# COMPREHENSIVE STUDY REPORT

# AMABEL-SAUBLE WELL SYSTEM UPGRADE PROJECT

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## AMABEL-SAUBLE WELL SYSTEM UPGRADE PROJECT

## EXECUTIVE SUMMARY

# 1.0 INTRODUCTION

## 1.1 Project Summary

The project proponent, the Town of South Bruce Peninsula, located in Bruce County, proposes to upgrade seven well systems within the community of Sauble Beach to address a series of identified deficiencies. The upgrading project will include the development of a new well, the construction of a treatment facility including an in-ground reservoir (to adequately disinfect treated water prior to distribution), the construction of approximately 6.7 km of transmissions watermains to connect the existing distribution systems to the new treatment facility, the decommissioning of existing treatment facilities, and ancillary works. The new well supply will be augmented by an existing well source in order to ensure the security of the total supply capacity within the system. Another existing well, with associated raw watermain, will be used as backup water supply source.

The improvements to the municipal water system constitute the Town of South Bruce Peninsula *Amabel-Sauble Well System Upgrade project.* The proposed project is located entirely within the limits of the community of Sauble Beach, which is located along the shoreline of Lake Huron, approximately 25 km northwest of Owen Sound.

## 1.2 Federal Regulatory Context

The Amabel-Sauble Well System Upgrade 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.

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

With respect to ground water extraction, Part III, item 10 of the *Comprehensive Study List Regulation* prescribes that comprehensive studies are required for projects proposing the construction of a facility for the extraction of 200,000 $m^3$/a or more of ground water, or the an expansion of such a facility that would result in an increase in production capacity of more than 35%. The *Amabel-Sauble Well System Upgrade project* proposes to construct a new municipal well supply capable of providing approximately 250,755 $m^3$/a. Accordingly, completion of a comprehensive study is required before a decision can be made to provide federal funding for the project.

## 1.3 Provincial Regulatory Context

The project was also subject to the Class Environmental Assessment process developed for municipal infrastructure projects (i.e. roads, water and wastewater projects) and followed the procedures set out in the *Municipal Class Environmental Assessment* (Class EA) document. With respect to the Amabel-Sauble Well System Upgrade Project, certain project components were considered Schedule C activities under the terms of Appendix I (i.e. development of a new groundwater supply, new water treatment plant). Schedule C projects generally include major expansions of existing facilities or new construction with a potential for some adverse environmental impacts. Projects are approved following the completion of a formal environmental screening process.

The provincial Class Environmental Assessment for the project was completed between December 2001 and January 17, 2005. The proponent selected the Amabel-Sauble Well System Upgrade Project as the preferred strategy for resolving the identified problems. In accordance with the Ontario *Safe Drinking Water Act*, implementation of the project requires a Permit to Take Water (for the new supply well) and a Certificate of Approval (for site servicing). The Permits to Take Water have been obtained for this project.

# 2.0 SCOPE OF THE PROJECT

The proposed project will require work at eight sites and along road allowances within Sauble Beach for the distribution watermain installation. Major works for this project include:

- the construction of a new well and the upgrading of the existing well at the Amabel Community School site;
- the construction of a new treatment building and associated site works at the school site;
- the decommissioning of four existing wells and pumphouses;
- the decommissioning of two additional wells and their conversion to monitoring wells;
- upgrading of one well supply so that it can be used as a raw water supply and

the construction of a raw watermain to connect this supply to the new treatment plant; and,
- the construction of approximately 6.7 kilometres of transmission watermain to connect the seven distribution systems to the new treatment building.

None of the well sites, existing or proposed, is located within 30 metres of a watercourse. The project requires only one watercourse crossing, at the Sauble River, as part of the distribution watermain installation. The proponent proposes to accomplish this watercourse crossing by directional drilling.

The new treatment facility will have a treatment capacity of 687 $m^3$/d (250,755 $m^3$/a). The design of the plant will also allow for the treatment of 262 $m^3$/d of raw water from the existing Winburk well supply.

## 3.0 DESCRIPTION OF EXISTING ENVIRONMENT

The new well, referred to as the Amabel-Sauble Well PW2, and the existing Well PW1 are located at the Amabel-Sauble School site.

The subject property is situated in the community of Sauble Beach, a resort area that has a population of approximately 2,000. The community is located on the eastern shore of Lake Huron, in the southwest corner of the Town of South Bruce Peninsula. The Saugeen Nation reserve is located along the southern boundary of the community.

Sauble Beach incorporates a traditional downtown commercial area called DCA. In general, the scale and nature of development evident in Sauble Beach is consistent with that of a resort area in small urban communities.

Soils in the vicinity of the project are classified as sand plains (prominent drumlinized till plain) that has been altered by a series of glacial lakes. The sand layer at the well location and the treatment plant building site is approximately 7 m thick and is underlain by clay and stone to a depth of approximately 16 m below the ground surface. The groundwater for the water supply well is obtained from three bedrock aquifer(s) at approximate depths of 27 m, 45 m and 82 m for well PW1 and 29 m, 64 m and 98 m for well PW2.

The site of the proposed treatment plant is on property owned by the Bluewater District School Board. A portion of the school site has been sold to the Town of South Bruce Peninsula to allow the development of the new water supply and the construction of a treatment plant. Vegetation at the proposed treatment plant site is limited and consists of shrubs and trees. Most of the site was cleared during the construction of the Amabel-

Sauble school building, parking lot and playground areas. The remaining vegetative cover at this site primarily consists of mid-aged red pine plantation.

There are two First Nations communities on the Bruce Peninsula. The Cape Croker First Nations community is located a significant distance north of the Sauble Beach area. The Saugeen First Nation community is just south of Sauble Beach community boundary and outside the regional boundary for this study.

The land uses adjacent to the project sites are primarily residential, institutional and natural. The project study area includes Lake Huron to the west, and some wetland areas to the north, east and south. Watermain construction will occur adjacent to a swampy area in one area only. The Sauble River, which winds through the project study area, is approximately 300 m from wells PW1 and PW2 at its closest approach.

There is evidence of the Monarch Butterfly, which has a status of Special Concern under the *Species at Risk Act* (SARA), in the project study area. Migratory birds are also prevalent in the area.

Local users of groundwater are primarily full time residents and cottage owners, as well as business owners. The majority of these users utilize sand point wells.

## 4.0 ASSESSMENT OF LIKELY ENVIRONMENTAL EFFECTS AND MITIGATION

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

| | |
|---|---|
| ▪ Groundwater quantity and quality | ▪ Air quality |
| ▪ Surface water quantity and quality | ▪ Heritage and historical cultural resources |
| ▪ Vegetation | ▪ Capacity of renewable resources |
| ▪ Species at risk | ▪ Wetlands |
| ▪ Migratory birds | ▪ Fish and fish habitat |
| ▪ Wildlife | ▪ Soil quality |
| ▪ Noise and vibrations | ▪ Climate change |

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. Table 4.1 summarizes the general findings of the environmental effects analysis.

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

**Table 4.1**

**Environmental Effects Summary Checklist**

| Environmental Component | Potential Project Effects | | | | | | Residual Effects | |
|---|---|---|---|---|---|---|---|---|
| | Potential Adverse Effects | | | Can it be Mitigated? | | | Is it Significant? | |
| | Yes | No | Uncertain | Yes | No | Uncertain | Yes | No |
| **Physical and Natural Environment** | | | | | | | | |
| - Groundwater quantity and quality | T | | | | T | | | T |
| - Surface water quantity and quality | T | | | T | | | | T |
| - Vegetation | T | | | | T | | | T |
| - Wetlands | | T | | | | | | N/A |
| - Species at risk | T | | | T | | | | T |
| - Fish and fish habitat | T | | | T | | | | T |
| - Migratory birds | T | | | T | | | | T |
| - Wildlife | T | | | T | | | | T |
| - Air quality | T | | | T | | | | T |
| - Soil quality | T | | | T | | | | T |
| **Socio-economic and Cultural Environment** | | | | | | | | |
| - Adjacent land uses | T | | | T | | | | T |
| - Aesthetics | T | | | T | | | | T |
| - First Nations | | T | | | | | | N/A |

| Environmental Component | Potential Project Effects | | | | | | Residual Effects | |
|---|---|---|---|---|---|---|---|---|
| | Potential Adverse Effects | | | Can it be Mitigated? | | | Is it Significant? | |
| | Yes | No | Uncertain | Yes | No | Uncertain | Yes | No |
| - Heritage & Historical Cultural Resources | | T | | | | | | N/A |
| - Local uses of groundwater | T | | | T | | | | T |
| - Noise and vibration | T | | | T | | | | T |
| - Public health and safety | T | | | T | | | | T |
| - Worker health and safety | T | | | T | | | | T |
| **Other Factors** | | | | | | | | |
| - Accidents and malfunctions | T | | | T | | | | T |
| - Effects of environment on the project | T | | | T | | | | T |
| **Cumulative Effects** | | | | | | | | |
| - Groundwater | | T | | | | | | N/A |
| - Surface water | | T | | | | | | N/A |
| - Species at risk | | T | | | | | | N/A |
| - Migratory birds | | T | | | | | | N/A |
| - Wildlife | | T | | | | | | N/A |

## 5.0 ASSESSMENT OF CUMULATIVE EFFECTS

Cumulative effects represent the combined impacts of successive actions upon an environmental setting. Based upon an assessment of the undertaking and other projects being carried out or considered in the community, the following projects which may act in a cumulative manner with residual effects from this project were considered:

- Construction of a water transmission pipeline from Wiarton to Sauble Beach;
- Replacement of watermain within existing seven subdivisions;
- Downtown Core Area (DCA) communal sewage systems; and,
- New residential construction.

An assessment methodology was carried out to evaluate the nature and magnitude of these cumulative impacts within the context of the existing environment setting and future development. Following consideration of the existing environmental conditions and nature and magnitude of development activity anticipated in the community, it was concluded that the implementation of the Amabel-Sauble Well System Upgrade Project, in combination with past, existing or imminent projects is not expected to represent an action which will generate any significant adverse cumulative effects upon the defined regional boundary.

## 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 04-03-8130).

- A public notice detailing the public comment 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 newspapers and was also posted to the Industry Canada and Canadian Environmental Assessment Agency websites. Hard copies were also made available for viewing in the Town of South Bruce Peninsula's Municipal Office and the Sauble Beach Community Centre. Three written responses were received which were addressed, as applicable, by this report.

- A public notice detailing a second public comment 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 newspapers and was also posted on the Industry Canada and Canadian Environmental Assessment Agency Internet sites. No written or oral comments were received.

A third public comment period will be provided following the completion of the comprehensive study report, at which time, the public will be provided with a 30-day review period to provide written comments on the project to the Canadian Environmental Assessment 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 monitoring and follow-up program has been designed to verify the accuracy of the EA predictions and to confirm that the mitigation measures identified are effective. The follow-up program will be 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 features to be adversely impacted by project implementation. The follow-up and monitoring program will include:

- Additional monitoring of existing wells in the area, including the Fedy and Forbes wells that will be modified into observation wells, will be conducted to further assess the impacts resulting from the pumping of Wells PW1 and PW2. This exercise will be carried out during the initial 36-month period of well operation to confirm the validity of the hydrogeologic study work with respect to ground water quantity. Data gathered during this period will provide information on the initial conditions of existing wells within the general cone-of-influence. This information will be used to monitor impacts associated with well pumping and, as necessary, to respond to adverse impacts over the operational phase of the project (e.g., excessive drawdown in Wells PW1 and PW2 and the Winburk well). The contingency plan will incorporate a specific well, identification, evaluation and reporting mechanism, as well as a strategy for corrective action.

- Annual water consumption data from each well, water level variations on a monthly basis, as well as recording the lowest water level during summer use, will be reviewed by a professional hydrogeologist to study the behaviour of the PW1, PW2, and the Winburk water supply wells, and the observation wells, and compared with the analysis utilized for the preparation of the report entitled “Aquifer Evaluation Report”, May 2003 by HPA. A summary of the findings from each year's analysis will be documented in a report, which will be provided to NRCan.

- Additional monitoring of chemical and microbiological parameters will be carried out in accordance with provincial Ministry of Environment sampling requirements. This monitoring program will confirm the validity of the hydrogeologic study work with respect to ground water quality.

Monitoring and reporting activities associated with the Follow-up Program will be carried out for a period of three years. 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 Canadian Environmental Assessment Agency will be provided with the annual well reports for further evaluation. The availability of the findings from the follow-up program will be posted on the CEA Registry.

## 8.0 CONCLUSIONS AND RECOMMENDATIONS

The environmental effects of the project were evaluated including accidents and malfunctions, effects of the environment on the project, alternative means, 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 and operation of the Amabel Sauble Well System Upgrade project is not likely to result in any significant adverse environmental effects. A monitoring and follow-up program has also been designed to ensure the accuracy of this conclusion.

# LIST OF ACRONYMS

ANSI: American National Standards Institute

AQI: Air Quality Index

AWWA: American Water Works Association

BMP: Best Management Practices

CA: Conservation Authority

C of A: Certificate of Approval

CEA: Canadian Environmental Assessment

CEAA: Canadian Environmental Assessment Agency

COIP: Canada-Ontario Infrastructure Program

COSEWIC: Committee on the Status of Endangered Wildlife in Canada

CSA: Canadian Standards Association

CSR: Comprehensive Study Report

DCA: Downtown Core Area in Sauble Beach

DWPR: Drinking Water Protection Regulation

EA: Environmental Assessment

FA: Federal Authorities

FEAC: Federal Environmental Assessment Coordinator

GSCA: Grey Sauble Conservation Authority

GUDI: Groundwater Supply Under Direct Influence of Surface Water Contamination

HPA: Henderson Paddon & Associates Limited

MAC: Maximum Acceptable Concentration

mg/L: milligrams per litre

MNR: Ministry of Natural Resources

MOE: Ministry of the Environment

NHIC: Natural Heritage Information Centre

NRCan: Natural Resources Canada

NSF: National Sanitation Foundation

OBC: Ontario Building Code

OPSS: Ontario Provincial Standards Specifications

PE: Polyethylene

PLC: Programmable Logic Controller

PTTW: Permit To Take Water

PVC: Poly Vinyl Chloride

RA: Responsible Authority

SAR: Species at Risk

SARA: Species at Risk Act

SCADA: Supervisory Control and Data Acquisition

TRS: Total Reduced Sulphur

TTHM: Total Trihalomethanes

UNESCO: United Nations Educational Scientific & Cultural Organization

UV Disinfection: Ultraviolet Rays Disinfection

VEC: Valued Ecosystems Components

WHI: Waterloo Hydrogeologic Inc.

# COMPREHENSIVE STUDY REPORT

# AMABEL-SAUBLE WELL SYSTEM UPGRADE PROJECT

# 1.0 INTRODUCTION

## 1.1 Purpose and Overview of Project

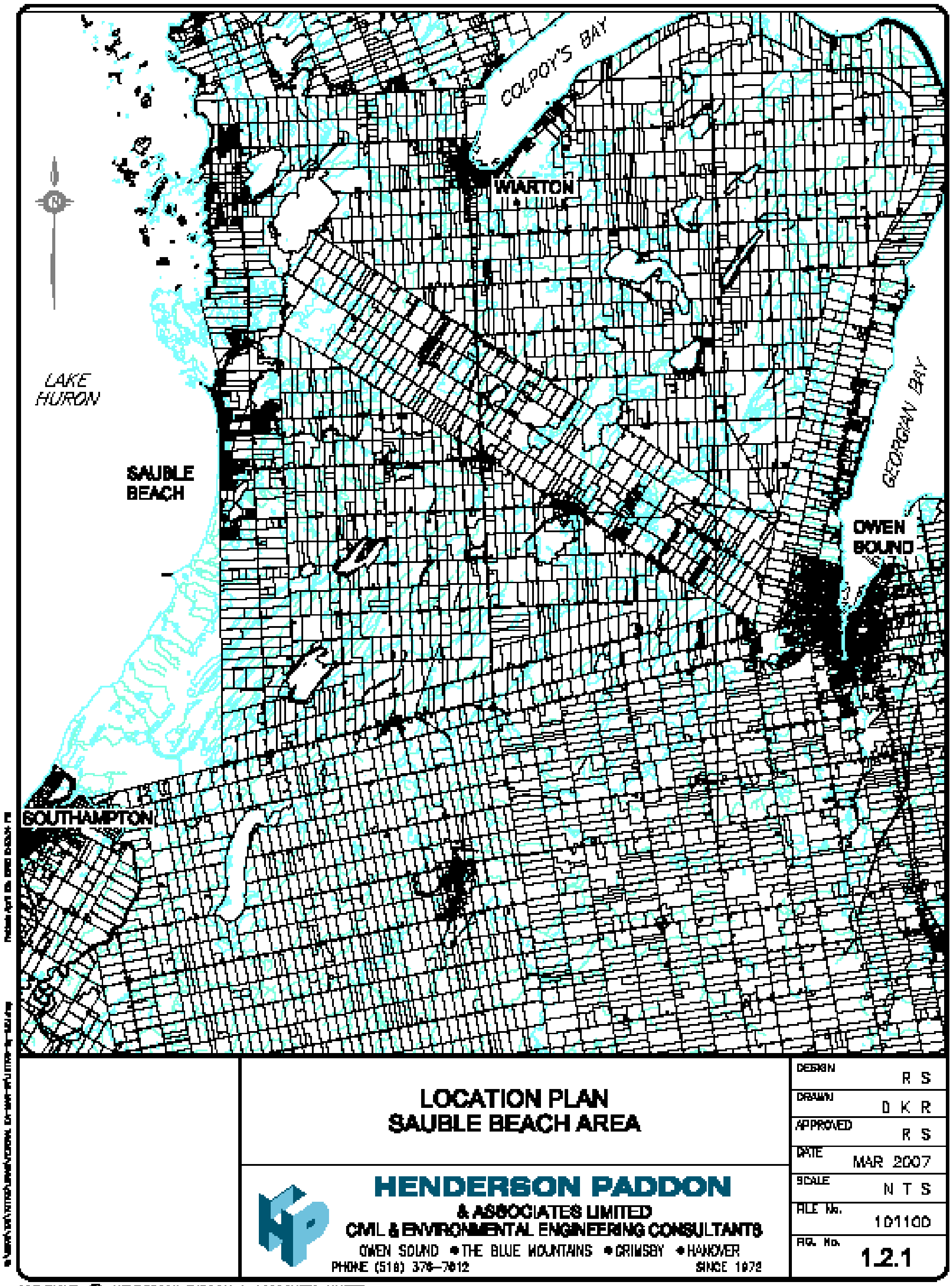
The Town of South Bruce Peninsula, the project proponent, proposes to upgrade seven well systems within the community of Sauble Beach to address a series of identified deficiencies. The upgrading project will include the development of a new well, the construction of a treatment facility including an in-ground reservoir (to adequately disinfect treated water prior to distribution), the construction of approximately 6.7 km of transmissions watermains to connect the existing distribution systems to the new treatment facility, the decommissioning of the existing treatment facilities, and ancillary works. The new well supply will be augmented by an existing well source in order to ensure the security of the total supply capacity within the system. Another existing well will be used as backup water supply source.

The improvements to the municipal water system constitute the Town of South Bruce Peninsula *Amabel-Sauble Well System Upgrade project.* Project contacts are as follows:

| **Municipal Contact:** | **Consultant Contact:** |
|---|---|
| Malcolm McIntosh, CAO | Rakesh Sharma, P. Eng. |
| Town of South Bruce Peninsula | Designated Consulting Engineer |
| Box 310, 315 George Street | Henderson Paddon & Associates Limited |
| Wiarton, ON N0H 2T0 | 945 3rd Avenue East, Suite 212 |
| | Owen Sound, ON N4K 2K8 |

## 1.2 General Description of the Community and the Municipal Water System

Sauble Beach, in the Town of South Bruce Peninsula, is located along the shore of Lake Huron approximately 25 kilometres northwest of Owen Sound (see Figure 1.2.1 for a general location map). The proposed project is located entirely within the limits of the community of Sauble Beach. The individual well sites are shown in Figure 1.2.2 in addition to other project information.


COLPOY'S BAY
WIARTON
LAKE HURON
SAUBLE BEACH
GEORGIAN BAY
OWEN SOUND
SOUTHAMPTON
LOCATION PLAN
SAUBLE BEACH AREA
HENDERSON PADDON
& ASSOCIATES LIMITED
CIVIL & ENVIRONMENTAL ENGINEERING CONSULTANTS
OWEN SOUND • THE BLUE MOUNTAINS • GRIMSBY • HANOVER
DESIGN R S
DRAWN D K R
APPROVED R S
DATE MAR 2007
SCALE N T S
FILE No. 101100
FIG. No. 1.2.1

The Sauble Beach area does not have a primary water supply. Instead, the Town of South Bruce Peninsula owns and operates seven small communal groundwater systems. The systems, Fedy, Forbes, Gremik, Robins, Trask, Thomson, and Winburk, are in relatively close proximity to each other (refer to **Figure 1.2.2**). Six of the seven water systems are located west of the Sauble River, which generally flows through the community from south to north in the project area before turning west and discharging to Lake Huron. Only the Robins well system is located east of the Sauble River.

