions or accidents associated with the project during construction, operation, modification, decommissioning, abandonment or other undertaking in relation to the work, and the potential adverse environmental effects of these events, should be identified and described. The description should include:
- accidental spills where possible;
- contingency plans and measures for responding to emergencies.

Any change to the project that may be caused by the environment
The environmental hazards that may affect the project should be described and the predicted effects of these environmental hazards should be documented. The following issues should be addressed in the environmental assessment and the design of the project:
- seismic activity;
- climate change.

Cumulative Environmental Effects
The cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out should be identified and assessed. The approach and methodologies used to identify and assess cumulative effects should be explained. The cumulative effects assessment should focus on, but not necessarily be limited to:

- cumulative effects of the proposed project with the possible replacement and/or installation of new water mains within Elora;
- cumulative effects of the project with other developments that are planned within Elora such as road and/or residential construction, or additional groundwater takings.

Sustainability of the Resource
The environmental assessment shall consider the renewable resources that may be significantly affected by the project and the criteria used in determining whether their sustainable use will be affected. The Comprehensive Study will emphasize in particular the sustainable use of the ground water system.

Spatial and Temporal Boundaries
The proposed project is located both within and outside of the Elora community limits. The following are proposed spatial boundaries for the project:

- The right-of-way includes any land area that is directly disturbed by the construction activities of the project. This includes: the new E4 well site; the E2 well site; the route of the transmission water main along Wellington County Road 21 and Cottontail Road; and, any associated construction equipment access routes and lay down areas.
- The corridor includes any area beyond the right-of-way, which could be disturbed by project effects. This includes effects during construction (noise, dust, vehicle emissions, traffic, etc) and would include a proposed area approximately 250 m beyond the right-of-ways. The corridor also includes possible effects, including accidents and malfunctions (for example - chemical spills, transmission water main failure, etc) as it relates to operation of the water system and would include an area of approximately 500 m beyond the right-of-way.
- The regional boundary will include an area beyond the project corridor, this being the greater of one kilometre or the extent of the area affected by the project. This could include the effects of construction activities (noise, dust, vehicle emissions, etc), operational activities (possible negative effects of draw down because of the system's groundwater withdrawal), and effects that the increased system capacity could have on the Elora sewage treatment system (possible negative effects from increased treatment volumes and decreased surface water quality).

The following are proposed temporal boundaries for the project:

- The short term temporal boundary of the project would last approximately eight months and includes the construction and commissioning phases of the project. It can include activities such as: the construction and commissioning of the new well; the construction and commissioning of the new pumphouse; the construction and commissioning of the transmission water main and its connection to the Elora distribution system; and, the decommissioning of the E2 well site. It can also include activities related to construction equipment access, lay down areas as well as any accidents and malfunctions that may be associated with the construction phase of the project.
- The medium term temporal boundary of the project is expected to be in the two to three year range and includes activities such as: the effectiveness of site restoration; possible accidents and malfunctions (for example - chemical spills, transmission water main failure, etc) as it

relates to operation of the water system; and, possible negative effects of draw down because of the system's groundwater withdrawal.

- The long term temporal boundary for the project would last up to the operational life expectancy of the project which is 10 years and includes the operation and maintenance, and eventual decommissioning of the project, in addition to activities such as: possible accidents and malfunctions (for example - chemical spills, transmission water main failure, etc) as it relates to operation of the water system; and, possible negative effects of draw down because of the system's groundwater withdrawal.

Proposed design of the Follow-up Program

The purpose of a follow-up program is to verify the accuracy of impact predictions and determine the effectiveness of mitigation measures. Elements of the follow-up program will be identified in the Comprehensive Study.

3.0 PUBLIC PARTICIPATION

The public is invited to provide its views at this stage of the environmental assessment of the project on the following areas:

- the proposed scope of the project;
- the factors proposed to be considered in the assessment and the proposed scope of those factors; and
- the ability of the comprehensive study to address issues relating to the project.

Persons wishing to submit comments may do so in writing to Industry Canada. Please be as detailed as possible and clearly reference the Elora well system and File Number 320 on your submission. Comments must be received by the close of business July 20, 2005. Comments may be sent by electronic mail to COIP-PICO@ic.gc.ca, by facsimile to (416) 954-6654, or by mail to:

Industry Canada
Canada-Ontario Infrastructure Program
151 Yonge Street, 3rd Floor
Toronto, Ontario
M5C 2W7

Should a comprehensive study be conducted for the project, Industry Canada will provide the public with an additional opportunity for input into comprehensive study process. Once the comprehensive study report has been submitted to the Agency, the public will be provided an opportunity to review and provide comments during the Agency's public comment period, prior to final recommendation to the Minister of Environment.