Each water system services a small residential subdivision. The well sites are situated within the residential subdivision it was designed to serve. Surrounding land uses at each of these sites is residential in nature. Only the properties that are connected to these well systems are serviced by municipal water in the Sauble Beach area. There is no communal sewage service provided by the Town in Sauble Beach.

Raw water at each well system is presently disinfected, using sodium hypochlorite, prior to being pumped directly to distribution. The Engineer's Reports for each of the systems, which were prepared for all of the water systems in 2000 and 2001, indicate that the systems do not meet provincial water treatment requirements because they do not provide sufficient disinfection time prior to distribution.

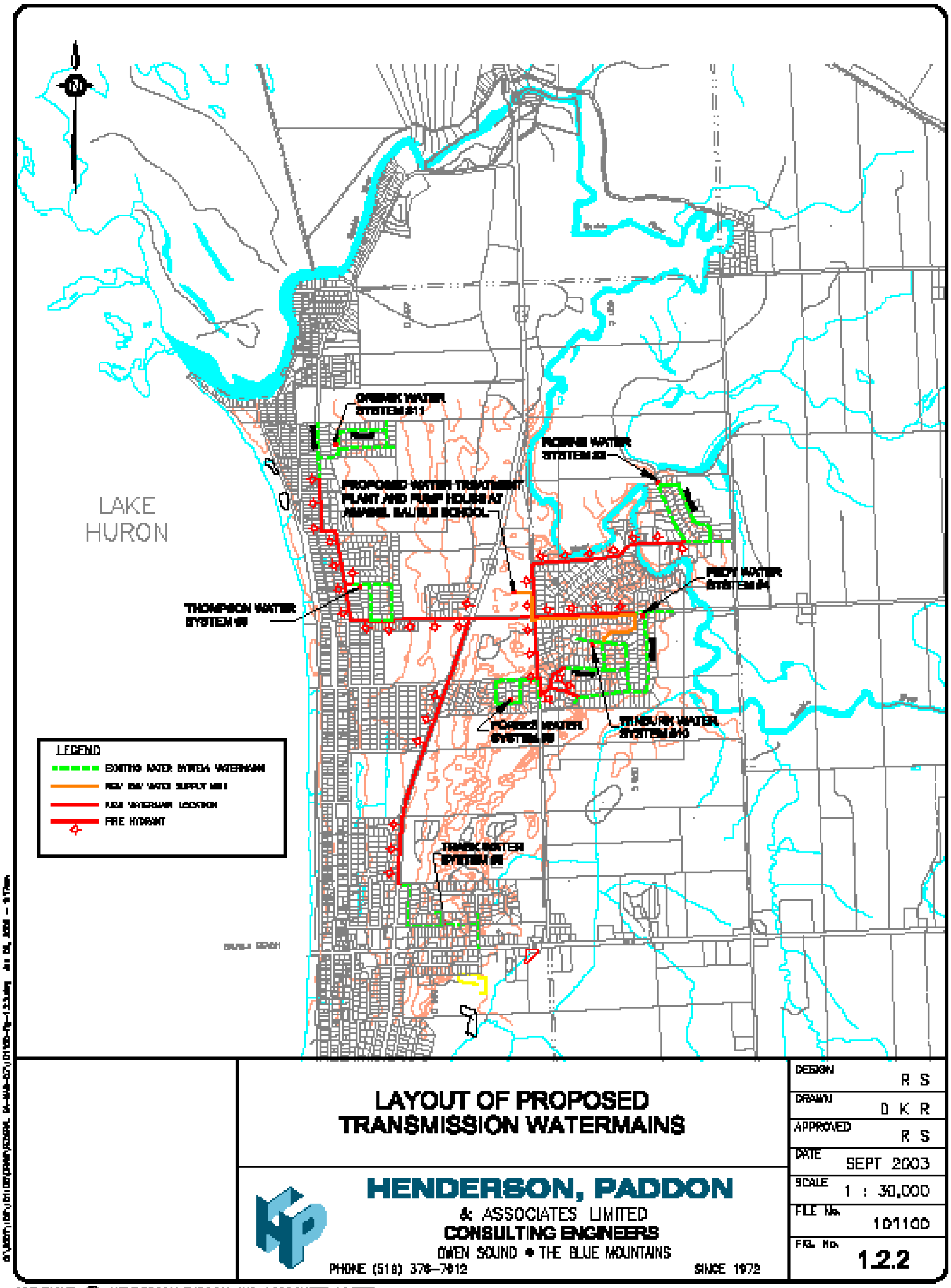
The Engineer's Reports also identified the following issues:

- Raw water from the wells have had poor turbidity and bacteriological problems, with evidence of total coliforms and high background counts being found over the period from 1998 to 2002;

- Iron concentrations in three wells, Robins, Fedy, and Winburk, is high and the iron sequestration treatment utilized has not always proved to be effective as treated water turbidity is still higher than provincial requirements at times;

- All of the wells have been identified as being potentially groundwater under influence of surface water (GUDI). Because of this, any treatment solution utilizing these wells would require an upgraded level of treatment, such as the use of an ultraviolet disinfection system; and,

- All of the systems do not provide disinfection of the raw water that meets the requirements of "Procedure for Disinfection of Drinking Water in Ontario", a reference document adopted by Ontario Regulation 170/03 under the Ontario *Safe Drinking Water Act*, 2002.


LAKE HURON
PROPOSED WATER TREATMENT PLANT AND PUMP HOUSE AT AMABEL SAUBLE SCHOOL
THOMPSON WATER
LEGEND
FIRE HYDRANT
LAYOUT OF PROPOSED TRANSMISSION WATERMAINS
HENDERSON, PADDON
& ASSOCIATES LIMITED
CONSULTING ENGINEERS
OWEN SOUND • THE BLUE MOUNTAINS
PHONE (519) 376-7612
SINCE 1972
DESIGN R S
DRAWN D K R
APPROVED R S
DATE SEPT 2003
SCALE 1 : 30,000
FILE No. 101100
FIG. No. 1.2.2

In December, 2001, the Town of South Bruce Peninsula initiated a Municipal Class Environmental Assessment (Class EA) under the *Environmental Assessment Act* of Ontario to resolve the problems identified above with the seven water systems. The Class EA investigation was completed in January, 2005. The proponent selected the *Amabel-Sauble Well System Upgrade project* as the preferred strategy for resolving the identified problems.

## 1.3 Project Description

### 1.3.1 General

The proposed project will require work at eight sites and along road allowances within Sauble Beach for the distribution watermain installation. Major works for this project include:

- the construction of a new well and the upgrading of the existing well at the Amabel Community School site;
- the construction of a new treatment building and associated site works at the school site;
- the decommissioning of the four existing wells and pumphouses;
- the decommissioning of two additional wells and their conversion to monitoring wells;
- upgrading of one well supply so that it can be used as a raw water supply and the construction of a raw water main to connect this supply to the new treatment plant; and,
- the construction of approximately 6.7 kilometres of transmission water main to connect the seven distribution systems to the new treatment building.

None of the well sites, existing or proposed, is located within 30 metres of a watercourse. The project requires only one watercourse crossing as part of the distribution watermain installation. The proponent proposes to accomplish this watercourse crossing by using directional drilling.

The seven existing water systems are all small, with maximum treatment capacities ranging in size from 69 $m^3$/d to 328 $m^3$/d. The systems service a total of 222 households, although with a full build-out of these subdivisions, 292 households could be connected to the proposed water system.

The new treatment facility will have a treatment capacity of 687 $m^3$/d (250,755 $m^3$/a). The plant design will include the existing Winburk well as a partial backup raw water supply.

## 1.4 Regulatory Context

### 1.4.1 Federal Environmental Assessment Process

The Town of South Bruce Peninsula initiated the *Amabel-Sauble Well System Upgrade 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 (EA) requirements prescribed by the *Canadian Environmental Assessment Act* (CEA Act). Pursuant to section 5 of the CEA Act, an environmental assessment must be conducted before a decision on the funding allocation can be made.

With respect to ground water extraction, Part III, item 10 of the *Comprehensive Study List Regulation* prescribes that comprehensive studies are required for projects proposing an the construction of a facility for the extraction of 200,000 $m^3$/a or more of ground water or the expansion of such a facility that would result in an increase in production capacity of more than 35%. The *Amabel-Sauble Well System Upgrade project* incorporates the construction of a new municipal well supply capable of providing approximately 250,755 $m^3$/a. Accordingly, completion of a comprehensive study is required before a decision can be made to provide federal government COIP funding for the project.

### 1.4.2 Provincial Environmental Assessment Process

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 Environment 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 Ontario Ministry of Environment 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 improvements to the Sauble Beach water systems 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 *Amabel-Sauble Well System Upgrade project*, certain project components were considered Schedule C activities under the terms of Appendix 1 (i.e., development of a new ground water supply, new water treatment plant). Schedule C projects generally include major expansions to existing facilities or new construction with a potential for some adverse environmental impacts. Projects are approved following the completion of a formal environmental screening process.

The Town of South Bruce Peninsula carried out the provincial Class EA investigation between December, 2001 and January 2005. Henderson Paddon & Associates was retained to coordinate the Class EA process on behalf of the Municipality.

### 1.4.3 Local Jurisdiction

The community of Sauble Beach was the urban part of the former Township of Amabel. In December 1999, the former Townships of Amabel and Albemarle, the Village of Hepworth and the Town of Wiarton amalgamated to form the Town of South Bruce

Peninsula. The new municipality has a population of more than 8,090 permanent residents (2001 Statistics Canada census data), a land base of approximately 532 $km^2$ and a population density of 15.2 persons per $km^2$. The community of Sauble Beach, a resort area, has a population of 2,000. Although the first settler is reported to have been Joan Aldridge, who built a cottage nearby in 1877, most of the resort development of the current community dates from about 1948. The main street has remained relatively unchanged in the past 50 years and still reflects the more relaxed and bygone days of the 1940's or 1950's. The resort community is located on the eastern shores of Lake Huron in the southwest corner of the Town of South Bruce Peninsula, and along the northern boundary of the Saugeen First Nation reserve.

Sauble Beach is characterized as a low density residential community, most of which is seasonal. Sauble Beach incorporates a traditional downtown commercial area called DCA. In general, the scale and the nature of development evident in Sauble Beach is consistent with that of a resort area in smaller urban communities.

Jurisdictional authority for the delivery of municipal water in the Town of South Bruce Peninsula has been defined through a service provision agreement between the County of Bruce and its constituent municipalities. The Town of South Bruce Peninsula is the owner and operator of municipal water supply facilities in Sauble Beach and has the authority to implement the upgrades.

## 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 significant adverse environmental effects associated with the planned 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 (the Agency) is 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

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

- Environment Canada (EC);
- Natural Resources Canada (NRCan); and,
- Health Canada (HC).

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 Sauble Beach and the surrounding rural area is not a traditional territory for First Nations. No First Nations interest has been identified or declared with respect to this project.

In 2002-03, the Town of South Bruce Peninsula, the Municipality of Arran-Elderslie, and Municipality of Brockton jointly investigated an undertaking in which a regional water system would be constructed that would supply water from the Wiarton Filtration Plant to the communities in Hepworth, Sauble Beach, Tara, Chesley, Elmwood and Walkerton.

During the course of this investigation, the Saugeen First Nations were contacted to determine their interest in this project which could provide them with potable water from the Wiarton Filtration Plant. The Saugeen First Nations verbally declined to participate in that project.

## 1.7 Scope and Timing of the Environmental Assessment

### 1.7.1 Comprehensive Study Scoping Document and Report to Minister

A *Comprehensive Study Scoping Document* was prepared for this project. Pursuant to section 21(2) 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 A to this report.

Pursuant to section 21(2), after this consultation was complete, the scoping document was incorporated into an *Environmental Assessment Track Report,* which 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 September 1, 2006.

### 1.7.2 Scope of the Project

The 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 a new well site, treatment plant building and transmission watermain, and modifications to or decommissioning of seven well sites within Sauble Beach area.

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

**Transmission watermain installation:**

- Construction of approximately 6.7 km of transmission watermain within existing road allowances to connect the seven distribution systems, including future provision of all hydrants (approximately 39 to be installed);
- Operation and maintenance of the watermain;
- Construction equipment access, laydown areas;
- Site rehabilitation; and
- Decommissioning of the watermain at the end of the project's operational life, 80 years or longer.

**Gremik, Robins, Thomson, and Trask Well Sites:**

- Decommissioning and abandonment of the wells;
- Removal and disposal of equipment and chemicals;
- Demolition of the pumphouse buildings (Gremik - 4.8 m x 3.6 m, Trask - 1.8 m x 3.0 m, Thomson - 4.1 m x 4.1 m, and Robins - 2.44 m x 3.66 m) in compliance with all applicable federal and provincial regulations (includes undertaking a Provincial Bill 208 Designated Substance Survey prior to demolition).
- Construction equipment access, laydown areas; and
- Site rehabilitation.

**Fedy and Forbes Well Site:**

- Decommissioning of the wells as a supply well and conversion for use as monitoring wells;
- Removal and disposal of equipment and chemicals;
- Construction equipment access, laydown areas; and
- Site rehabilitation.

**Winburk Well Site:**

- Convert well into a backup water supply well;

- Construction of a new raw watermain to the new treatment plant building along existing road allowances;
- Site rehabilitation.

**Amabel-Sauble School Site (Refer to Figure 1.7.2):**

- Construction of well components (two wells) capable of providing a supply of at least 687 $m^3$/d (250,755 $m^3$/a);
- Construction of a pumphouse, approximately 14.8 m by 16.4 m in size, including all aspects of treatment and pumping equipment, an in-ground reservoir and a process wastewater treatment system;
- Construction of discharge watermains to connect to the transmission system;
- Operation and maintenance of the well, pumphouse, treatment processes, and the connecting watermains;
- Construction equipment access, laydown areas;
- Site rehabilitation; and
- Decommissioning of the site at the end of the project's operational life.

### 1.7.3 Scope of Assessment

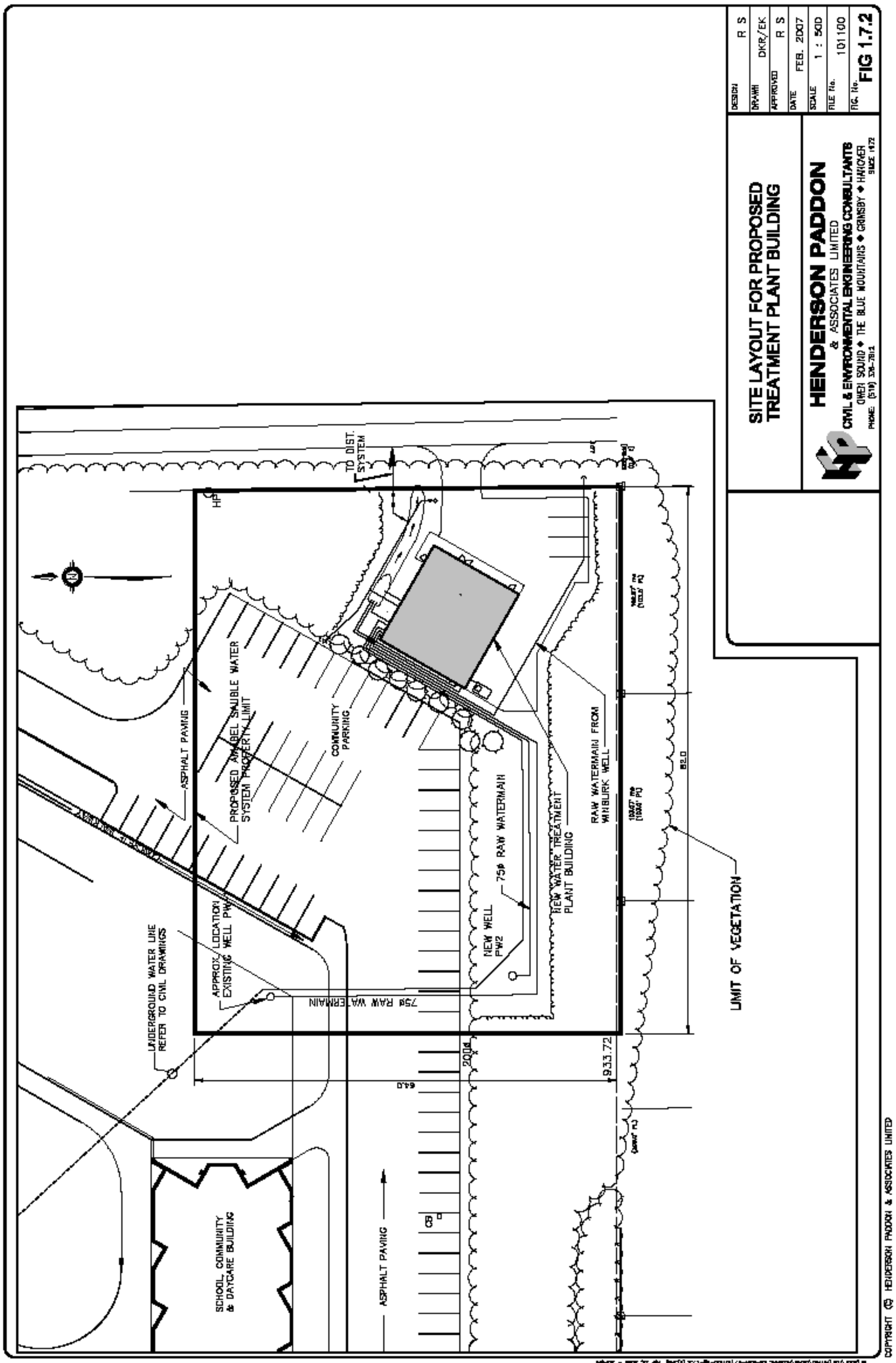
#### 1.7.3.1 Factors to be Considered

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.


SITE LAYOUT FOR PROPOSED TREATMENT PLANT BUILDING
HENDERSON PADDON & ASSOCIATES LIMITED
CIVIL & ENVIRONMENTAL ENGINEERING CONSULTANTS
FEB. 2007
1 : 500
101100
FIG 1.7.2
UNLIMIT OF VEGETATION
COMMUNITY PARKING
NEW WATER TREATMENT PLANT BUILDING
RAW WATERMAIN FROM WINBURK WELL
SCHOOL, COMMUNITY & DAYCARE BUILDING
ASPHALT PAVING
NEW WELL PW2

$ 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.

$ The capacity of renewable resources which are likely to be significantly affected by the project to meet the needs of the present and those of the future.

#### 1.7.3.2 Scope of Factors to be Considered

Table 1.1 summarizes the scope of factors considered in this environmental assessment.

**Table 1.1**
**Scope of Environmental Assessment**

| **Environmental Component** | **Scope of Factors Considered** |
|---|---|
| Physical and Natural Environment | A ground water quantity and quality, including:<br>o natural groundwater quality;<br>o potential contaminant sources in the study area;<br>o potential for contaminant migration to the wells during the operational life of the project;<br>o potential for septic seepage<br>A surface water quantity and quality;<br>A vegetation, including wildlife habitat and biodiversity;<br>A wetlands, if applicable, and their functions;<br>A species at risk;<br>A fish and fish habitat;<br>A migratory birds, particularly with respect to the potential for disturbance or destruction of migratory |

| Environmental Component | Scope of Factors Considered |
|---|---|
| | birds or their nests;<br>A wildlife;<br>A air quality - local and downwind airborne emissions (including odours and volatiles);<br>A soil quality (including any contaminated soils). |
| Socio-economic and Cultural Environments | A adjacent land uses;<br>A aesthetics;<br>A First Nations;<br>A heritage and historical cultural resources;<br>A local neighbourhood and residents;<br>A local users of groundwater (including issues related to septic seepage);<br>A noise and vibration;<br>A public health and safety (including health effects from using chlorine in the water treatment process);<br>A worker health and safety. |
| 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 and contingency plans and measures for responding to emergencies. |
| Changes to the Project Caused by the Environment | Environmental hazards that may affect the project should be described and the predicted effects of these environmental hazards (e.g., seismic activity, climate change, and icing and winter operations). |

| Environmental Component | Scope of Factors Considered |
|---|---|
| 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, including:<br>A the proposed replacement and/or installation of new water mains within the community;<br>A the proposed construction of a water transmission pipeline from Wiarton to Sauble Beach;<br>A the existing septic/sewage systems within Sauble Beach;<br>A other developments that are planned within the Sauble Beach area such as road and/or residential construction or additional groundwater takings. |
| Sustainability of the Resource | Consideration of the 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 sustainability of the ground water system). |

## 1.8 Spatial and Temporal Boundaries

### 1.8.1 Spatial Boundaries

The proposed project is located entirely within the limits of Sauble Beach. 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 seven existing well sites, the new well site at the Amabel-Sauble School, all roadways affected by the installation of the transmission watermain, 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 around beyond the right-of-ways. The corridor also includes possible effects, including accidents and malfunctions (for example, 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 will include an area beyond the Sauble Beach community boundary, 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), and operational activities (possible negative effects of draw down because of the system's groundwater withdrawal).

The spatial boundary for the project is shown in Figure 1.8.1.

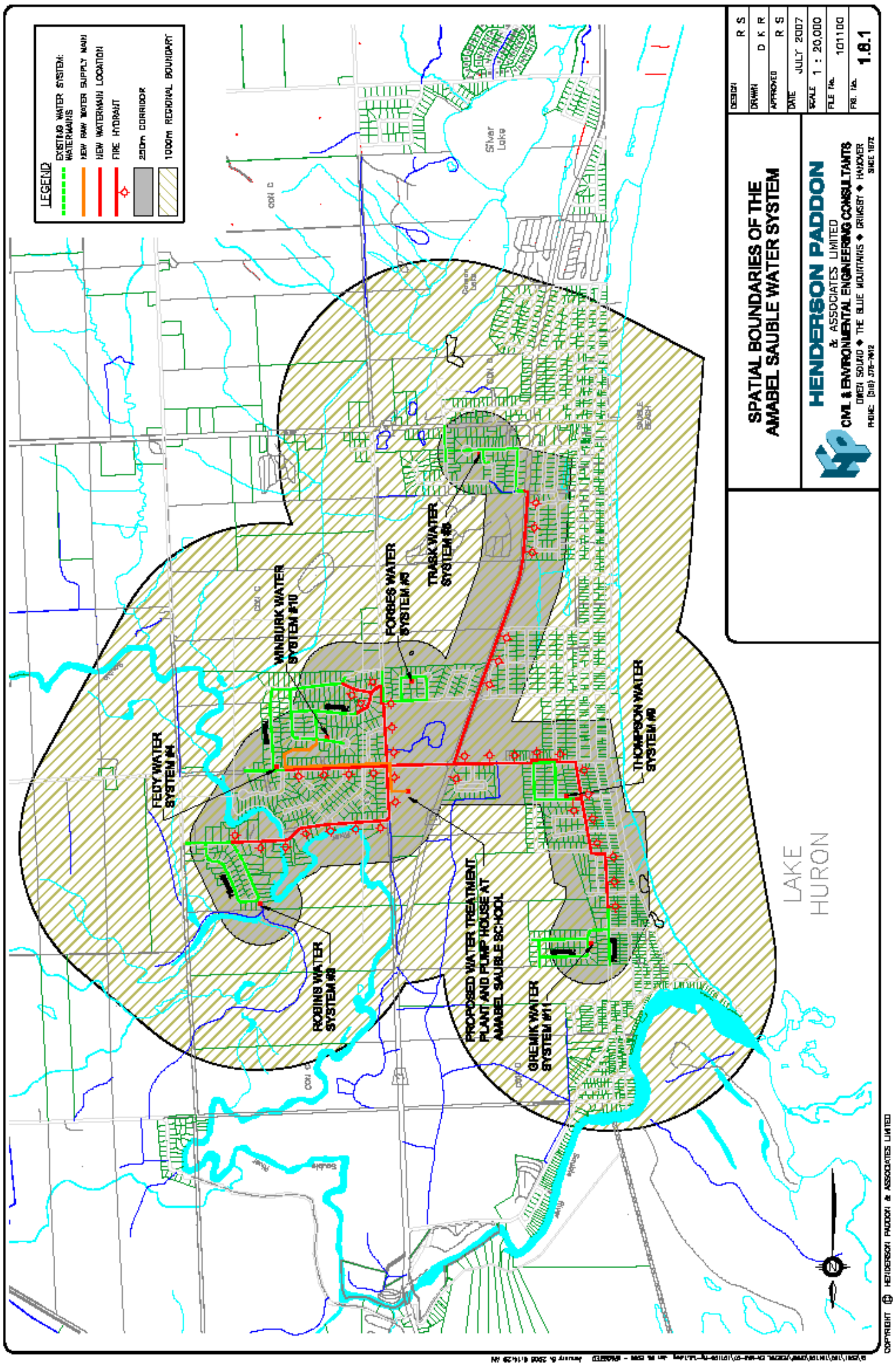
### 1.8.2 Temporal Boundaries

The following are the temporal boundaries for the EA:

$ The short term temporal boundary of the project would last approximately one year and includes the construction and commissioning phases of the project. It can include activities such as: the construction and commissioning of the wells and treatment plant; the installation of the transmission watermain; and, the decommissioning and abandonment of the existing wells and pumphouses. It 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 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, failure of the new transmission watermain, chemical spills, 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 20 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, failure of the new transmission watermain, chemical spills, etc) as it relates to operation of the water system; and, possible negative effects of draw down because of the system's groundwater withdrawal.


LEGEND
EXISTING WATER SYSTEM: WATERMAINS
NEW RAW WATER SUPPLY MAIN
NEW WATERMAIN LOCATION
FIRE HYDRANT
250m CORRIDOR
1000m REGIONAL BOUNDARY
SPATIAL BOUNDARIES OF THE
AMABEL SAUBLE WATER SYSTEM
HENDERSON PADDON
& ASSOCIATES LIMITED
CIVIL & ENVIRONMENTAL ENGINEERING CONSULTANTS
DESIGN R S
DRAWN D K R
APPROVED R S
DATE JULY 2007
SCALE 1 : 20,000
FILE No. 101100
FIG. No. 1.6.1
Silver Lake
LAKE HURON
WINBURK WATER SYSTEM #10
FORBES WATER SYSTEM #5
TRASK WATER SYSTEM #6
THOMPSON WATER SYSTEM #9
FEDY WATER SYSTEM #4
ROBINS WATER SYSTEM #8
PROPOSED WATER TREATMENT PLANT AND PUMP HOUSE AT AMABEL SAUBLE SCHOOL
GREMIK WATER SYSTEM #11
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## 1.9 Study Framework

This report summarizes the study process conducted for the comprehensive study and defines the significance of the environmental effects anticipated with project implementation.

The principal components of the document are as follows:

$ Environmental Assessment objectives, approach and study methodology.
$ Identification of alternative means of carrying out the project.
$ Description of 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 ENVIRONMENTAL ASSESSMENT OBJECTIVES, GENERAL APPROACH AND METHODOLOGY

## 2.1 Objectives and General Approach

The objectives of this Comprehensive Study Report are to provide the following:

$ Identify the need and justification for the project;

$ An identification of alternative means of undertaking the project, including design, configuration, and location of project components;

$ The proposed construction methodology and schedule;

$ A summary of public involvement and notification initiatives conducted, including liaison with regulatory agencies, and non-government organizations;

$ Characterization of the existing environmental setting of the project area including physical, biological, and cultural resources;

$ An evaluation of potential environmental effects that might occur as a result of the construction and operation of the project facilities;

$ An evaluation of the effects of the environment on the project;

$ An evaluation of the cumulative effects to environmental resources in consideration of other past, current, and future projects and activities;

$ Recommended mitigation measures to be implemented by Town of South Bruce Peninsula to undertake the project in an environmentally responsible manner;

$ Recommended environmental monitoring and surveillance programs during construction of the project to oversee the implementation of the mitigation measures; and

$ A follow-up program to evaluate the integrity and performance of any design mitigation and compensation features.

In order to accomplish these objectives, information has been collected from a number of available sources.

## 2.2 Assessment Methodology

A general methodology was carried out to evaluate the effects of the project on existing environmental resources. The methodology incorporated the following stages of evaluation:

i. Identification of existing environmental conditions

ii. Identification and evaluation of potential effects

iii. Identification and evaluation of mitigation measures

iv. Prediction of environmental effects (residual effects following mitigation)

v. Determination of the significance and likelihood of adverse environmental effects

The identification of baseline conditions and evaluation of potential impacts generally followed the study process carried out during the provincial Class EA process. A variety of activities were incorporated into this analysis, including spatial analysis, field reconnaissance, field investigations, consultation with 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:

$ Groundwater quantity and quality.
$ Surface water quantity and quality.
$ Vegetation including wildlife habitat and biodiversity
$ Species at risk
$ Wetlands
$ Fish and fish habitat
$ Migratory birds
$ Wildlife
$ Air quality

$ Noise & vibrations
$ Soil quality
$ Adjacent land uses
$ Aesthetics for the Study Area
$ Heritage and historical cultural resources
$ First Nations
$ Local neighbourhoods and residents
$ Local users of groundwater
$ Public Health & Safety
$ Worker Health & Safety

The environmental effects of the project on these VEC's are discussed and evaluated in Section 7.0 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.

### 2.2.1 Physical and Natural Environment

#### 2.2.1.1 Ground Water Quantity and Quality

The characterization of the ground water quantity and quality in the Sauble Beach area has been undertaken by reviewing the information available from previously completed hydrogeological engineering studies that include the following:

$ Aquifer Evaluation Report, Amabel Sauble School Wells PW1 and PW2, Volume I and II, Town of South Bruce Peninsula, by Henderson Paddon & Associates Limited, May 2003.

$ NRCan's Comments by way of letter dated September 28, 2006, on "Aquifer Evaluation Report, Amabel Sauble School Wells PW1 and PW2, Town of South Bruce Peninsula, by Henderson Paddon & Associates Limited, May 2003.

$ Henderson Paddon & Associates letter dated December 6, 2006 signed by Ross Slaughter, P. Eng. and Norman A. Bell, P. Geo., in response to NRCan's comments.

$ NRCan's comments by way of letter dated January 5, 2007 on Henderson Paddon's letter dated December 6, 2006 by Ross Slaughter and Norman A. Bell.

$ Hydrogeologic Assessment of Silver Lake Area, South Sauble Beach for Aquifer Yield and Potential Groundwater Supply, Town of South Bruce Peninsula, dated November 2001, prepared by Henderson Paddon & Associates Limited.

$ Aquifer Evaluation - Daciw and Graham Subdivision, Township of Amabel, Phase III, File S-1000 by Gamsby & Mannerow, 1981.

$ Aquifer Evaluation W6- Huron Woods Subdivision, Township of Amabel, File S-1000 by Gamsby & Mannerow, 1990.

$ Hydrogeological Site Assessment - Eagle Ridge Estates by Henderson Paddon & Associates Limited, 1990.

$ Quaternary Geology of Wiarton Area, Southern Ontario by Sharp & Jamieson, 1982.

$ The Ministry of the Environment Water Well Records Database.

$ Groundwater Supply Study Sauble Beach, Township of Amabel, by Conestoga Rovers & Associates, 1993.

In order to determine the quality of groundwater available in the Sauble Beach area, Water Analysis Reports from the existing water supply systems was collected and reviewed. The first Engineer's Reports, that were prepared in accordance with Regulation 459/00, which highlighted the quality of groundwater in the water systems were also reviewed and utilized.

With respect to contaminant sources in the study area, the report entitled "Grey and Bruce Counties Groundwater Study Final Report" (Waterloo Hydrogeologic Inc., May 2003) was reviewed. This report identified threats to the existing municipal water supplies and provided information pertaining to the Intrinsic Susceptibility Index (ISI) factors which provide the potential for contaminant migration to the wells. With regard to the potential for septic seepage into the bedrock wells, information pertaining to the proximity of septic beds to the water supply wells was considered.

In order to determine the potential impact on sand points utilized by the property owners along the watermain route, as a result of any dewatering operations during the construction of watermain, piezometers were installed along the watermain route and water level measurements were taken to determine the depth of the water table.

#### 2.2.1.2 Surface Water Quantity and Quality

Information relaing to to quantity and quality of surface waters in the area was obtained from the Grey Sauble Conservation Authority, the Provincial Ministry of the Environment, Environment Canada, and local knowledge.

Information pertaining to Sauble River flows and general quality of the water was obtained from Environment Canada records. Further, it is known that as the Sauble River winds through agricultural areas, as well as wetland and other swampy areas, the water has the potential to become contaminated from bacteria, fertilizer, and organic (vegetation) sources.

#### 2.2.1.3 Vegetation Including Wildlife Habitat and Biodiversity

The characterization of vegetation resources including wildlife habitat and biodiversity within the project area was based on a review of the information available from Grey Sauble Conservation Authority, Ministry of Natural Resources (MNR) and Environment Canada. The databases posted on their websites were checked to determine if there are any records of rare, endangered or unique plant species or vegetative communities within the vicinity of the project. A significant amount of information is available on MNR’s Natural Heritage Information Centre website, and was utilized for this study.

A field inspection of the plant site, watermain route and location of existing wells and pumphouses was undertaken to identify the prevalent vegetation.

#### 2.2.1.4 Wetlands

Sources of information utilized to characterize wetlands within the vicinity of the project area included MNR and the Grey Sauble Conservation Authority (GSCA).

The MNR, when contacted, indicated that the project area is in the close proximity to provincially significant wetlands. The wetlands in question are the Bannister Swamp and the Oliphant Wetland. MNR indicated that increased pumping of the wells could have a link to the wetlands and may require mitigation measures.

The GSCA provided a location map of all wetlands and swamps in the Sauble Beach area (see Figure 6.1.4).

#### 2.2.1.5 Species at Risk (SAR)

Sources of information that were used to characterize potential animal and plant species at risk within the vicinity of the proposed water system area included the Royal Ontario Museum, Environment Canada and Ministry of Natural Resources websites. These data sources served to identify potentially sensitive species and their habitats that may be impacted by the construction and operation of the Amabel Sauble water system.

Information concerning federal species at risk in the Amabel Sauble area was obtained from the Environment Canada Species-at-Risk website. This site provides a listing and mapping of species found in Schedule I to the *Species at Risk Act.* The site also provides links to the habitat requirements of the species identified in the listing.

The Ontario Ministry of Natural Resources (OMNR) utilizes status designations at the provincial level that are used in application of Ontario legislation and policies for the protection of species at risk and their habitat. The status designations are the product of complimentary review and assessment processes implemented at the national and provincial levels. The national assessment process takes place under the /Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Ontario has been an active participant on COSEWIC since its inception in 1978. The provincial review process is implemented by the OMNR's Committee on the Status of Species at Risk in Ontario which includes non-OMNR memberships. The purpose of this committee is to ensure a uniform, science based, defensible approach to provincial status and evaluations conducted for Ontario species.

The designations assigned to the species, in most cases, are in agreement with those assigned to the species by COSEWIC. However, OMNR has assigned certain species a status designation that differs from the national designation. Therefore, species whose Ontario status is of greater concern than the status elsewhere in Canada have been assigned a higher designation by OMNR.

### 2.2.1.6 Fish and Fish Habitat

The following information sources were reviewed to evaluate the aquatic habitat characteristics and potential fisheries resources on the Bruce Peninsula and more specifically, in the study area.

$ Ministry of Natural Resources by way of their website.

$ Grey Sauble Conservation Authority by way of their website,

$ Royal Ontario Museum website.

$ Local knowledge and interviews with staff fisheries biologist.

### 2.2.1.7 Migratory Birds

Information used to characterize migratory birds on the Bruce Peninsula was collected from the website of the Royal Ontario Museum which provides information pertaining to common birds in Bruce County as welll as migratory birds that fly over the Bruce Peninsula. Other information sources included the websites of the Ministry of Natural Resources and National Heritage Information Centre.

An expert consultant (avian biologist) was retained to investigate and report on migratory birds. The sub-consultant performed a field inspection to identify migratory birds by visual and oratory means while surveying the project site. Information recorded during this assessment included the general habitat, footprint and the habitat immediately adjacent to the sites, as well as temperature, wind speed, present cloud cover, and precipitation. The sub-consultant, in its report, also utilized the following references to provide their assessment:

$ Cadman, M.D., Eagles, P.F.J., and F. M. Helleiner. 1987. Atlas of the Breeding Birds of Ontario. University of Water Press, Waterloo, ON.

- http://www.birdsontario.org/atlas/atlasmain.html. Atlas of the Breeding Birds of Ontario, 2001-2005.

- Migratory Bird Convention Act. 1994. Department of Justice. http://laws.justice.gc.ca/en/M-7.01/.

#### 2.2.1.8 Wildlife

The sources of information used to characterize the potential wildlife and terrestrial habitats within the study area included the Environment Canada, the Ministry of Natural Resources, and the Grey Sauble Conservation Authority databases that are available on their respective websites. These data sources serve to identify potentially sensitive species and their habitats that could be impacted by the proposed project.

The study method included a review of background information on terrestrial wildlife, ANSI's and species at risk known to exist in the vicinity of the regional boundary.

#### 2.2.1.9 Air Quality

Air quality information for the study area was obtained from Ontario Ministry of Environment (MOE) website. The 2003, 2004 and 2005 reports entitled "Air Quality in Ontario", by Ministry of Environment were reviewed to obtain information pertaining to the Air Quality Index. The MOE maintains 38 Air Quality Monitoring Stations across the province. Although there are no air quality stations on the Bruce Peninsula, air quality information was obtained from the Tiverton station which is located approximately 50 km southwest of the project site. The Air Quality Index at this site, which is an indicator of overall air quality, was used to assess the existing air quality.

#### 2.2.1.10 Soil Quality

The sources of information used to characterize the soil quality in the study area included the following:

$ The Ministry of the Environment well records.
$ Paleozoic Geology of Southern Bruce Peninsula, Southern Ontario; Ontario Geological Survey, by D. Armstrong, 1993, Open File Report 5875, 19 p.
$ The Physiography of Southern Ontario (Third Edition), Ontario Geological Survey, by L. J. Chapman and D. F. Putnam, 1984, Special Volume No. 2.

$ Groundwater Supply Study - Sauble Beach, Township of Amabel, by Conestoga-Rovers & Associates (CRA), 1993, Reference 3853.
$ Soils of Bruce County, North Sheet Ontario, Soil Survey Report #16, by Hoffman & Richards, 1954, Scale 1:63, 360 p.
$ Quaternary Geology of the Wiarton Area, Southern Ontario, by Sharpe & Jamieson, 1982, P. 2559.

### 2.2.2 Socio-Economic and Cultural Environments

#### 2.2.2.1 Adjacent Land Uses

For the determination of adjacent land uses, the information was obtained from the Town of South Bruce Peninsula and the County of Bruce. A field visit at the site was also conducted as part of this assessment. The observations were used to identify existing land uses and the public safety issues that could be impacted by the project.

#### 2.2.2.2 Aesthetics of Study Area

The aesthetics of the study area was reviewed by way of field visit to identify the existing structures and buildings in the study area. The Bluewater District School Board officials were also contacted regarding their opinion on the architecture of the proposed building. The information was collected and utilized to ensure that the structure proposed under this project would not adversely affect the property values or create a visual site nuisance.

#### 2.2.2.3 First Nations

Consultation with the Town of South Bruce Peninsula officials was undertaken to determine if there were any issues that might have an impact on the local First Nations communities. Two First Nations communities are located in the general area of Saubel Beach.

The first community, Saugeen First Nations, is located along the southern boundary of Sauble Beach and the Lake Huron shoreline. The Saugeen First Nation is located outside the regional boundary of the project and were contacted during the provincial class evironmental assessment process. Information pertaining to this community was also obtained from their website.

The second community, Cape Croker First Nations, is located at a significant distance northeast of the study area and was not consulted as part of this environmental assessment.

#### 2.2.2.4 Heritage and Historical Cultural Resources

Information relating to Heritage and Historical Cultural Resources was obtained from:

$ the provincial Ministry of Culture (Heritage & Libraries Branch), Southwest Archaeological Field Office in London, Ontario. A letter was received from the Minister’s office outlining their initial concerns and interest in the project. Subsequently, another letter was received confirming that proposed development will not result in any disturbances to cultural heritage resources.

$ the Bruce County Museum and Cultural Centre, Bruce County

#### 2.2.2.5 Local Neighbourhood and Residents

The information pertaining to the local neighbourhood and the residents was obtained from:

$ Consultation with Town of South Bruce Peninsula;
$ Information posted on the County of Bruce website; and
$ Completion of a field reconnaissance survey.

#### 2.2.2.6 Local Users of Groundwater

Information pertaining to the local users of groundwater was compiled and reviewed by obtaining provincial MOE well records in the study area. The well records and user information for wells constructed prior to 1984 is not available. Municipal officials were also contacted to obtain information pertaining to the sand points that are widely used in the study area. The Municipality does not have any records concerning the location of sand points, other than the known fact that the majority of the residences and cottages, who are not on municipal water supply, utilize sand points for their water supplies.