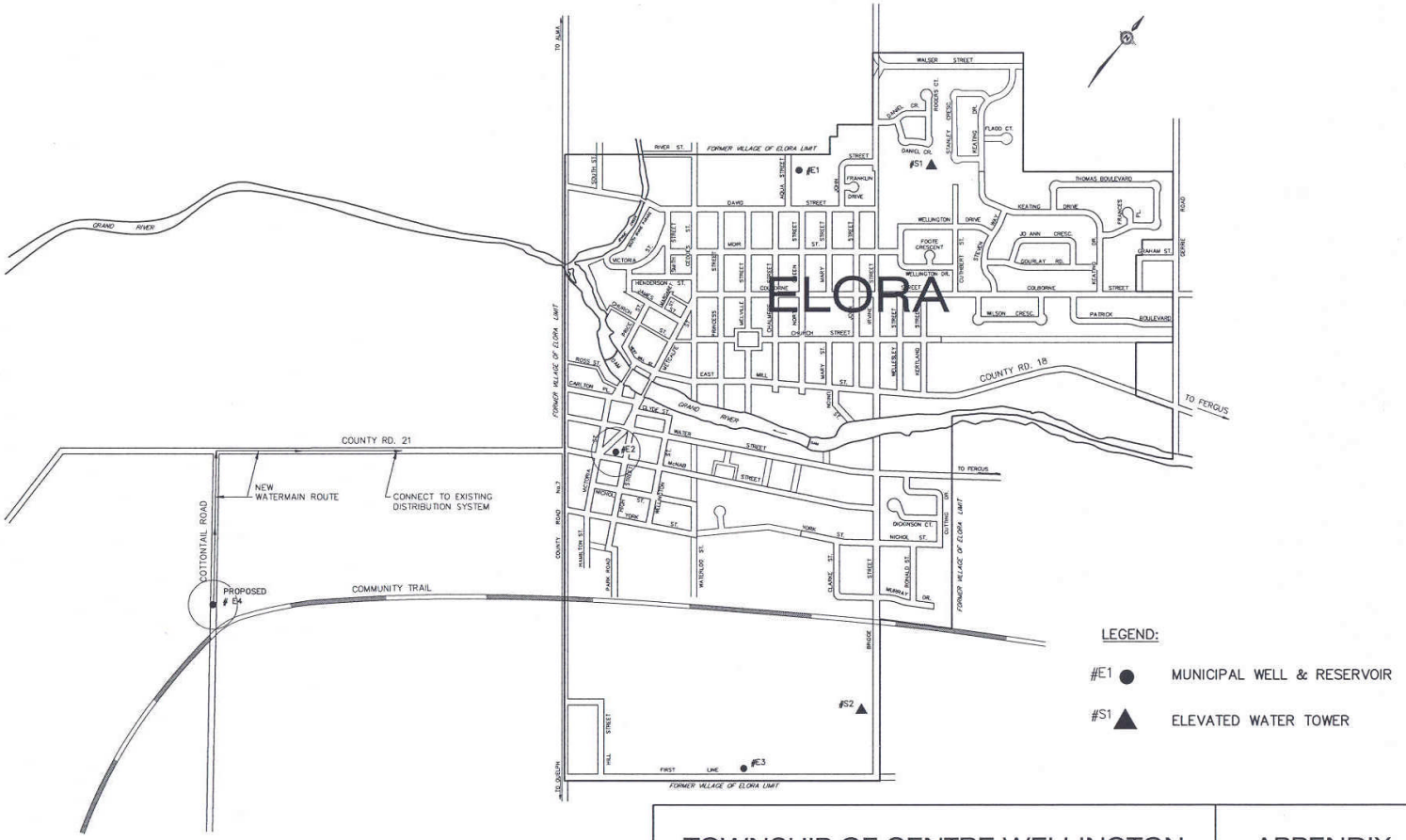
The public will also have opportunities to participate in the review, should the project be referred to a mediator or a review panel.