Information that had been obtained from earlier consultations with local Health Unit officials regarding the potential contamination from the septic seepage was also utilized.

#### 2.2.2.7 Noise and Vibration

No background information pertaining to noise and vibration is available. For this report, consideration was given to municipal bylaws that provide guidelines and restrictions on noise-related activity in residential areas.

#### 2.2.2.8 Public Health and Safety

The public health and safety information was obtained by way of written consultation with local Health Unit officials.

The issue of the effects to health from using chlorine in the water treatment process was investigated by way of a literature survey and utilizing textbooks on the subject.

The impact of an increase in sodium levels, resulting from the use of ion-exchange media softeners to reduce hardness in raw water, was also considered.

Information pertaining to the proximity of the school to the proposed treatment plant building, the duration and timing of construction activities, and the availability of alternative access to the plant building site was also collected and utilized.

#### 2.2.2.9 Worker Health and Safety

Information relating to worker health and safety was obtained from the Ontario Ministry of Labour website and the Ministry's Occupation Health & Safety Act and Regulations for Construction Projects that governs all matters relating to Worker's Health and Safety.

## 2.3 Evaluation Criteria and Determination of Significance of Adverse Environmental Effects

As a basis for determining "significance" of potential adverse environmental effects associated with the proposed development of Amabel Sauble Water System Project, impact parameters and evaluation criteria are presented here and are applied to potential environmental effects, both before and after mitigation.
Residual impacts are defined as environmental changes that result from the project after mitigation measures have been incorporated. As much as possible, the "significance" of residual impacts is qualified with an assessment of the level of impact

according to the parameters and evaluation criteria described below. It is intended that application of these criteria will enable a systematic and objective determination of "significance", which is both defensible and transparent, and which reduces or eliminates biases in deciding the importance of adverse impacts to environmental resources following mitigation.

The following impact parameters are used as a basis for determining significance of residual impacts:

- *Magnitude* describes the amount of change in a measurable parameter or variable relative to the baseline condition;
- *Duration* refers to the length of time over which an environmental impact occurs;
- *Frequency* describes how often the effect occurs within a given time period;
- *Geographical extent* is the spatial area that is affected by the project. In general, the geographic extent of an impact is defined as being local, municipal, or regional; and
- *Reversibility* is an indicator of the potential for recovery of the ecological endpoint from the impact (for example, if a vegetation or wildlife species is threatened and could be impacted as a result of the project, significance of impact would be considered higher for a listed species than for a non-listed species).

Table 2.3.1 provides evaluation criteria for each of the above impact parameters, and which are applied to the environmental effects assessment before mitigation, and as a basis for determining significance or residual environmental effects after mitigation in this Comprehensive Study Report.

**Table 2.3.1**
**Parameters and Evaluation Criteria Used to Determine Significance**

| Impact Parameter | Descriptors | Evaluation Criteria |
|---|---|---|
| Magnitude | Negligible<br><br>Low<br><br>Moderate<br><br>High | $ < than 2% change over baseline<br>$ 2 to 5% change over baseline<br>$ 5 to 10% change over baseline<br>$ > 10% change over baseline |

| Impact Parameter | Descriptors | Evaluation Criteria |
|---|---|---|
| Duration | Short Term<br>Medium Term<br>Long Term | $ 1 to 45 days<br>$ 45 to 90 days<br>$ > than 90 days |
| Frequency | Low<br>Moderate<br>High | $ 0 to 5 times or events per year<br>$ 5 to 10 times or events per year<br>$ > than 10 times or events per year |
| Geographical Extent | Localized<br>Municipal<br>Regional | $ within a 2 km radius of well and treatment plant site, and transmission line corridors<br>$ within 2 to 5 km radius of well and treatment plant site, and transmission line corridors<br>$ greater than 5 km radius of well and treatment plant site, and transmission line corridors |
| Reversibility | Yes<br>No | $ returns to baseline immediately following construction of well and treatment plant and/or water transmission pipelines<br>$ does not return to baseline following construction of well and treatment plant and/or water transmission pipelines |

A rating scheme has been developed to provide a measurement that consolidates these parameters. The purpose of assigning a numeric rating which integrates these parameters is to provide a systematic basis for making a determination whether a residual impact after mitigation is “significant” or not. Table 2.3.2 outlines the scoring system used to determine whether a residual impact is significant or not based on the above parameters and evaluation criteria. The scoring system uses a numerical score for each of the parameters considered in evaluating an impact. The total is then used as a guide for determining “significance” of residual impacts, as follows:

$ Negligible: 0 to 5
$ Low: 6 to 10
$ Moderate: 11 to 15
$ High: greater than 15

**Table 2.3.2**
**Evaluation Criteria for Determining Significance**

| Magnitude (Severity) | Geographic Extent | Duration | Frequency | Reversibility |
|---|---|---|---|---|
| negligible<br>0 | local<br>0 | short-term<br>0 | low<br>0 | Yes<br>-3 |
| low<br>+5 | municipal<br>+1 | medium-term<br>+1 | moderate<br>+1 | no<br>+3 |
| moderate<br>+10 | regional<br>+2 | long-term<br>+2 | high<br>+2 | |
| High<br>+15 | | | | |

For the purposes of this assessment, a residual impact with an aggregate total rating of 15 or higher would be considered “significant”. For example, if a residual impact was considered to have a moderate magnitude (i.e., 5 to 10% change over baseline conditions), with a regional geographic extent (i.e. affecting an area greater than a 5 km radius of the project site), having a long-term duration (i.e. greater than 90 days), and a high frequency of occurrence (i.e. greater than 10 times per year), then it would be assigned a score of 16, and therefore, considered “significant”.

Impact magnitude is weighted more heavily than the other parameters, with a maximum value of 15 provided for a high magnitude impact, compared with maximum values of 2 for geographic extent, 2 for duration, 2 for frequency, and 3 for reversibility.

Note that not all of the above-referenced evaluation criteria will necessarily be applicable to residual impacts for each environmental component. However, it is anticipated that in most instances magnitude, duration and geographical extent will be relevant. In addition, it should be noted that the above-referenced evaluation criteria used to derive significance of adverse residual impacts are specific to this project.

These evaluation criteria are applied to the potential environmental effects before mitigation in Section 7.3 of this report. The results are summarized in a matrix format to determine significance of the residual effects of the project.

# 3 EVALUATION OF ALTERNATIVES

## 3.1 Alternative Means of Carrying Out the Project

During the course of the provincial Class EA investigation, the merits of several alternatives to the project were reviewed to determine their effectiveness at addressing the identified water supply deficiencies. Each alternative was assessed with respect to relevant environmental, economic and technical considerations. Following a preliminary evaluation of the identified water supply alternatives, it was concluded that the construction of a centrally located new water treatment plant at Amabel-Sauble School utilizing groundwater supply wells and the construction of distribution watermains to connect the new treatment plant building to the existing seven water distribution systems was the most practical solution for upgrading the water supply. Additional evaluations, which are provided in this section, were conducted to assess alternative means of carrying out the three main components of the project: the raw water supply; the location of treatment plant building; and, the transmission watermain.

### 3.1.1 Raw Water Supply

Groundwater well supplies for Amabel-Sauble water system require an evaluation of the location of the new well and the number of wells that are needed to obtain the required raw water quantity.

#### 3.1.1.1 Location of the New Well

Factors that were considered regarding the site location for the new well included the following:

$ Distance to the treatment plant building
$ Accessibility in winter
$ Security against vandalism
$ Hydrogeology of the area
$ Availability of land

Based on these factors, no alternative means for the well location were available.

A well located at a considerable distance from the plant building would require long raw water supply pipes, which would significantly increase construction costs, and result in a longer retention time in the pipeline, which could cause a deterioration of the raw water quality.

Accessibility to the well site is a factor in the Sauble Beach area, especially during the winter months, as many of the smaller streets/roads cannot be plowed within a reasonable time frame after snow squall events. The school location, being on the Sauble Falls Parkway, a county road, is well maintained and is therefore easily accessible year round.

The school location provides better security against vandalism as the site is used by the School Board throughout the year. During the summer months when the school is closed, Board staff still maintain the site because of a daycare that utilizes the school building.

The hydrogeology of the area also was a major factor in selecting this location. The Hydrogeology Report by CRA (referenced in Section 2.2.1.1) had indicated that the construction of a large groundwater supply well in the area would require extensive investigation and exploration. The existing well at the school, which had already been subjected to a 24-hour pump `test, provided greater certainty of obtaining raw water supply in sufficient quantities.

In addition, no suitable municipal land around the school location was available. The purchase of private property could result in expropriation, which was considered to be an expensive and time consuming undertaking. The School Board was willing to sell a portion of the school site to the Town in order to allow the project to proceed.

In view of the above, Amabel-Sauble School was considered the most appropriate economically and provided the best chance of obtaining groundwater in sufficient quantities.

#### 3.1.1.2 Number of New Wells

Alternative means for the number of wells are:

$ Construction of one new well and upgrade the existing Amabel-Sauble School well

$ Construction of two new wells at the school site and decommission the existing Amabel-Sauble School well.

Both of these options would utilize the Winburk well as a backup water supply.

#### 3.1.2 Location of Treatment Building and Associated Site Works

No alternative means were feasible once accessibility during the winter and availability of land close to new wells PW1 and PW2 were considered. The School Board was willing to sell a portion of the school site to the Town in order to allow the project to proceed.

#### 3.1.3 Transmission Watermain Route

No alternative means (locations of the existing water systems already fixed providing no alternative routes).

#### 3.1.4 Method of Constructing Transmission Watermain

$ Directional drilling.
$ Open cut excavation.
$ Combination of directional drilling and open cut excavation.

### 3.2 <u>Analysis of Alternative Means</u>

#### 3.2.1 The Number of Wells

The number of wells needed requires the following considerations:

$ An adequate quantity of water in the well(s)
$ A minimum of two wells to ensure reliability of water supply.
$ Availability of a backup water supply in consideration of environmental changes.

The use of existing school well provided greater certainty of finding an adequate water supply since it had already been pump tested for 24 hours. As a result, the school site provided the natural choice for a new well exploration program. The Winburk well, the largest of the existing supply wells and the closest well to the school location, was chosen to be the backup water supply well.

Based on these factors, the following alternative means were analyzed:

Option 1: Construction of one new well and upgrade the existing school well.

Option 2: Construction of two new wells and decommission the existing school well.

The new well, PW2, was constructed, tested and evaluated to confirm supply of required quantity of water for water works in conjunction with the well PW1. After the confirmation of available raw water supply from two wells, PW1 and PW2, it was needless to explore another new well and decommission existing well PW1.

### 3.2.2 Method of Constructing Transmission Watermain

In order to prevent adverse impacts from dewatering during construction, alternative means of watermain construction were analyzed. Water table information was collected which confirmed there was a high water table along certain sections of the route, which means that extensive dewatering could be required if the open-cut excavation method was employed. Directional drilling option was considered as an option to this problem. This method would eliminate dewatering costs and more importantly, eliminate the impacts to sand point wells.

## 3.3 Environmental Effect Analysis

The potential interactions between the identified alternative means for the number of wells and method of construction with VEC's identified in Section 2.2 of this report were evaluated. The purpose of this evaluation was to determine, in relative terms, the anticipated environmental effects of each identified option on the various environmental components prior to mitigation by using the impact criteria described in Section 2.3.

Tables 3.2.3.1 and 3.2.3.2 summarize the outcome of the preliminary environmental effects analysis that was completed for the number of wells, and the method of construction for the transmission watermains.

Given the findings of the technical review and the Environmental Effects Analysis, the recommended options were:

- construction of one new well (PW2) and upgrade the existing school well (PW1); and,
- construction of transmission watermains by utilizing a combination of an open cut excavation method where the water table is low and a directional drilling method where the water table is high.

There are several factors which justified this selection, the most significant of which is:

- Minimal long term impacts to ground water, surface water, vegetation, air quality, noise and vibrations levels, migratory birds, wetlands, local users of groundwater, and public health and safety.

The installation and operation of the two water supply wells and the transmission watermains is not anticipated to have significant adverse environmental effects on the selected VEC's. Refer to Section 7 for a specific analysis of environmental effects.

## Table 3.2.3.1

## Alternative Means: Number of Wells

| Valued Economic Component (VEC) | Option 1<br>One New Well and One Existing Well | Option 2<br>Two New Wells and Abandon Existing Well | Considerations |
|---|---|---|---|
| Groundwater Quality and Quantity | Low | Low | Both options will likely have a similar impact on groundwater resources due to withdrawal from the same aquifer. |
| Surface Water Quantity and Quality, Wetland, Fish and Fish Habitat | Nil | Nil | No impacts expected as there are no direct connections with surface water sources |
| Vegetation and Wildlife | Nil | Nil/Minimal | Well development in option 1 requires no vegetation removal. Minimal impact in Option 2 depending on exact location of wells on school site |
| Species at Risk | Nil | Nil | No SAR at the project site |
| Migratory Birds | Minimal/Nil | Minimal/Nil | No or minimal impact after the development of wells |
| Air Quality, Soil Quality | Nil/Minimal | Nil/Minimal | Neither option is expected to impact upon air and soil quality in the area. |
| Local uses of Groundwater | Nil | Nil/Minimal | Neither option is expected to significantly impact upon groundwater resources. |
| Heritage and Historical Cultural Resources | Nil/Minimal | Nil/Minimal | No impacts are expected from well development |
| Noise and Vibration | Nil/Minimal | Nil/Minimal | Both options will generate a small amount of noise and vibration during construction only. |
| Public Health and Safety | Minimal | Minimal | Both options have minor exposure to this VEC during construction. |

Note: Mitigation measures will be as indicated in Section 10.

**Table 3.2.3.2**

**Alternative Means: Different Methods of Connecting the Seven Systems**

| Valued Economic Component (VEC) | Open Cut Excavation Method | | Directional Drilling (DD) Methods | |
|---|---|---|---|---|
| | Level of Effect | Considerations | Level of Effect | Considerations |
| Groundwater Quality and Quantity | Low | Some sections of watermain may require dewatering operations | Minimal/Low | DD does not generally require dewatering operations |
| Surface Water Quality and Quantity | Low to Minimal | Sections requiring dewatering may discharge to surface water | Minimal/Low | DD does not generally require dewatering operations |
| Vegetation and Wildlife | Low to Minimal | Some sections of watermain may require vegetation removal. Wildlife will not be significantly impacted as clearance will be limited to road allowance | Minimal/Low | DD would require minimal to negligible vegetation removal |
| Species at Risk | Low to minimal | Monarch butterfly may be found along installation route | Low to minimal | Monarch butterfly may be found along installation route |
| Migratory Birds | Low to Minimal | Clearing and grubbing prior to nesting periods will minimize impact | Nil to Minimal | Clearing and grubbing prior to nesting periods will minimize impact |
| Air Quality | Low | Increase in air emissions and dust levels during construction. None after construction | Nil to Minimal | Increase in air emissions from drilling equipment. No impact after construction |
| Soil Quality | Low | Some localized segregation of soil strata | Nil to Minimal | Minor, localized impact on soil strata |
| Local User of Groundwater | Low to Medium | Dewatering in high water table area section may affect the sand points | Nil to Minimal | None to Minimal Dewatering |
| Heritage and Historical Cultural Resources | Minimal to Nil | No significant impact after mitigation measures | Minimal/Nil | No significant impact after mitigation measures |

| Valued Economic Component (VEC) | Open Cut Excavation Method | | Directional Drilling (DD) Methods | |
|---|---|---|---|---|
| | Level of Effect | Considerations | Level of Effect | Considerations |
| Noise and Vibration | Low | Increase in noise and vibration due to construction equipment. None after construction | Low | Increase in noise and vibration due to construction equipment. None after construction |
| Public Health and Safety | Minimal | Minor exposure to public safety issue. None after construction | Minimal | Minor exposure to public safety issue. None after construction |
| Note: Mitigation measures will be as indicated in Section 10. | | | | |

# 4 PROJECT COMPONENTS AND ACTIVITIES

## 4.1 Existing Water Supply Facilities

### 4.1.1 Identified Water System Deficiencies

The Municipality of South Bruce Peninsula owns and operates seven small communal groundwater systems in the Sauble Beach area (Fedy, Forbes, Gremik, Robins, Thomson, Trask, and Winbruk). These systems do not meet the requirements of the Ontario Drinking Water Protection Regulation (DWPR). The mandatory Engineer's Reports that were prepared for the water systems in 2000/2001 identified the following concerns:

1. The raw water supply from the wells at times is poor from a turbidity standpoint, as well as bacteriologically. Raw water bacteriological data compiled for the Engineer's Report for years 1998, 1999 and 2000 indicated evidence of total coliform and high background counts in the water supply wells. A review of the raw water bacteriological data for 2001 and 2002 confirmed the continuation of these water quality problems.

2. The raw water turbidity exceeds the 1 NTU criteria in some of the water supply wells and continues to be a concern since the preparation of the Engineer's Report.

3. Iron concentration in the Fedy, Robins, and Winburk well supplies is high (greater than 0.30 mg/L). Iron sequestering, which was utilized at some of the water works, has not always proved to be effective as evidenced by treated water turbidity results being greater than 1.0 NTU at times, which is unacceptable.

4. Based on the "Terms of Reference for Groundwater Supplies Possibly Under the Influence of Surface Water Contamination", all seven water supply wells were characterized as potential GUDI wells. As a result, any project proposal to maintain these sites as municipal wells would require significant capital upgrades comprising of chemically assisted filtration or equivalent treatment.

The Ministry of the Environment, by way of Consolidated Certificates of Approval, required the following works:

**All sites**

1. Preparation of a hydrogeological study as per the MOE Terms of Reference entitled, "Hydrogeological Study to Examine Ground Water Sources Potentially Under the Direct Influence of Surface Water" to establish whether or not the groundwater source is under the direct influence of surface water. As a result, additional detailed hydrogeological investigations and the preparation of a Well Head Protection Plan is required for each well. As an alternative to submitting this report, the Owner may choose to submit a proposal to provide full treatment consisting of chemically-assisted filtration and continuous disinfection or an equivalent treatment process.

2. All works and measures necessary to meet the requirements of the "Procedure for Disinfection of Drinking Water in Ontario".

**Fedy Water Works**

All works and measures necessary to ensure the effective treatment and integrity of the works, including but not limited to:

- i fencing the pumphouse property,
- ii proper blowoffs on the water distribution system to prevent build up of sludges,
- iii cleaning the pumphouse,
- iv provision of standby power.

**Forbes Water Works**

All works and measures necessary to ensure the effective treatment and integrity of the works, including but not limited to:

- i proper blowoffs on the water distribution system
- ii standby power,
- iii a standby hypochlorite solution tank,
- iv secondary containment for all chemical tanks.

**Gremik Water Works**

All works and measures necessary to ensure the effective treatment and integrity of the works, including but not limited to:

- i upgrade chlorine contact tank to ensure 15 minute contact time before the first customer,
- ii disconnect any private wells that may be connected to the water system,
- iii connect standby chlorinator into the system,
- iv provide standby chlorine solution tank at chlorination point,
- v provide standby power, and
- vi undertake an evaluation of treatment options necessary to reduce turbidity levels to less than 1 NTU and implement the recommended works to comply with the treatment requirements in accordance with the Regulation.

**Robins Water Works**

All works and measures necessary to ensure the effective treatment and integrity of the works, including but not limited to:

- i secondary containment for chemical storage tanks,
- ii standby power,
- iii standby chemical pump for sequestering system,
- iv standby chemical solution tanks,
- v perimeter fencing

**Trask Water Works**

All works and measures necessary to ensure the effective treatment and integrity of the works, including but not limited to:

- i secondary containment for chemical storage tanks,
- ii standby power,
- iii provision of a means to reduce turbidity
- iv perimeter fencing,
- vi provision of a means to reduce fluoride concentration to acceptable ODWS limits.

**Thomson Water Works**

All works and measures necessary to ensure the effective treatment and integrity of the works, including but not limited to:

- i reinstallation of softeners or other means to control barium,

ii proper blowoffs on the water distribution system,
iii standby power,
iv a standby hypochlorite solution tank,
v secondary containment for all chemical tanks.

**Winburk Water Works**

All works and measures necessary to ensure the effective treatment and integrity of the works, including but not limited to:

i Rehabilitate the well, including extending the casing 6m into bedrock, injection of bentonite grout in the annular space between the casing and the bedrock, and improving the upper terminal well construction by converting to a standard pitless unit that extends at least 0.45m above grade;
ii Provide treatment to ensure the treated water turbidity consistently meets the Ontario Drinking Water Standards;
iii Provide spill containment around all chemical tanks;
iv Install standby power to operate the system at average flow;
v In the interim, within six (6) months of issuance of this certificate of approval, repair the peak flow meter in the existing pumphouse.

Equivalent full treatment, as referenced above, for the water works will require combinations of iron removal treatment with cartridge filtration, UV disinfection and chlorination for the Fedy, Forbes, Robins, and Winburk water systems, and chemically assisted filtration combined with UV disinfection and chlorination for the Gremik, Trask, and Thomson systems. UV disinfection is required to inactivate Giardia, and Cryptosporidium.

It should also be noted that at some pumphouse locations, the lot sizes are too small to accommodate the expansion required for the new treatment works.

## 4.2 Production Capacity and Demand

### 4.2.1 Current Water Demand

Current water demands for the seven water systems, based on water consumption flow records, are low. This is due to the seasonal occupancy of the households on the water system. The annual average daily flow, in 2000-01, for the six water systems in operation (Forbes, Gremik, Robins, Thomson, Trask, and Winburk) was approximately 120 L/capita/day, with the average day water demand during summer months rising to approximately 235 L/capita/day. Table 4.2.1 provides a summary of the water demands from 2001 to 2005. It may be noted that the water demands have substantially increased in the recent years. However, this is not a reflection of the actual water consumption, but a reflection of the amount of water that is used for flushing the water distribution piping in order to maintain the chlorine residuals as mandated by provincial regulations.

### 4.2.2 Population Projections

In order to determine the treatment capacity of the new Amabel Sauble water system, a population projection method was not employed.

Since this water system is being constructed only to serve the needs of the seven individual subdivisions affected by this project, the size of the water system was based on a fixed population for the lifetime of the project. The population of these subdivisions can be determined based on the number of lots that can be connected to the system. This includes current households that are already connected and lots within the subdivisions that have been approved but are not yet constructed. Based on this, a total of 292 connections (222 current, 70 approved) can be made to the new water system. See Table 4.2.2 for a summary of the water connections for the seven Sauble Beach area water works.

Based on an occupancy rate of 2.5 persons per household, the seven subdivisions would have an estimated population of 730 people.

## TABLE 4.2.1

## Water Demands
## Sauble Beach Area Water Systems (2001 – 2005)

| | 2001 | | 2002 | | 2003 | | 2004 | | 2005 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Annual ($m^3$)** | **Avg. Day ($m^3$/day)** | **Annual ($m^3$)** | **Avg. Day ($m^3$/day)** | **Annual ($m^3$)** | **Avg. Day ($m^3$/day)** | **Annual ($m^3$)** | **Avg. Day ($m^3$/day)** | **Annual ($m^3$)** | **Avg. Day ($m^3$/day)** |
| Robins | 6,866.00 | 18.8 | 7,162.00 | 19.6 | 7,294.00 | 20 | 10,058.00 | 27.5 | 10,582.00 | 29 |
| Fedy | - | - | - | - | - | - | - | - | - | - |
| Forbes | 5,468.00 | 15 | 5,392.00 | 14.8 | 5,302.00 | 14.5 | 4,606.00 | 12.6 | 5,230.00 | 14.3 |
| Trask | 6,067.00 | 16.6 | 6,546.00 | 17.9 | 6,059.00 | 16.6 | 6,172.00 | 16.9 | 6,871.00 | 18.8 |
| Thomson | 2,448.00 | 6.7 | 2,467.00 | 6.8 | 2,980.00 | 8.2 | 3,769.00 | 10.3 | 6,210.00 | 17 |
| Winburk | 10,385.00 | 28.5 | 8,921.00 | 24.4 | 8,997.00 | 24.6 | 11,526.00 | 31.5 | 15,613.00 | 42.8 |
| Gremik | 7,626.00 | 20.9 | 7,613.00 | 20.9 | 8,103.00 | 22.2 | 9,447.00 | 25.8 | 11,678.00 | 32 |
| **Total** | **31,994.00** | **87.7** | **30,939.00** | **84.8** | **31,441.00** | **86.1** | **35,520.00** | **97.1** | **45,602.00** | **124.9** |

**TABLE 4.2.2**

**Existing and Approved Water Connections**
**Sauble Beach Area Water Systems**

| Name of Water Works | Approved Connections | Existing Connections | Approved Vacant Lots |
|---|---|---|---|
| Robins | 40 | 31 | 9 |
| Fedy | 21 | 10* | 11 |
| Forbes | 34 | 25 | 9 |
| Trask | 31 | 31 | 0 |
| Thomson | 30 | 22 | 8 |
| Winburk | 77 | 58 | 19 |
| Gremik | 59 | 45 | 14 |
| Total | 292 | 222 | 70 |

* Currently being serviced from Winburk

### 4.2.3 Water Demand Projections

The water demand projections were based on the following two criteria:

$ Consideration was given to an increase in water demand due to the ongoing change in the trend of occupancy for the cottages. Many of the cottages are being converted for use on a year-round basis, thereby suggesting increased water consumption.

$ Water demands in the Grey and Bruce County area were compared with the suggested provincial water demand guidelines which recommend a water consumption of 450 L/capita/day for detached homes.

Based on these criteria, a water demand of up to 380 L/capita/day was considered appropriate.

As a result, when including a maximum day factor of 2.7 (based on the population of the subdivisions), a water treatment plant capacity of 743 $m^3$/day (2.7 x 0.38 $m^3$/day x 292 lots x 2.5 persons/lot) was considered appropriate to meet the water demands of the seven water systems including future demand projections. Note that treatment plants are designed, as a minimum, to supply maximum day demand.

Water demands for firefighting were also considered. Based on Provincial MOE guidelines, a fire flow of 38 L/s for a two hour duration was considered in the design.

### 4.2.4 Water Storage Demand Projections

Water storage demand projections were made for the water treatment facility with and without fire protection. Water storage for a system consists of two components: plant storage and the system storage. Plant storage is comprised of the water used for backwashing the filters, chlorine contact time, and other miscellaneous use in the plant. System storage has three components: fire, emergency and equalization storage.

All storage for the new water system will be provided by the clearwell that will be constructed underneath the treatment plant. As noted earlier, the proponent has decided to provide fire protection. Therefore, total clearwater storage required for the system is 671 $m^3$ which was determined as follows:

$ Fire storage - 272 $m^3$

$ Equalization storage - 237 $m^3$

$ Emergency storage - 127 $m^3$

$ Plant storage for backwashing of filter and chlorine contact storage – 35 $m^3$

## 4.3 Preliminary Engineering Concept

The Preliminary Engineering Concepts were prepared by preparing piping and instrumentation diagrams and schematic flow diagrams to finalize the treatment equipment required and as to how the whole treatment process would function. Preliminary layouts for the treatment plant building were created and refined to finalize the size of the treatment plant building required, the depth of underground storage tanks, etc. Equipment suppliers for the treatment equipment such as greensand filters, pumps, diesel generator set, and electrical panel manufacturers, were contacted to obtain information pertaining to the preliminary sizing of the equipment and space requirements. Several layouts were initially prepared and refined to create a layout that would meet all of the treatment requirements and will provide a facility where the Operators will be able to perform their duties efficiently and safely.

## 4.4 Proposed Works to be Undertaken

### 4.4.1 Wells PW1, PW2, and Winburk

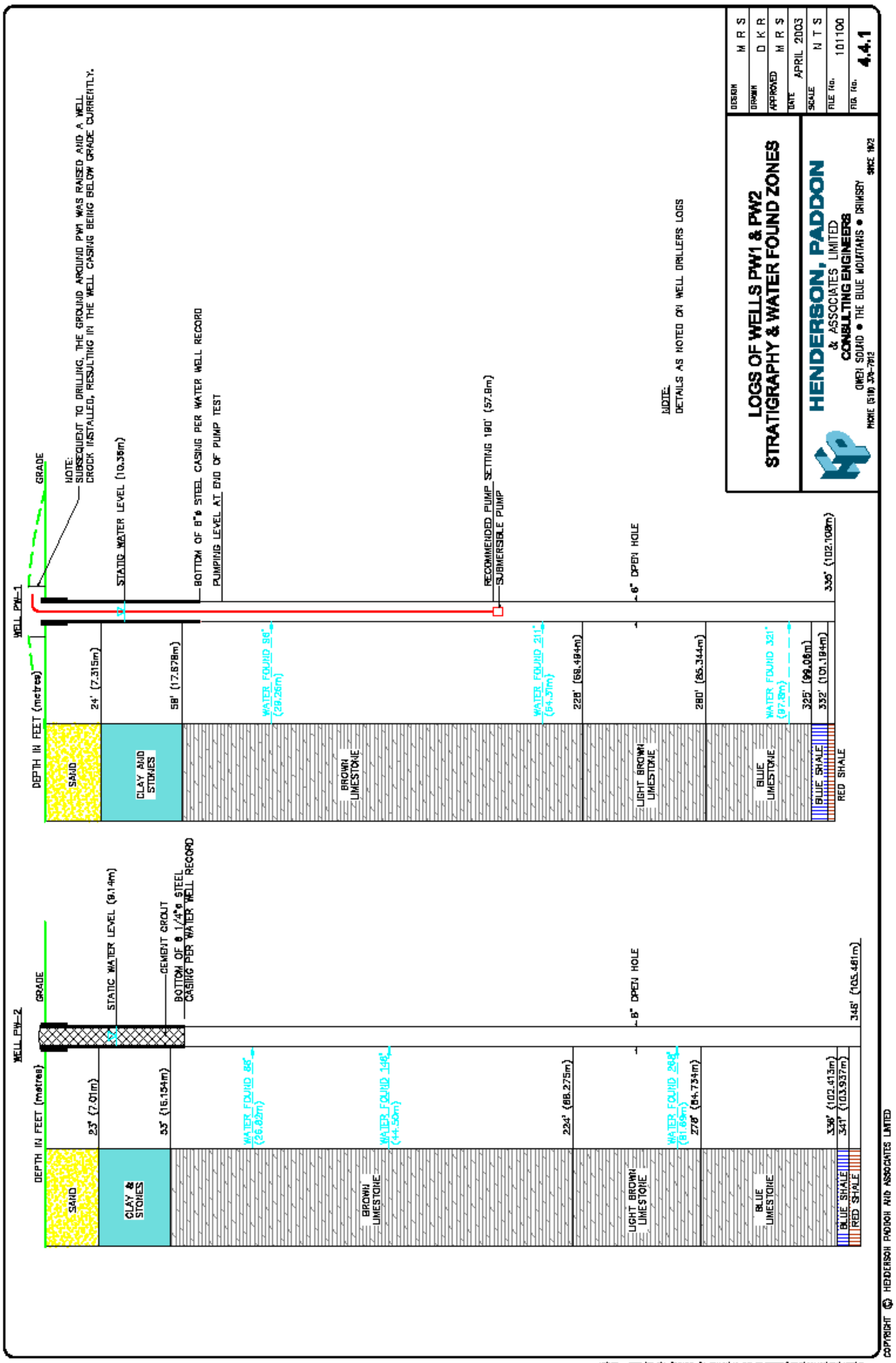
#### 4.4.1.1 Construction

Wells PW1 and PW2

As indicated earlier in the report, the school site has an existing well (PW1) which is currently being utilized to meet the water demands of the school and the daycare within the school building. Well PW1 is a bedrock well and has its well casing grouted into the bedrock. The well log for PW1 is provided in Figure 4.4.1. The well does not meet provincial standards for municipal water supply well construction, and requires improvement by way of overdrilling the well, re-setting the well casing, and providing unshrinkable grout in the annular space around the well casing. The well has a 523 $m^3$/day capacity pump and has been pump tested at a flow rate of 589 $m^3$/day for 24 hours. This well, after improvements to the casing, will be subject to testing to ensure that the drilling contractor's activities do not result in a significant loss of water supply.

A new well, PW2, has been constructed approximately 34 m south of Well PW1. This well is also a 200 mm diameter drilled bedrock well. It has a steel casing that is 18 m deep and is grouted over the entire interval using cement grout within the annular space. The depth to the bedrock is 16.1 m and is overlain by a 9.1 m confining layer of clay and stones which will provide security to the bedrock aquifer. The well driller reported that water was found at 26.8 m, 44.5 m and 81.7 m depth fracture levels. The well log is provided in Figure 4.4.1.

Wells PW1 and PW2 were tested and a report prepared, which was titled "Aquifer Evaluation Report, Amabel Sauble School Wells PW1 and PW2, Town of South Bruce Peninsula, Volume I and II", dated May 2003. The report was reviewed by hydrogeologists from NRCan and the provincial Ministry of the Environment. The report confirms that the wells PW1 and PW2 together are capable of meeting the short term and long term requirements of the Amabel Sauble water system. The NRCan hydrogeologist recommended that the Winburk water supply well, the existing well for


LOGS OF WELLS PW1 & PW2
STRATIGRAPHY & WATER FOUND ZONES
HENDERSON, PADDON
& ASSOCIATES LIMITED
CONSULTING ENGINEERS
OWEN SOUND • THE BLUE MOUNTAINS • GRIMSBY
DESIGN M R S
DRAWN D K R
APPROVED M R S
DATE APRIL 2003
SCALE N T S
FILE No. 101100
FIG. No. 4.4.1
WELL PW-1
WELL PW-2
DEPTH IN FEET (metres)
GRADE
SAND
CLAY AND STONES
BROWN LIMESTONE
LIGHT BROWN LIMESTONE
BLUE LIMESTONE
BLUE SHALE
RED SHALE
STATIC WATER LEVEL (10.36m)
STATIC WATER LEVEL (9.14m)
BOTTOM OF 8"ø STEEL CASING PER WATER WELL RECORD
PUMPING LEVEL AT END OF PUMP TEST
RECOMMENDED PUMP SETTING 190' (57.9m)
SUBMERSIBLE PUMP
6" OPEN HOLE
CEMENT GROUT
NOTE:
DETAILS AS NOTED ON WELL DRILLERS LOGS
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the Winburk subdivision, be utilized as a contingency measure, which was acceptable to the proponent. This contingency provision was also recommended in Class EA that was completed in accordance with the provincial EA requirements.

Winburk Well and Raw Watermain

The existing municipal well for Winburk water system will be utilized as the backup water supply well to Amabel Sauble School site Wells PW1 and PW2. The Winburk well does not meet the Regulation 903 requirements, and therefore will be upgraded by overdrilling the well, re-setting the well casing and providing unshrinkable grout in the annular space around the well casing. The well will also be provided with a pitless adaptor. The well, after improvements to the casing, will be subject to a pump test to ensure that the drilling contractor's activities do not result in any loss of water supply from this well. A 100 mm diameter raw watermain will be constructed from the Winburk well site to the treatment plant building. A continuous water level monitoring device will be installed in the well, which will provide water level information to the SCADA computer at the treatment plant.

#### 4.4.1.2 Operation and Maintenance

The PW1, PW2 and Winburk water supply wells can be operated singly or in combination to meet the water demands of the water distribution system. The wells will be operated in accordance with the Permit To Take Water (PTTW) requirements as provided by the Ontario Ministry of the Environment. The wells, including observation wells, will be provided with automatic water level logging instruments that will provide continuous feedback to the PLC at the treatment plant about the water level fluctuations. The information shall be recorded, compiled, and reviewed by the Operators. This information will be provided to the provincial Ministry of the Environment in accordance with the requirements outlined in the PTTW.

A record of water taking from each individual well is also required on a daily basis. The Municipality is not allowed to increase the water takings from any well beyond the amounts specified in the PTTW. Information relating to the amount of water takings will also be collected and provided annually to the Ministry of the Environment.

Provincial regulations require the Municipality to prepare a well maintenance and inspection program, which is reviewed by MOE inspectors. A well maintenance plan will be prepared for all three wells and be adopted by the Municipality. The Well Maintenance Plan will provide information pertaining to the frequency of video inspection, flow testing of the water supplying fractures, determination of the decline in yield due to calcification, etc.

In general, the three municipal supply wells will be operated, maintained and inspected in accordance with best management practices to ensure that the integrity of the wells is maintained and they continue to supply water as designed.

#### 4.4.1.3 Decommissioning

The wells will not be decommissioned at the end of the 20-year design period. If the Amabel Sauble water system requires upgrading and expansion, the wells will remain part of the upgraded system. Typically, the wells have a useful life many years beyond the 20-year design life of the water works.

### 4.4.2 New Treatment Plant Building and Associated Site Works

#### 4.4.2.1 Construction

The Amabel-Sauble water treatment building will be located in a manner that minimizes damage to the existing parking lot, and is close to the two constructed water supply wells. The location was selected so that it does not adversely impact the trail at the south end of the site, and minimizes environmental impacts by minimizing the amount of vegetation that needs to be removed. The proposed site layout is shown in Figure 1.7.2.

The school building has a brick exterior and an attractive architecture. The School Board has indicated their sensitivity to the appearance of the treatment plant building and accordingly, the Proponent agreed to provide a building exterior matching or complimenting the existing school building.

Construction of the treatment plant building will require minor site restoration since vegetation removal (approximately 600 $m^2$) has been minimized and a portion of the existing parking lot is being utilized. The underground water storage tank will be a reinforced concrete structure and have cells for potable water storage and a separate cell for holding and treating the filter backwash wastewater. In order to prevent contamination of the potable water in the clearwells, the adjacent walls of the clearwell and wastewater treatment tank will have an air gap between them and have separate walls to prevent seepage of wastewater into the clear water storage tank. The main floor of the plant will house all of the treatment equipment which includes greensand filters, highlift pumps, backwash pumps, cartridge filters, and UV reactors. The pumps will be vertical turbine pumps. Chemicals that will be used in the treatment process are potassium permanganate (iron removal) and sodium hypochlorite (used to maintain chlorine residual in the distribution system). The building will be designed in such a manner as to allow future expansion of the facility.

The plant building will also have a standby power generator room where the diesel generator will be located. This room shall be provided with treatment on the walls and ceiling to absorb sound waves. The dampers and louvres will also integrate an acoustic design which will minimize the amount of noise that escapes from the building. The treatment plant will also be equipped with an on-site lab, a small lunch/office room, and washrooms with shower facilities.

Where possible, vegetation removed during construction of the building and raw water supply pipes will be restored by planting native shrubs and plants species that will blend in with the existing vegetation.

Since the Winbruk well will be used a backup water supply source, the well house at this site will not be affected by the project, except for the installation of any equipment that may be required, such as additional transmitters, monitoring equipment, electrical panels, etc. No vegetation clearance will be required at this site.

#### 4.4.2.2 Operation and Maintenance

The new water treatment plant will be operated in accordance with the Ministry of Environment (MOE) requirements. After construction is completed, the Proponent will apply to the MOE to determine the certificate level of the treatment facility, which will confirm the license level of the Operator-in-Charge.

The treatment plant shall be provided with SCADA (Supervisory Control And Data Acquisition) system, which will have the capability to provide automatic operation of the plant with minimal input from the Operators. The Operators will have to make chemical adjustments to properly treat the minor fluctuations in the raw water quality. The Operators will also have the responsibility to maintain all instrumentation that provides data to the PLC for the automatic operation of the plant. Calibration of instrumentation will be done in accordance with the manufacturer's requirements.
The Municipality will prepare annual budgets for the operation and maintenance of the water system and maintain a reserve fund to deal with any contingency expenditures relating to the breakdown of equipment, repairs and replacement.

#### 4.4.2.3 Decommissioning

The new treatment plant will not be decommissioned at the end of the water system's 20-year design life. As indicated earlier, if the Amabel Sauble water system requires upgrading or expansion, the building will remain part of the upgraded system as the plant layout will be designed to allow future expansion. Typically, the plant building has a useful life beyond 20 years.

### 4.4.3 Transmission Watermains

#### 4.4.3.1 Construction

The transmission watermain will be constructed from Amabel Sauble School to the locations of the existing seven water distribution systems. The watermains will be constructed within the existing road allowances to minimize environmental impacts.

The Municipality has installed piezometers along the watermain route to determine the groundwater table level, and to determine the dewatering requirements, if the open cut excavation method for watermain construction is used. At the time of final design, additional soil investigations will be undertaken along the watermain routes, and more information pertaining to the water table levels will be collected. In the areas where there is a high water table, directional drilling method will be utilized to reduce or eliminate dewatering requirements, which in turn will eliminate the impacts to water table aquifer and household sand point wells. For the remainder of the installation, either open cut excavation or directional drilling methods will be used. Preliminary consultations with directional drilling contractors who have experience working with the sandy, silty soils in Sauble Beach area indicated that during wet conditions or when the water table is high, they have been successful in constructing watermains using the directional drilling method. Property owners along the watermain routes will be notified prior to the commencement of the construction.

The watermain installation at the Jubilee Bridge location, which crosses the Sauble River, will be achieved by directional drilling.