Following the Minister's decision on the type of environmental assessment that is to be conducted (comprehensive study, mediation, or panel review), funding will be available from the Canadian Environmental Assessment Agency for members of the public to participate in the environmental assessment.

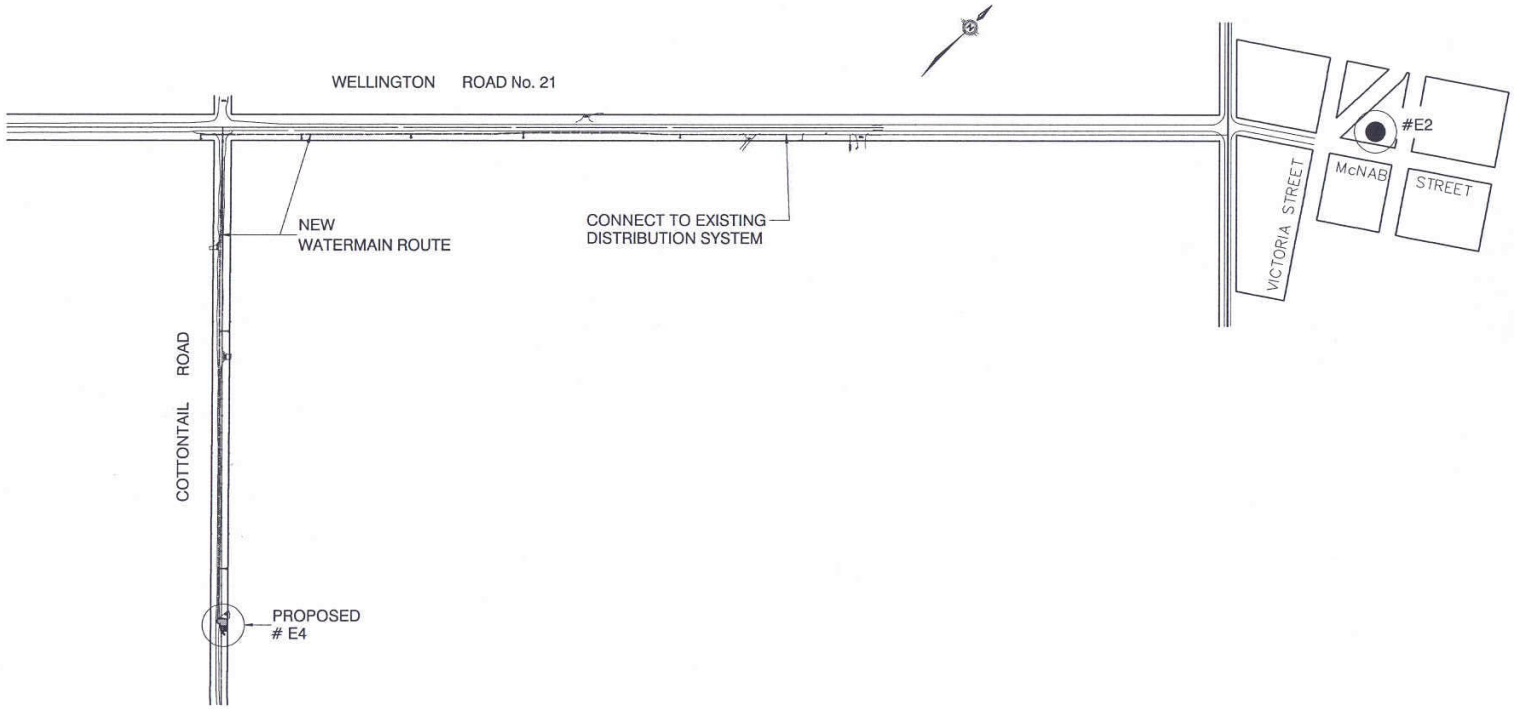
References

Triton Engineering Services Limited, *Engineer's Report, Fergus and Elora Water Systems*, 2000.

Triton Engineering Services Limited, *Township of Centre Wellington, Elora Well Exploration, Class EA Project File*, 2003.



TOWNSHIP OF CENTRE WELLINGTON ELORA WELL SYSTEM	APPENDIX 1
EXISTING WATER SUPPLY FACILITIES	SCALE 1:20,000



TOWNSHIP OF CENTRE WELLINGTON COMMUNITY OF ELORA	APPENDIX 2
PROPOSED WELL SITE #4 AND WATERMAIN ROUTE	SCALE 1:7,500