The watermains will be constructed of PVC piping or polyethylene piping, have an inside diameter of approximately 200 mm, and shall be installed at a depth of 1.8 m below ground level. Where this depth cannot be achieved, insulation shall be provided to prevent freezing. In built-up areas, fire hydrants will be installed at a spacing of 150 m. The new watermain pipe shall be connected to the existing smaller diameter piping in the seven distribution systems by utilizing properly selected reducers. The constructed watermains will be flushed, pressure tested and disinfected using chlorine solution. The chlorine solution, after disinfection is completed, will be dechlorinated and discharged at a location away from surface water courses. The water system is not designed to provide water service to existing homes along the transmission watermain route. Therefore, no new water services will be provided under this project. The construction of the watermains shall be undertaken in accordance with applicable Ontario Provincial Standards and Drawings, and applicable Canadian Standards Association (CSA) and American Water Works Association (AWWA) standards.

This project will not require the decommissioning of any distribution watermains. All of the existing water distribution piping will be incorporated into the new water distribution system.

#### 4.4.3.2 Operation and Maintenance

The transmission watermains shall be operated based on MOE regulatory requirements. Water in the distribution system will be sampled and tested as required by Ontario Regulation 170/03. The watermains will have its valves exercised at least once a year to prevent seizing, thereby ensuring their reliability. The dead ends shall be flushed as required to prevent stagnation of the water and the development of associated problems such as iron bacteria growth, stale water, colouration, etc. Watermain breaks will be repaired in accordance with the manufacturer's requirements and Water Industry Standards that include the CSA and AWWA. The Municipality's Operating Authority shall maintain an inventory of repair clamps and spare PVC pipes and also make arrangements with local contractors to undertake any emergency repair work.

#### 4.4.3.3 Decommissioning

The new transmission watermain shall not be decommissioned at the end of the 20-year design period of the water system. As indicated earlier, if the Amabel Sauble water system requires upgrading or expansion, the transmission watermains will remain part of the upgraded system. Typically, PVC watermains have a life expectancy of 80 years.

### 4.4.4 Decommissioning of the Six Remaining Well Supplies

#### 4.4.4.1 Construction

The decommissioning and abandonment of four (Gremik, Robins, Thomson, and Trask) supply wells will be required. These wells are considered redundant and are to be decommissioned and abandoned in accordance with Ontario Regulation 903/90 recent revision (Regulation 903). The existing treatment buildings are to be demolished, their waste materials disposed of at an approved landfill site, and the sites restored to a natural setting.

The remaining two wells, Fedy and Forbes, will be decommissioned but not abandoned. These wells are to be utilized as observation wells and have water level monitoring transducers installed which will provide water level information to the SCADA system at the treatment plant building. The observation wells are a requirement of both the Provincial Ministry of Environment and NRCan. The existing treatment buildings will be retained at these sites.

#### 4.4.4.2 Operation and Maintenance

Once the Gremik, Robins, Thomson, and Trasks wells have been decommissioned and abandoned, no further operational and maintenance activities will be required at these sites.

The observation well sites will only require minor maintenance activities to ensure the water level monitoring transducers are working as required.

#### 4.4.4.3 Decommissioning

The observation wells will not likely be decommissioned over the operational life of the water system. However, if these wells are ever decommissioned, it will be carried out in accordance with Regulation 903, or any successor regulation, and with regard to all municipal contingency plans in effect at that time.

# 5 CONSTRUCTION PLAN AND TIMETABLE

## 5.1 General Construction Sequence

### 5.1.1 Well Development

The construction plan for the development of the Amabel-Sauble School site wells will incorporate the following general tasks:

$ Mobilization of the Contractor to the site.
$ Over-drilling of Well PW1, deepen casing, install unshrinkable grout
$ Provide pitless adaptor
$ Undertake step test and pumping tests
$ Restoration of all disturbed areas
$ Completion of all disinfection procedures
$ Completion of all required documentation and reporting on the works.

### 5.1.2 Water Treatment Plant and Pumphouse Facility

The plan for the construction of the new water treatment plant will incorporate the following general tasks:

- Completion of the layout and topsoil stripping (including delineation of the access road and laydown areas).

$ Excavation of trenching for all inground services.
$ Installation of services in accordance with engineering specifications.
$ 3 phase power supply for new plant building.
$ Backfilling of trenches in accordance with engineering specifications.
$ Excavation and confirmation of the soil bearing capacity of the foundation (geotechnical testing).
$ Installation of the footings and pouring of the concrete slab.
$ Construction and inspection of the ground-level reservoir and all associated facilities.
$ Construction and inspection of the pumphouse structure and exterior finish.
$ Completion of mechanical, electrical and miscellaneous metal work associated with the pumphouse controls.
$ Completion of all necessary chlorination procedures.
$ Installation of yard piping and completion of miscellaneous site work.
$ Revegetation of disturbed areas with native grass seed and mulch.

$ Completion of all required documentation and reporting on the works.

### 5.1.3 Transmission Watermain

The plan for the construction of the transmission watermain will incorporate the following general tasks:

$ Mobilization of the Contractor to the site.
$ Layout of the watermain route and checking by Inspector.
$ Installation of watermain by open cut excavation or directional drilling as required.
$ Pressure testing, flushing and disinfection of watermain.
$ Sampling for bacteriological analysis and commissioning.
$ Revegetation of disturbed areas with native grass seed and mulch.
$ Completion of all required documentation and reporting on the works.

### 5.1.4 Upgrade of the Winburk Well Supply and Connection to the New Plant Site

The plan for the upgrading of the Winburk well supply and its connection to the new water treatment plant will incorporate the following general tasks:

$ Mobilization of the contractor to the site.
$ Overdrilling of the well, deepen casing, install unshrinkable grout around the well casing.
$ Undertake step test and pumping test to ensure drilling contractor's operation has not reduced water supply.
$ Provide pitless adaptor.
$ Construct raw watermain from Winburk well to the Treatment Plant building location.
$ Restoration of all disturbed areas.
$ Completion of all required documentation and reporting on the works.

### 5.1.5 Decommissioning of the remaining six well supplies

The plan for the decommissioning of the remaining six well supplies will incorporate the following general tasks:

$ Removal all treatment equipment, chemicals, and items that can be salvaged from the buildings.
$ Demolition of the treatment building at four sites and disposal of materials at an approved landfill site (includes undertaking a Provincial Bill 208 Designated Substance Survey prior to demolition).
• Pull out the well casings of the four wells to be decommissioned and abandoned. Decommission and abandon these wells in accordance with Regulation 903 requirements.
$ Convert the remaining two wells (Forbes and Fedy) into monitoring wells.
$ Restoration of all disturbed areas.
$ Completion of all required documentation and reporting on the works.

## 5.2 Project Timetable

The following summarizes the general steps for the completion of the upgrading project:

$ Completion of detailed design, obtaining approvals, tendering, etc. for all plant facilities and transmission watermains (November 2007 to February 2008).

$ Council resolution authorizing award of project (March, 2008).

$ Pre-construction Meeting and initiation of field work for watermains and the treatment plant building (April, 2008).

$ Construction and commissioning of the watermain (May, 2008 to October, 2008).

$ Construction and commissioning of the treatment plant building (April, 2008 to July, 2009).

$ Completion of site restoration activities (July, 2009).

$ Decommissioning of the existing treatment plant buildings.

$ Decommissioning of the wells.

# 6 DESCRIPTION OF EXISTING ENVIRONMENT

## 6.1 Physical and Natural Environment

### 6.1.1 Ground Water Quantity and Quality

Groundwater in the Sauble Beach area is available in the following hydrogeologic units:

$ Water table or unconfined aquifer unit that is comprised of surficial sands or sands and gravels.

$ Aquitard unit (confining layer) consisting of sandy silt till, termed “clay” on local well records.

$ Confined (overburden) aquifer unit comprised of sand and gravel.

$ Bedrock aquifer unit comprised of dolostone and to a lesser degree, shale.

The “water table aquifer unit” is heavily used in the Sauble Beach area by way of sand points. Water table aquifers generally provide water in adequate quantities for residential use. It is unlikely that the water table aquifer could be utilized for a municipal water system without affecting the yield of private sand points surrounding the well site. Water table aquifers typically have a higher risk of contamination from sources such as septic systems and contaminant spills. Because the potential for the a migration of contaminants is high due to the perviousness of the sandy soils, water table aquifers are generally considered unsuitable as a municipal water supply source.

“Aquitard units” consist of sandy silt till and generally do not provide a large quantity of water for users. Water in these units is not able to migrate in the required quantities toward water supplying wells due to the relatively low permeability of the aquifer. As a result, wells that are constructed in such soils experience significant drawdown during pumping. The aquitard units, however, do provide good protection to the overburden aquifer and bedrock aquifer. These water supply units are generally considered unsuitable for municipal water supplies due to their low yields.

A “confined overburden aquifer” generally serves as a good raw water source for a municipal well supply since it is protected from potential surface contaminant sources such as septic leakage and contaminant spills by the overlying aquitard unit. This aquifer could provide water supplies in appreciable quantities. In the Sauble Beach area, a confined overburden aquifer is utilized by the existing Huron Woods water system. Although there was a small possibility of finding a confined overburden aquifer in the Amabel-Sauble School area, and in the northeast area of Huron Woods, the confining impervious layer above these aquifers may not be sufficient to provide the required protection. Furthermore, the availability of a water supply in sufficient quantities can only be confirmed by a detailed and expensive well exploration programme.

The “bedrock aquifer”, when protected by low permeable clay and silty material, can provide water supplies that are free from bacterial contamination and are also protected from surface contaminant sources. However, if a contaminant could find entry into the bedrock by way of an improperly constructed neighbourhood well in the area, or through an exposed rock surface in the vicinity of the water supply aquifers, contaminants could migrate to the wells in a relatively shorter period. In the Sauble Beach area, bedrock wells are primarily used for residential purposes and appear to have low yields. One significant exception is the well at the Amabel-Sauble school site which was pump tested at an approximate flow rate of 590 $m^3$/d for 24 hours. This test indicated that the probability of finding an additional bedrock well water supply in abundance at this site was good. Bedrock wells, depending on the type of rock chemistry, can provide water supplies that are highly mineralized in nature, contain high levels of iron, manganese, sulfur, and hardness and other metals such as barium, sodium, and radium 226. The Amabel-Sauble school well supplies water that is generally free from any bacterial contamination, but has high hardness and elevated levels of iron, manganese, and fluoride. However, the raw water can be treated to meet Ontario drinking water standards.

Amabel Sauble Wells PW1 and PW2

Well PW1 is the existing Amabel-Sauble school well that was drilled in June, 1994. The well is a 150 mm diameter bedrock well constructed to a depth of 102.1 m. The well is cased to a depth of 20 m. Three water zones were found in this well at depths of 29.3 m, 64.3 m and 97.8 m. Test pumping of the well was completed over a 24 hour period at a rate of 408.6 L/min with a drawdown of 12.5 m. The limestone bedrock is overlain by a 10.4 m confining layer of clay and stones which provides good security to the bedrock aquifer. The well derives its supply from the Guelph Amabel (dolostone) formation bedrock and terminates in the underlying shales of the Cabot Head formation.

Step testing of this well was undertaken in May 2002 by utilizing the existing well pump and pumping at its maximum achievable rate of 373 L/min (82 IGPM) for a two hour duration. Analysis of the results suggested the probability of additional long-term yield availability from the aquifer. As a result, a new well, PW2, was drilled at a distance of 34.5 m south of the existing well.

Well PW2 was constructed in July, 2002. It is a 200 mm diameter bedrock well that was constructed to a depth of 105.46 m. The well has steel casing to a depth of 18 m, which is grouted over the entire interval using cement grout within the annular space. The depth to bedrock is 16.1 m and is overlain by a 9.1 m confining layer of clay and stones, which provides security to the bedrock aquifer. Based on the well log record, water was found at depths of 26.8 m, 44.5 m and 81.7 m.

A series of investigations were undertaken on Well PW2. The well was video inspected by utilizing a downhole video camera on September 23, 2002. The video log included "down hole" and "side scan" views. The logging was completed under pumping conditions at a rate of 272 L/min. Several pumping tests were undertaken, which comprised of a series of step tests, long duration tests, testing of the lower water supply aquifer, etc. Initial pump tests were undertaken on August 14, August 15, September 24, September 25, and September 26, 2002. Additional testing was completed on January 8, February 10, February 13, and February 19, 2003. After review and analysis of the pumping test results and investigations, a report entitled "Aquifer Evaluation Report, Amabel Sauble School Wells PW1 and PW2, Town of South Bruce Peninsula", dated May, 2003, was prepared by Henderson Paddon & Associates. The report highlighted that the aquifers supplying water to wells PW1 and PW2 had no connectivity with wetlands in the area, the shallow groundwater table, or the Sauble River. The report provided thirteen conclusions and four recommendations.

The highlights of the conclusions are:

$ PW2 is individually able to provide a long-term perennial yield of approximately 340.5 L/min for a period of between 10 and 20 years;

$ Based on the simulation of the continuous pumping of PW1 and PW2, a 10 to 20 year safe yield is 372.3 L/min (82 IGPM) for both wells, or 186.1 L/min (41 IGPM) per well;

$ The short term maximum pumping rate (120 days of simultaneous pumping from PW1 and PW2) was found to be 408.6 L/min (90 IGPM) combined.

$ The water quality analysis noted that chlorides were relatively low in both wells and range from 4.9 to 7 mg/L. Hardness was elevated ranging between 172 to 190 mg/L. Turbidity at the end of a 48 hour test was 0.8 NTU. Nitrate was generally non-detectable and organic matter concentration was less than the operational guidelines of 1.5 mg/L. Bacteriologically, test results showed good water quality;

$ Good security was inferred for both wells by way of a relatively impermeable layer of clay and stones above the bedrock aquifer that ranges in thickness from 9.1 m to 10.4 m. Alluvium deposits of sand, silt and organic material were also noted to provide additional retardation of infiltration of surface water; and,

$ The wells were not observed to be connected to the Sauble River flow. As a result, Well PW2 was deemed a non-GUDI well.

The report was submitted to the Ministry of the Environment, Ontario for a Permit To Take Water which was issued in February, 2007.

NRCan reviewed the Aquifer Evaluation Report and provided their comments on September 28, 2006. Their comments generally disagreed with the analysis results and conclusions provided in the report. In summary, they were concerned that the two pumping wells, PW1 and PW2, may not be able to sustain the short term (sum of maximum) and long-term (20-year average) pumping rates suggested in the report, and presented a conceptual explanation for the aquifer response observed in the study results. They noted some technical problems regarding the analysis by the Consultant, the assumptions implicit to the analysis, the interpretations of the results. NRCan recommended a modest re-analysis of some of the existing data to provide more realistic estimates of sustainable pumping rates and recommended the development of a contingency plan in the event that the wells could not produce sufficient water for all the community's needs.

On November 9, 2006, NRCan provided an additional nine comments and re-confirmed the need for the modest re-analysis recommended by them earlier.

In response to HPA's letter dated December 6, 2006, NRCan provided an additional eight comments and concluded that the Consultant had not responded to all of NRCan's comments and did not address the issue that elevated pumping rates do not take into account the long term decline in the pumping water level due to average pumping. NRCan recommended a detailed contingency plan as part of the follow-up program that would include a monitoring program and securing one or more backup wells that meet MOE Regulations and could be brought online to prevent significant water shortages in the community.

Transmission Watermain

To determine if there could be interference issues with the groundwater table during the construction of the transmission watermains when utilizing open-cut excavation, the groundwater table was measured by installing piezometers along the watermain route and by taking water level measurements. The locations where the water table could potentially interfere with watermain construction are shown in the shaded areas of Figure 6.1.1.

### 6.1.2 Surface Water Quantity and Quality

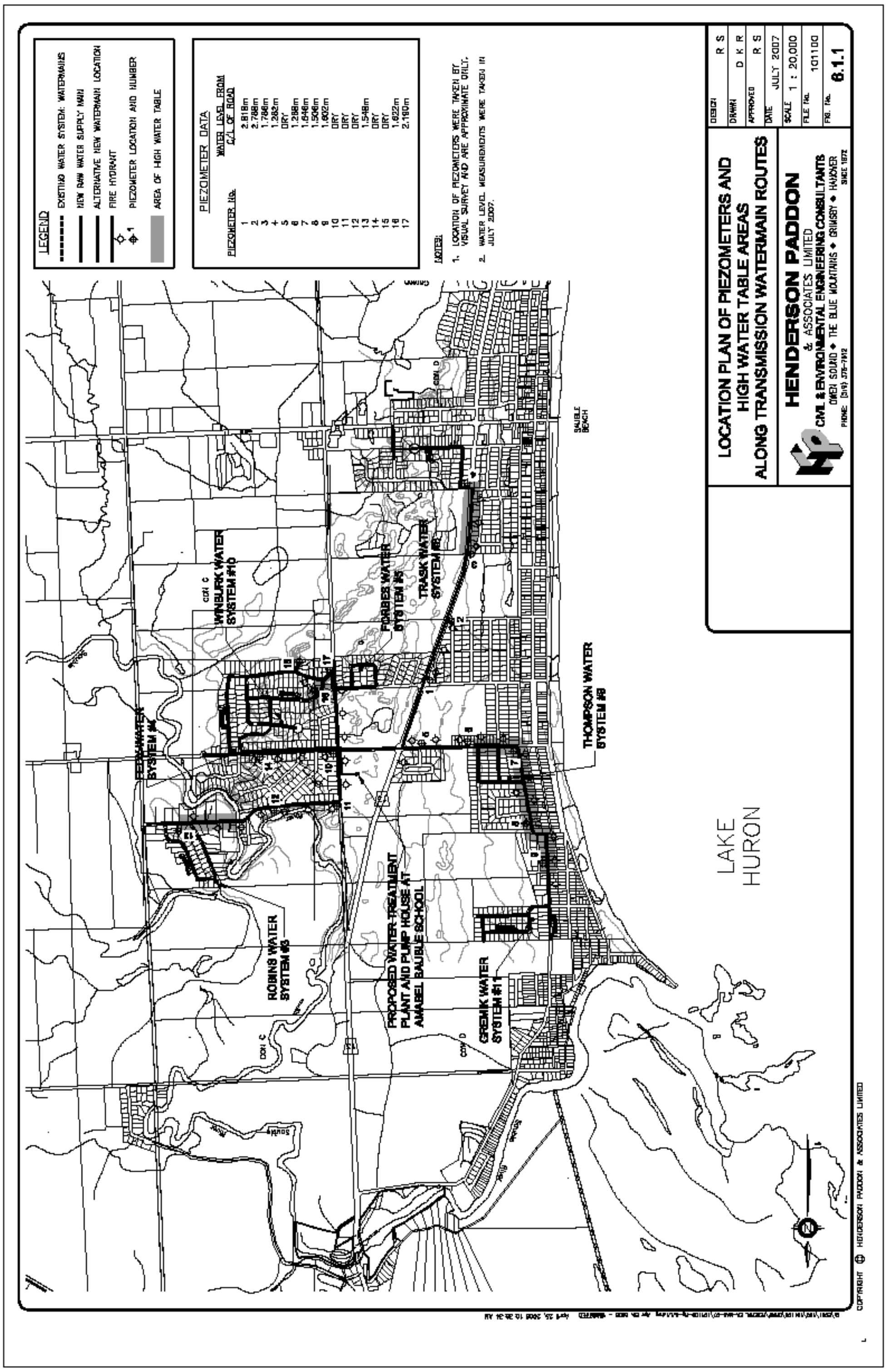
There are a number of surface water bodies that are located in the Sauble Beach area. These include Lake Huron to the west, Silver Lake and Carson Lake to the south, and Spry Lake and Boat Lake to the north in the Oliphant area. The Sauble River winds through project area in a northerly direction before turning westward and eventually discharging to Lake Huron. In addition, there are also several wetlands. Refer to Figure 6.1.2 regarding the location of surface water bodies in the area.

Lake Huron in the Sauble Beach area has a very shallow shoreline. Although the quality of the lake water is generally good, it is affected by significant spikes in turbidity during storm events and from the impacts of shoreline ditches which discharge during the spring and fall. A water treatment facility using the lake as a raw water source would require the construction of a very long intake, and a low lift station which would pump raw water to the treatment plant location. A project of this type would also require a delineation of intake protection zones in order to comply with provincial regulatory requirements.

The smaller lakes, identified above, in the Sauble Beach area are generally too small and also are located too far from the seven water system locations to be seriously considered as a raw water source. Because smaller lakes generally are more susceptible to sudden changes in water quality variation, a raw water source of this type would require a significantly higher level of treatment than a groundwater source in order to meet provincial water quality requirements. Of the smaller lakes, only Carson Lake falls within the regional boundary of the project. Carson Lake is a small inland lake with a relatively shallow water depth. It is prone to impacts on its water quality as a result of spring and fall run-off events which cause sudden and high fluctuations to turbidity and organic material levels, as well as increased bacterial contamination.

The wetlands within the regional boundary of the project include the Hellhole Wetland and Bannister Swamp. These wetlands are unsuitable raw water supply sources for municipal water works due to water quality and quantity issues.

The Sauble River, as indicated earlier, winds through the Sauble Beach area. The river’s drainage basin includes marshlands, wetlands and farms which affect the water


LOCATION PLAN OF PIEZOMETERS AND
HIGH WATER TABLE AREAS
ALONG TRANSMISSION WATERMAIN ROUTES
HENDERSON PADDON
& ASSOCIATES LIMITED
LEGEND
PIEZOMETER DATA
LAKE HURON
THOMPSON WATER SYSTEM #8
ROBINS WATER SYSTEM #5
GREMIK WATER SYSTEM #11
PROPOSED WATER TREATMENT PLANT AND PUMP HOUSE AT AMABEL SAUBLE SCHOOL
JULY 2007
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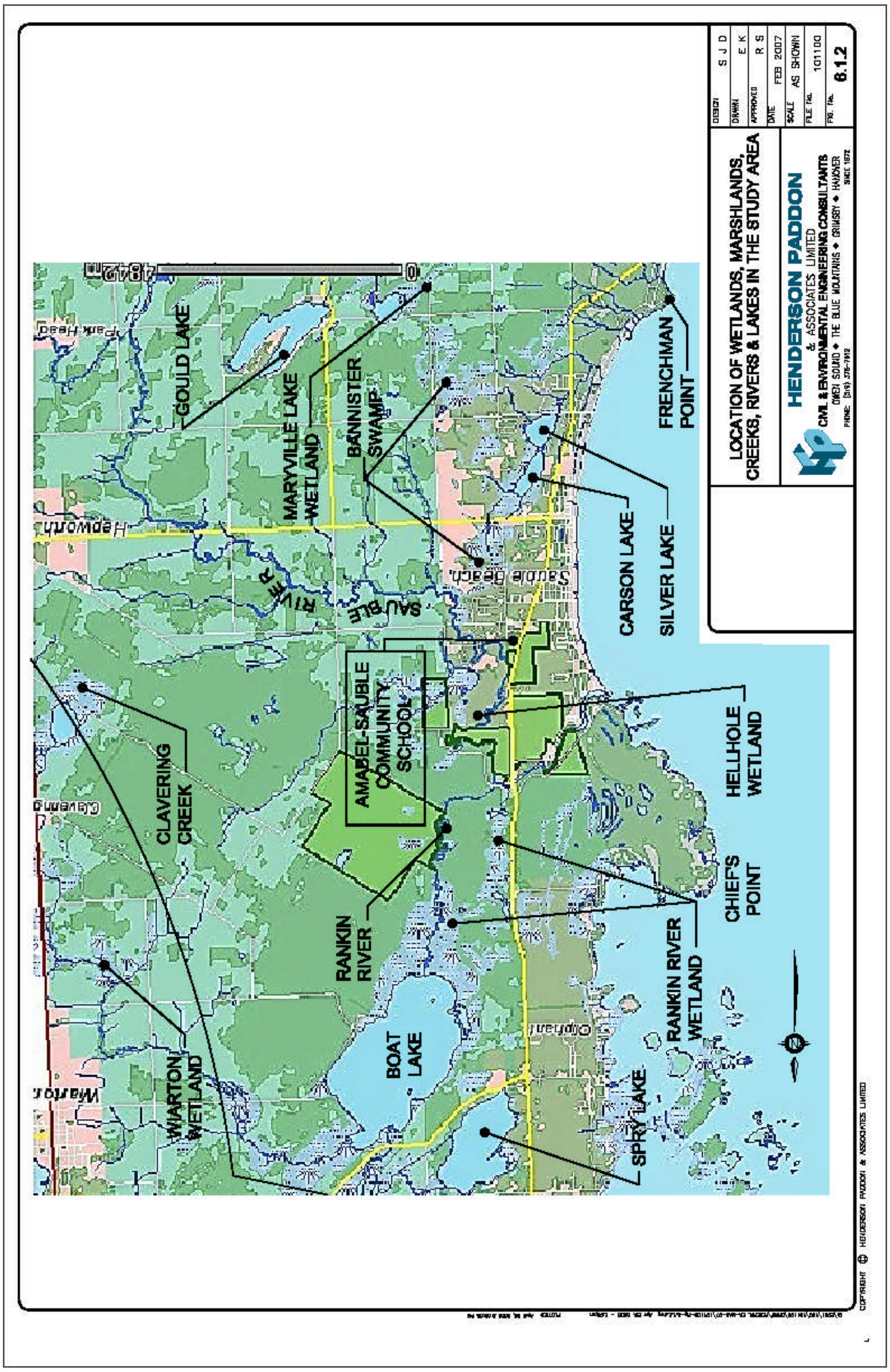
6.1.1


LOCATION OF WETLANDS, MARSHLANDS, CREEKS, RIVERS & LAKES IN THE STUDY AREA
HENDERSON PADDON
& ASSOCIATES LIMITED
CIVIL & ENVIRONMENTAL ENGINEERING CONSULTANTS
DESIGN S J D
DRAWN E K
APPROVED R S
DATE FEB 2007
SCALE AS SHOWN
FILE No. 101100
FIG. No. 6.1.2
GOULD LAKE
MARYVILLE LAKE WETLAND
BANNISTER SWAMP
FRENCHMAN POINT
CARSON LAKE
SILVER LAKE
SAUBLE RIVER
AMABEL-SAUBLE COMMUNITY SCHOOL
HELLHOLE WETLAND
CLAVERING CREEK
CHIEF'S POINT
RANKIN RIVER
RANKIN RIVER WETLAND
BOAT LAKE
SPRY LAKE
WIARTON WETLAND
Sauble Beach
Hepworth
Wiarton
Oliphant
Clavering
Park Head

quality of the river. River water supplies generally experience higher fluctuations in turbidity and organic material, as well as increased bacterial contamination. Sudden changes in the water quality, although treatable, would be more difficult to handle in water treatment plants. Based on Environment Canada records, the lowest recorded flow in the Sauble River, at the Sauble Falls location, was 0.459 $m^3$/s in September 1998. Typically, low flows in the Sauble River occur during the months of August, September and October. Because the month of August is generally a high water consumption month, a municipal water system utilizing the Sauble River could have an adverse effect on downstream flows it was used as a raw water source. In addition, local interest groups in Sauble Beach area are sensitive to appreciable quantities of water taking from the river due to sport fishing issues. Although the quantity of water required for this project is relatively small, it may be an issue with these groups.

As noted previously in Section 6.1.1, the aquifer evaluation report indicated that none of the surface water sources were hydraulically connected to the bedrock aquifer that is used by wells PW1 and PW2.

### 6.1.3 Vegetation

The Bruce Peninsula is part of the Niagara Escarpment World Biosphere Reserve and is home to two National Parks - the Bruce Peninsula National Park and Phantom Five National Marine Park. The Bruce Peninsula has the largest remaining area of forest and natural habitat in Southern Ontario and is home to some of the oldest trees in eastern North America. The Bruce Peninsula also provides habitat to a variety of wildlife and provides significant biodiversity. It is an important fly way for migrating birds, and also has one of the greatest concentrations of native orchid species in North America.

The Bruce Peninsula is home to some of the rarest flowers and ferns in Ontario. They include the lakeside daisy, dwarf lake iris, and northern holly fern. The lakeside daisy is Ontario’s rarest plant and grows at five sites on the Bruce Peninsula in a distinctive and unusual habitat - Alvar. However, Alvar habitat is not prevalent at or around the project sites. The lakeside daisy, or rubber reed, is a showy spring blooming perennial which arises from a short, thick tap root. It has dark green leaves and bright yellow flowers on stalks which reach a maximum height of about 40 cm. The dwarf lake iris only grows in very special sites, one being the northern shores of Lake Huron on the Bruce Peninsula, which is outside of the project’s regional boundary. The northern holly fern is generally found on the cliffs of the Bruce Peninsula in rock crevices or at the base of boulders, mostly in the boreal and sub-alpine coniferous forests. There is no habitat of this type that will be affected by this project.

Globally, there are more than 30,000 orchid species. Canada is home to 77 species of these orchids. Ontario has 61 varieties of orchids and of these, 44 can be found in the Bruce Peninsula. A selection of the most interesting orchids on the Bruce Peninsula include yellow lady's slipper, nodding lady's dresses, eastern prairies fringed orchid, ram's head, lady's slipper and European common twayblade.

The native plants that form Lake Huron's coastal ecosystem also include native trees and shrubs. The endemic species of native trees include basswood, sugar maple, white ash, red mulberry, white pine, red pine, eastern white cedar, eastern hemlock, choke cherry and paper birch. The endemic species of shrubs include the juniper, honey locust, trembling aspen, American highbush cranberry, mountain ash, pin cherry, service berry, red osier, dogwood, and alternate leaved dogwood. These species of trees and shrubs are for the entire Lake Huron coastal ecosystem and all species necessarily are not found on Bruce Peninsula.

A field inspection visit was completed to identify vegetation along both sides of the roadway for the proposed watermain route. Vegetation species were recorded, as well as any species at risk that were identified by the SARA website. Photographs were taken and field guides were referred to in cases of uncertainty. The majority of the searched area is lined with houses, therefore rendering a search of 250 m impossible as much of the area was either disturbed or lawn areas. Vegetation species that were found were typical of road sides and disturbed areas. No species were identified that were considered sensitive or rare.

Forests are along the pipeline routes are mixed. Predominant tree species are spruce, balsam fir, cedar, pine, black choke cherry, maple, ash, trembling aspen, sumac and birch. Oak, elm, ironwood, common apple, basswood, beech, large-tooth aspen, manitoba maple, hemlock and tamarack were also present.

Other predominant vegetation species are identified in Table 6.1.3:

**Table 6.1.3**

**Species Recorded in Project Study Area**

| Family (Common) Name | Scientific Name | Species Common Name | Species Scientific Name |
|---|---|---|---|
| Aster | Asteraceae | Yarrow | Achillea millefolium |
| | | Coreopsis | Coreopsis lanceolota |
| | | Ragwort | Senecio jacobaea |
| | | Ox-eye daisy | Leucanthemum vulgare |
| | | Bull thistle | Cirsium vulgare |
| | | Narrow-leaved hawk's beard | Crepis tectorum L. |
| | | Canada fleabane | Conyza canadensis |
| | | Yellow hawkweed<br>Pineapple weed | Hieracium caespitosum<br>Matricaria matricarioides |
| | | Philadelphia fleabane | Erigeron philadelphicus |
| | | Goats-beard | Tragopogon dubius |
| | | Chicory | Cichorium intybus |
| | | Joe-pye weed | Eupatorium fistulosum |
| Buttercup/Crowfoot | Ranunculaceae | Canada anemone | Anemone canadensis |
| Crowfoot | Ranunculaceae | Tall buttercup | Ranunculus acris L. |
| Borage | Boraginaceae | Viper's bugloss | Echium vulgare L. |
| Buckwheat | Polygonaceae | Curled dock | Rumex crispus |
| Carrot | Apiaceae | Queen Anne's lace | Dacus carota |

| Family (Common) Name | Scientific Name | Species Common Name | Species Scientific Name |
|---|---|---|---|
| Cattail | Typhaceae | Cattail | Typha latifolia L. |
| Dogbane | Apocynaceae | Spreading dogbane | Apocynum androsaemifolium |
| Figwort | Scrophulariaceae | Common mullein | Verbascum thapsus L. |
| Goosefoot | Chenopodiaceae | Garden orache | Atriplex hortensis L. |
| Grass | Poaceae | Wild oat | Avena fatua L. |
| | | Smooth brome | Bromus inermis Leyss |
| | | Red top | Agrostis gigantea |
| | | Annual bluegrass | Poa annua L. |
| | | Johnson grass | Sorghum halapense (L.) Pers. Redtop Agristis gigantea |
| | | Timothy grass | Phleum pratense |
| Bluebell | Campanulaceae | Harebell | Campanula rotundifolia |
| Milkweed | Asclepiadaceae | Milkweed | Asclepias speciosa Torr. |
| Mustard | Brassicaceae | Field Pennycress | Thlaspi arvense |
| Nightshade | Solanaceae | Bittersweet nightshade | Solanum dulcamara |
| Geranium | Geraniceae | Bicknell's cranesbill | Gernaium bicknellii |
| Pea | Fabaceae | White clover | Trifolium repens L. |
| | | Red clover | Trifolium pratense |
| | | Alsike clover | Trifolium hydridea ssp-elegans |
| | | Bird's-foot trefoil | Lotus corniculata |

| Family (Common) Name | Scientific Name | Species Common Name | Species Scientific Name |
|---|---|---|---|
| | | Pale vetchling | Lathyrus ochroleucus |
| | | Cow vetch | Vicia cracca |
| Pink | Caryophyllaceae | Bladder campion | Silene cucubalus Wibel |
| Plantain | Plantaginaceae | Common plantain | Plantago major L. |
| Spurge | Euphorbiaceae | Cypress spurge | Euphorbia cyparissias L. |
| | | Leafy spurge | Euphorbia esula L. |
| Sumac | Anacardiaceae | Poison Ivy | Rhus radicans L. |
| Rose | Rosaceae | Wild strawberry | Fragaria Virginiana |
| | | Flowering raspberry | Rubus odoratus |
| | | Wild red raspberry | Rubus idaeus ssp. melanolasius |
| | | Smooth wild rose | Rosa blanda |
| Birthworth | Aristolochiaceae | Wild ginger | Asarum canadense |
| Dogwood | Cornaceae | Bunchberry | Cornus canadensis |
| Wintergreen | Pyrolaceae | Pink pyrola | Pyrola asarifolia |
| Mint | Lamiaceae | Heal-all | Prunella vulgaris |
| | | Motherwort | Leonurus cardiaca |
| Day-lily | Hemerocallidaceae | Orange day-lily | Hemerocallis fulva |
| Lily | Liliaceae | Wood lily | Lilium philadelphicum |
| Orpine | Crassulaceae | Mossy stonecrop | Sedum acre L. |
| Trillium | Trilliaceae | | |
| | | | |

Milkweed, which is an indicator of possible monarch butterfly habitat, was identified on most sections, in particular Ninth Street North, Bunnyview Drive, Martin Drive, Seventh Street North and Sauble Falls Parkway.

Monarch caterpillars were identified on milkweeds on Ninth Street North and Sauble Falls Parkway. Two monarch butterflies were identified on Davies Drive and Bunnyview Drive.

### 6.1.4 Wetlands

The Natural Heritage Information Centre shows there are significant wetland areas and the areas of natural and scientific interest in the Sauble Beach area. Some of these wetland areas in the Sauble Beach area include the Rankin River Wetland complex to the north, the Wiarton Wetland Complex to the east, the Hellhole Wetland Complex to the northeast, and the Bannister Swamp to the southeast. These wetlands provide a habitat for a variety of wildlife and fauna. Figure 6.1.2 depicts the location of all wetlands in and around Sauble Beach area. The Sauble Beach area is also subject to the Sauble Beach secondary plan which is part of the former Township of Amabel Official Plan. Schedule C of the Constraint Map to this document shows the areas that have natural scientific interest, as well as provincially significant wetlands. Much of the Bruce Peninsula is also protected under the United Nations as part of a UNESCO Biosphere Reserve.

The wetlands have more complex vegetation with a large amount of fen and swamp habitat. The fens, also known as coastal meadow marshes have been identified as globally imperilled communities (NHIC website). Some of the rarest plant species that can be found in the coastal meadow marshes include blue hearts, round stemmed purple foxglove, twining bartonia, rigid yellow flax, etc.

Fens are characterized by peat lands where surface layers are of poorly to moderately decomposed peat with well decomposed peat near the base. They are normally covered by a dominant component of sedges, with grasses and reeds being associated with the local pools. Many are found along an eight 8 km stretch of beach shoreline contained between two major headlands, Chief's Point and Frenchman's Point.

The wetlands are home to a variety of wildlife including the northern flying squirrel, black bear, chipmunks, long-eared bats, red squirrel, fox, massasauga rattlesnake, red-shouldered hawk, battle owl, hermit thrush, black-throated blue warbler, scarlet tanager, and the yellow spotted salamander. Bald eagles are also known to use the area as a winter nesting ground. The wetlands in the area are known to have warm water fish species, including minnows and centrachids (sunfish family).

The Rankin River Wetland is a provincially significant wetland complex made up of 14 individual wetlands, and is composed of three wetland types - bog (0.1%), swamp (40.3%) and marsh (59.6%). Dominant vegetation forms include dead deciduous trees, robust emergents, deciduous trees, narrow-leaved emergents, tall shrubs, submergents, coniferous trees, low shrubs, broad-leaved emergents, shrubs-rich, dead coniferous trees, floating plants, dead shrubs, and herbs. The Rankin River Wetland is located outside of the regional boundary of this study and as a result, will not be affected by this project.

The Wiarton Wetland complex is a non-provincially significant wetland complex that is made up of 8 individual wetlands composed of 2 wetland types - swamp (97%) and marsh (3%). The dominant vegetation is deciduous, coniferous, dead deciduous, and dead coniferous trees, sedges and sensitive fern. The Wiarton wetland is located outside of the regional boundary of this study and as a result, will not be affected by this project.

The Hellhole Wetland is a Provincially Significant Wetland complex, made up of three individual wetlands, and is composed of two wetland types - swamp (76.7%) and marsh (23.3%). The wetland is a large swamp/marsh wetland located on organic and clay soils. Neighboring habitat includes agricultural crops and pasturelands, deciduous and coniferous forests, residential development, aggregate pits, open lake and creeks. The wetland contains a few resources with potential economic value including snapping turtles, and furbearers (muskrat, racoon, beaver). The large area of wetland vegetation helps remove excess nutrients from agricultural run-off and maintains water quality for downstream communities. Birds found in Hellhole include Red-Shouldered Hawk. This wetland is located to the northeast of the Robins water system. However, since no works will be occurring in the area of the wetland, it is anticipated that this wetland will not be affected by this project.

The Bannister Swamp is a Provincially Significant Wetland complex, made up of nine individual wetlands, and is composed of two wetland types - swamp (90%) and marsh (10%). Vegetation in this wetland includes coniferous and deciduous trees, shrubs, grasses and ferns. The wetland is hydrogeologically connected by surface water to other wetlands within 0.5 km. Commercial fish are abundant during at least part of the year. Other species include bullfrogs, snapping turtles, mink, beaver, racoon and muskrat. There is moderate disturbance or localized pollution in the area. Disturbances include roads, buildings, draining, filling and channelization. The majority of the land is privately owned (65%). The winter cover in the wetland is of provincial significance for white-tailed deer. The area is host to Caspian Tern. The wetland is located in to the east of Carson Lake. Part of the wetland area falls within the southeast portion of the study area. However, since no works will be occurring in the area of this wetland, it is unlikely that it will be affected by this project.

As noted above, there are four major wetland areas around the study area for this project. Although there are some wetlands areas located within the 250 m corridor and one kilometre regional boundary, none are located near the project well sites or within the road allowances where the transmission pipelines will be installed. Also, as noted earlier in Section 6.1.1, none of the wetland complexes are hydraulically connected to aquifers supplying water to Wells PW1 and PW2.

### 6.1.5 Species at Risk (SAR)

For the preparation of the list of species at risk, information from provincial and federal sources were compiled and reviewed. The information available is not necessarily for the Bruce Peninsula or the area of study and could be at the provincial level. The habitat of the species at risk was investigated to determine their occurrence in the project study area.

A brief description of the species that may be prevalent at or in the vicinity of the project site is provided below.

**Species at Risk - Mammal**

Grey Fox

The grey fox is a *Species at Risk Act* (SARA) Schedule I threatened species. It is a member of the dog family and is superficially very similar to the familiar red fox. It is generally found from Southern Canada to Northern Columbia and Venezuela. In Canada, the population of this species is very small and is thought to be present from southeastern Ontario (Windsor) to southwestern Quebec (Sherbrooke region). They were once abundant in eastern Canada, but disappeared 300 years ago. Grey foxes inhabit deciduous forests and marshes. They make their dens in many different kinds of substrate such as rock outcrops, hollow trees, underground burrows dug by other animals, or piles of brush, but the dens are usually located in an area of dense brush fairly close to a water source. The Grey Fox is not believed to be within the 250 m corridor of this project.

Spotted Turtle

The Spotted Turtle is a SARA Schedule I endangered species and has the same designation under COSEWIC. The loss of habitat is a major factor in the decline of Spotted Turtles. Losses are also as a result of road kill, which are on the increase. Losses are also due to their use as favoured pets and thus are increasingly removed from the wild to be held captive. The habitat for Spotted Turtles includes ponds, ditches, streams, swamps, bogs and marshes. They generally prefer soft, muddy substrate and some aquatic vegetation. The turtle requires quiet water and their presence in large, swift-flowing bodies of water usually indicates marshy areas along the shores. Spotted turtles are not believed to be within the 250 m corridor of this project.

**Species at Risk - Lepidopterans**

Monarch Butterfly

The Monarch Butterfly is a SARA Schedule I species of special concern and has the same designation under COSEWIC. The Monarch's habitat in Canada exists primarily wherever milkweed and wild flowers exist. This includes abandoned farmland, along roadsides and other open spaces where these plants grow. Wide spread and increasing use of herbicides in North America is a significant threat that kills both the milkweed needed by the caterpillars and the nectar-producing wild flowers needed by the adults.

The Monarch butterfly was present adjacent to the road allowance and within the 250 m corridor of project study area during the field visit. Monarch caterpillars were identified on milkweed along Ninth Street North and Sauble Falls Parkway. Two monarch butterflies were identified on Davies Drive and Bunnyview Drive.

**Species at Risk - Birds**

Yellow Rail

The Yellow Rail is a SARA Schedule I species of special concern and has the same designation under COSEWIC. This bird is minute in size, has buffy plumage with black and white markings, a very short tail, light eyebrow and a small bill. It is similar in appearance to a Quail. The Canadian breeding range for the Yellow Rail includes most of Ontario. Nesting Yellow Rails are typically found in marshes dominated by sedges, truegrasses and rushes where there is little or no standing water, generally zero to 12 cm of water depth, and where the substrate remains saturated throughout the summer.

They can be found in damp fields and meadows, on the flood plains of rivers and streams and in the herbaceous vegetation of bogs and at the upper levels of estuarine and salt marshes. A greater diversity of habitat types is used during migration and winter than during their breeding season. In winter, the Rails are known to use coastal wetlands. The loss and degradation of wetlands due to agricultural and human development is the greatest threat to this species throughout its breeding range. This bird is also protected by the *Migratory Birds Convention Act*.

An expert sub-consultant, based on a field survey and other research, concluded that the Yellow Rail is not in the project area and no further study or investigation is required.

Loggerhead Shrike

The Loggerhead Shrike Migrans sub-species bird is a SARA Schedule I endangered species and has the same designation under COSEWIC. The Shrikes are medium-sized black, white and grey birds with hawk-like habits. In Canada, the eastern sub-species of Loggerhead Shrike occurs mainly in Ontario and in southeastern Manitoba. Data suggests that there are about 40 pairs of Loggerhead Shrikes in Ontario. There is some evidence that the populations are sustaining themselves and that the numbers may be augmented through releases of captive bred birds. However, the present Canadian population is very low, with at most 100 pairs in three main widely separated areas. Their habitat includes open areas with some trees and shrubs, which provide nesting sites and perching sites used for hunting. The Shrikes use pasture areas because the process of pasturing keeps the grass short. Areas with short grass are good foraging areas for the Loggerhead Shrike. Habitated area size is also important because larger areas allow the birds to nest at a distance from fence lines which increases reproductive success. Habitat losses resulting from intensive agricultural practices and a shift from pasturing have contributed to the decline of Shrike numbers in Canada. This bird is also protected by the *Migratory Birds Convention Act*.

An expert sub-consultant, based on a field survey and other research concluded that the Loggerhead Shrike is not in the project area, and no further study or investigation is required.

Least Bittern

This bird has Schedule 1 is a SARA Schedule I threatened species and has the same designation under COSEWIC. The bird is a relatively small member of the Heron and Bittern family. In Canada, the bird has been reported in all provinces except Prince Edward Island. The Canadian population of Least Bitterns is estimated at less than 1,000 pairs, a majority of which are found in Ontario. The bird’s habitat includes fresh water marshes where dense, tall aquatic vegetation is interspersed with clumps of wooded vegetation and open water. They are most regular in marshes that exceed 5 ha in area. In the northern part of their range, they are most strongly associated with cattails. The main factor for the decline in the number of birds is the loss of habitat due to the drainage of wetlands and natural succession, the natural filling in of wetlands by wooded vegetation has also been a cause of the habitat loss. In southwestern Ontario, more than 90% of the original marshes are gone. Human disturbance during the nesting period is a second important limiting factor. This bird is also protected by the *Migratory Birds Convention Act*.

An expert sub-consultant, based on a field survey and other research concluded that the Least Bittern is not in the project area, and no further study or investigation is required.

**Species at Risk - Plants**

Butternut

The Butternut is a SARA Schedule I endangered species and has the same designation under COSEWIC. It is a small to medium sized tree with broad and irregularly shaped crown. It is a member of the walnut family. The species is wide-spread in Canada and grows in southern Ontario and Quebec, as well as in New Brunswick. The Butternut is mainly encountered as a minor component of deciduous forests, but large, pure populations exist on certain flood plains. It grows best in rich, moist and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those near or above limestone. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests, commonly associated with trees such as Linden, Black Cherry, Beech, Black Walnut, Elm, Hemlock, Hickory, Oak, Red Maple, Sugar Maple, Yellow Poplar, White Ash and Yellow Birch. The most serious and wide-spread threat currently faced by Butternut is a Butternut Canker, but there are no known means of fighting Butternut Canker. Logging and the disappearance of forests for agricultural and urban development purposes are the major limiting factors for the Butternut. The tree is also protected under the *Canada National Parks Act*.

American Ginseng

The American Ginseng is a SARA Schedule I endangered species and has the same designation under COSEWIC. The American Ginseng is a long-lived perennial herb which measures 20 to 70 cm in height. In Ontario, concentrations of American Ginseng occur along the Niagara Escarpment and the eastern edge of the Precambrian Shield. Only seven viable populations are known in Ontario with a total of 8,619 plants. The habitat for Ginseng includes rich, moist, undisturbed and relatively mature deciduous woods in the areas of neutral soil, such as over limestone or marble bedrock. It is also found in areas where the forest canopy is usually dominated by Sugar Maple, White Ash, Bitternut Hickory, and Basswood. Colonies of Ginseng are often found near the bottom of gentle, south facing slopes where the microhabitat is warm and well drained. The main limiting factors for Ginseng are small population size, habitat loss and degradation from clearing, logging and over-harvesting. Small populations are very vulnerable to changes in the environment.

Neither the Butternut nor the American Ginseng was observed in the project study area during a field investigation.

### 6.1.6 Fish and Fish Habitat

There are three watercourses of significance in the Sauble Beach area: the Rankin River, Sauble River, and Lake Huron.

Rankin River lies outside the 1 km regional boundary of the study area and will not be discussed further.

The Sauble River, which flows through the project area in a northerly direction before turning westward and eventually discharging to Lake Huron, has a fish community designation of “Transitional” and “Cold Water”. The fish species found in the river include the Chinook Salmon, Rainbow Trout, Small Mouth Bass and Northern Pike. The river provides habitat to 35 species of fish, none of which are considered at risk, 39 species of invertebrates and 6 species of plants. The benthic database for the Sauble River indicates the presence of over 70 species of flies, beetles, snails, worms, etc.

Lake Huron, due to its size and extent, has a wide fish community encompassing various species. To the west, Georgian Bay and Bruce Peninsula waters of Lake Huron are known for Trout and Salmon, as well as Bass and Bandfish fishing. The rivers feeding Lake Huron include Trout, Bass and Channel Catfish in lower sections.

The only project component that involves works in or near a watercourse is the crossing of the Sauble River during the installation of the transmission water main to the Robins subdivision. Since the method of achieving this crossing will be directional drilling, no in-water works will be required and adverse effects to fish and fish habitat are not anticipated.

### 6.1.7 Migratory Birds

The Bruce Peninsula is located on a major northern bird migration route. There are many species of migratory birds that can be found on the Bruce Peninsula.

Generally, birds do not fly over water. They follow the lands along the Niagara Escarpment to Tobermory, and then across Georgian Bay to Manitoulin Island and beyond. Most birds also travel at night.
The Bruce Peninsula Bird Observatory has been monitoring migration patterns since 1998. The highest concentration of nesting birds can be found during May and June each year. These include the black-throated parula, and the yellow-rumped and green warblers. These birds also have their summer homes in the wooded areas along the Peninsula. Bald eagles are also known to have their wintering grounds on the Peninsula.

A migratory bird assessment was undertaken by an avian biologist. 34 bird species (migratory and permanent) were noted in the project area, a list of which is provided in Table 6.1.7.1.

### 6.1.8 Wildlife

Local wildlife habitat in the vicinity of the project area supports a typical rural fringed wildlife community including a variety of thicket field and avian species, as well as mammals such as deer, raccoon, skunk, wolf, mouse, and squirrel. Rare species of wildlife that have been recorded on the Bruce Peninsula include several species of reptiles and mammals, none of which are known to be in the project construction areas because of the small amount of vegetative cover at the treatment plant site and proximity of residential buildings along the watermain route.

The proposed watermain alignment runs adjacent to existing roadways that are bordered by non-woody vegetation which is periodically mown. This border varies from approximately 5 m in width along Sauble Falls Parkway to 1 m in width along many of the small residential streets such as 2$^{nd}$ Avenue and Martin Drive. The borders all have similar vegetation which is dominated by a sparse growth of non-woody species such as grasses, bracken ferns, Queen Anne’s lace, ragweed, bladder campion, St. John’s wort and poison ivy.

## TABLE 6.1.7.1

## Bird Species in Project Area

| Common Name | Scientific Name | Migrant/ Permanent Resident | Deciduous Forest | Pine Plantation | Natural Conifer Forest | Mixed Forest Wetland | Residential | Riparian |
|---|---|---|---|---|---|---|---|---|
| American Crow | *Corvus brachyrhynchos* | P | X | X | X | X | X | |
| American Goldfinch | *Carduelis tristis* | P | X | | | | X | |
| American Robin | *Turdus migratorius* | M | X | X | X | X | X | |
| Baltimore Oriole | *Icterus galbula* | M | X | | | | X | |
| Belted Kingfisher | *Ceryle alcyon* | M | | | | | | X |
| Black-backed Woodpecker | *Picoides arcticus* | P | | X | | | | |
| Blackburnian Warbler | *Dendroica fusca* | M | X | | | | | |
| Black-capped Chickadee | *Poecile atricapillus* | P | X | X | X | X | X | |
| Black-throated Green Warbler | *Dendroica virens* | M | X | | X | X | | |
| Blue Jay | *Cyanocitta cristata* | P | X | | X | X | X | |
| Blue-headed Vireo | *Vireo solitarius* | M | | | | X | | |
| Broad-winged Hawk | *Buteo platypterus* | M | X | | | | | |
| Cedar Waxwing | *Bombyillia cedrorum* | P | X | | | X | X | |
| Chipping Sparrow | *Spizella passerina* | M | X | X | X | | X | |
| Common Grackle | *Quiscalus quiscula* | M | | | | X | X | |
| Downy Woodpecker | *Picoides pubescens* | P | X | | | | X | |

| Common Name | Scientific Name | Migrant/ Permanent Resident | Deciduous Forest | Pine Plantation | Natural Conifer Forest | Mixed Forest Wetland | Residential | Riparian |
|---|---|---|---|---|---|---|---|---|
| Hermit Thrush | *Catharus guttatus* | M | X | X | | | | |
| House Wren | *Troglodytes aedon* | M | X | | X | | X | |
| Magnolia Warbler | *Dendroica magnolia* | M | | | X | | | |
| Mallard | *Anas platyrhynchos* | M | | | | | | X |
| Mourning Dove | *Zenaida macroura* | P | | | | | X | |
| Nashville Warbler | *Vermivora ruficapilla* | M | | | | X | | |
| Northern Cardinal | *Cardinalis cardinalis* | P | X | | | X | X | |
| Northern Flicker | *Colaptes auratus* | P | X | X | X | X | X | |
| Ovenbird | *Seiurus aurocapilla* | M | X | | | | | |
| Pine Warbler | *Dendroica pinus* | M | | X | | | | |
| Red-breasted Nuthatch | *Sitta canadensis* | P | | X | X | | | |
| Red-eyed Vireo | *Vireo olivaceus* | M | X | | | X | X | |
| Scarlet Tanager | *Piranga olivacea* | M | X | | | | | |
| Song Sparrow | *Melospiza melodia* | M | X | | X | X | X | |
| Spotted Sandpiper | *Actitis macularius* | M | | | | | | X |
| White-breasted Nuthatch | *Sitta carolinensis* | P | X | | | | X | |
| White-throated Sparrow | *Zonotrichia albicollis* | M | | | | X | | |
| Winter Wren | *Troglodytes troglodytes* | M | X | | | X | | |

Habitat immediately adjacent to the proposed worksites can be classified into six general types:

- Much of the proposed route will run through residential areas. Residence areas adjacent to the watermain occur along all of much of 2nd and 3rd Avenues, 6th Street, Jubilee Bridge Road, D Line, Deer Trail Road and Martin Drive. In these residential areas, natural cover has been modified to varying degrees. Some lots have been left with most of the original trees, understorey and ground cover intact and provide habitat similar to a nearby forest. Other lots have been altered by removing large native trees and planting lawns, ornamental shrubs and trees. Where lots have been left largely unmodified, they are generally maple dominated except along 2nd and 3rd Avenues where conifers dominate;

- Along most of Sauble Falls Parkway and portions of 6th Street, Jubilee Bridge Road and D Line, the watermain will run adjacent to a deciduous forest at a distance of 3 to 5 m from the forest edge. This forest is generally dominated by mid-aged to fairly mature sugar maple trees growing on well drained sandy soils. Along 2nd and 3rd Avenues, the watermain will skirt pockets of natural conifer forest dominated by white cedar but also containing white pine, red pine and white spruce. At the southern end of Sauble Falls Parkway, the watermain will parallel the edge of a mixed forest wetland at a distance of approximately 5 m. Common trees here are white cedar and red maple with an understorey of balsam fir;

- The watermain will run parallel to and at a distance of one to five metres from the edge of pine plantations at the northern end of Sauble Falls Parkway, within the Amabel Sauble School yard and eastern portions of Jubilee Bridge Road. These plantations are composed of mid-aged red and scots pine;

- The watermain will also cross riparian habitat at the Jubilee Bridge Road crossing of the Sauble River. The habitat here includes mixed forest;

- The Gremik, Robins, Thomson and Trask pumphouses, which are slated for demolition, are surrounded by several general habitats. The Gremik and Thomson pumphouses are adjacent to mixed forest. The Robins pumphouse is adjacent to mature maple dominated forest. The Trask pumphouse has both deciduous forest and residential habitat bordering them; and,

- The proposed water treatment plant and pumphouse at the Amabel Sauble School yard will be constructed in what is currently a mid-aged red pine plantation with some mature trees and shrubs. Most of the vegetation at the site was cleared during the construction of the school building, parking lots, access roads, children's play area, fire storage tank and septic beds.

### 6.1.9 Air Quality

The provincial Ministry of Environment has ambient air monitoring stations located throughout Ontario. Air monitoring stations measure the levels of six types of contaminants, ozone, fine particulate matter, nitrogen dioxide, carbon monoxide, sulphur dioxide, and total reduced sulphur (TRS) compounds. Based on the measured concentrations of these contaminants, an Air Quality Index (AQI) value is calculated.

Although an air monitoring station is not located on the Bruce Peninsula, the closest station is located in Tiverton, which is approximately 50 km southwest of Sauble Beach. Since Tiverton is in close proximity to Sauble Beach, and also since it is located within 5 km of the Lake Huron shoreline, it is reasonable to assume that the air quality data available from this monitoring station would provide a relatively accurate representation of the airshed conditions in the study area.

Table 6.1.9 summarizes the AQI at the Tiverton monitoring station for the time period of 2003 - 2005. This information was obtained from 2003, 2004 and 2005 MOE reports entitled "Air Quality in Ontario".

**Table 6.1.9**

**Air Quality Index (2003 - 2005): Tiverton Monitoring Station**

| Year | Percentage of Valid Hours in AQI Range | | | | |
|---|---|---|---|---|---|
| | Very Good (0 - 15) | Good (16 - 31) | Moderate (32 -49) | Poor (50 - 99) | Very Poor (100+) |
| 2003 | 21 | 67.6 | 10.4 | 1.0 | 0 |
| 2004 | 34.7 | 58.3 | 6.9 | 0.1 | 0 |
| 2005 | 23.7 | 65.9 | 9.7 | 0.6 | 0 |
| Average | 26.5 | 63.9 | 9.0 | 0.56 | 0 |

Based on these findings, the air quality in the study area is, on average, assumed to be good to very good approximately 90% of the time.

### 6.1.10 Soil Quality

Information concerning soil quality was collected by reviewing potentially contaminated sites databases. The Provincial Ministry of Environment collects and maintains databases pertaining to landfills, fuel storage tanks, spills, discharges from wastewater treatment plants, etc. Waterloo Hydrogeologic Inc. (WHI) completed a Grey and Bruce Counties Groundwater Study Report in May 2003 for the Ministry of Environment which obtained and utilized information pertaining to potentially contaminated sites. Information was obtained for each of the existing seven water supply wells in the area. The report indicated there are few storage sites in the Sauble Beach area and no known sources of PCB storage, contaminant spills, etc. There are no wastewater treatment plants or landfill sites near the study area that could cause contamination of the soil. WHI used this contaminated sources information, determined Intrinsic Susceptibility Factors and prepared maps. These maps are essentially indicators of contaminated sources impact on ground water quality and could indirectly provide information on the nature of the soil in capture areas of the wells. The maps indicate medium to high susceptibility for Sauble Beach area.

Residential septic beds are located throughout Sauble Beach, including along the watermain route. At the proposed treatment plant site, the nearest septic bed is at a distance of approximately 140 m from Well PW1, and approximately 165 m from well PW2.

The soils in the project study area are predominantly silty sand till materials to varying depths. The soil comprises of a drumlinized till plain that has been modified with the deposition of a thin veneer (10 - 20 m) of sand deposits near surface. Coarser materials consisting of sand and gravel are remnants from shoreline deposits, beaches, bars and spits, and possibly glaciofluvial deposits. Overburden thickness of 6 m to 20 m overlies the Guelph Formation dolostones.

## 6.2 Socioeconomic and Cultural Environments

### 6.2.1 Adjacent Land Uses

Adjacent land use in the project area consists of a combination of residential, institutional and natural. The treatment plant building will be located adjacent to the existing Amabel Sauble School building, which is a sensitive receptor. There are existing homes around the treatment plant site location, as well as along the water transmission route. The Sauble River winds through the Sauble Beach area and is approximately 300 m from the school site at its closest point.

There is a Fire Hall near Trask Pumphouse location. The community hall and the library building are located within the 1,000 m regional boundary of the project area.

### 6.2.2 Aesthetics

The treatment plant building will be located on the same site as is Amabel Sauble School. The school bulding was constructed by the Bluewater District School Board in mid 1990's. The building has an attractive architecture and is also used for public meetings and other activities. School Board officials, during consultation, indicated their sensitivity to the plant building architecture and requested that the building exterior compliment the existing school building. The Board officials' concerns about the architecture of the proposed treatment plant building can be resolved through design considerations.

The area along the watermain route is primarily residential. The area along Sauble Falls Parkway, Amabel Sauble School and eastern portions of the Jubilee Bridge Road has prime plantation, composed of mid-aged red and scotch pine. Aesthetics will not be a factor with respect to the watermain portion of the project.

### 6.2.3 First Nations

There are two First Nations communities on the Bruce Peninsula. The Cape Croker First Nations community is a significant distance the north of the Sauble Beach area and has not been considered further. The Saugeen First Nation community is just south of Sauble Beach community boundary but outside the regional boundary for this study.

Land uses on Saugeen First Nation reserve include 17 to 20 local businesses (craft shops, fisheries, carpentry, bus operators, a construction company, auto body repair shop, campground, gas bar and variety store, photography shop, an amphitheatre and gardens, hairstyling, towing services, etc). The reserve also has local attractions that include the Saugeen Amphitheatre, which is an outdoor theatre located in the heart of the Village of Saugeen and overlooks the scenic Saugeen River, rock gardens, fishing locations and the South Sauble Beach Park which is a sandy beach. Several community events are held throughout the year and include a fireworks display, a slo-pitch tournament, a fastball tournament, historical walking tours, bingo games, etc. The reserve lands may also have sacred and traditional sites.

### 6.2.4 Heritage and Historical Cultural Resources

Heritage resources in the Sauble Beach area, based on the National Heritage Information Centre website, include Sauble Falls, the Rankin Waterfall Management Area, the Rankin River Wetland, Oliphant Marsh and Sauble Falls Provincial Park. Sauble Falls has been a life science ANSI, and is considered one of the best remaining examples of natural vegetation's response to beach ridges, sand plains, sand dunes and swales. The majority of the ANSI is privately owned. The Sauble Falls Bridge on Sauble River, built in 1929/30, is intended to be designated under Part IV of the Ontario Heritage Act by the Town of South Bruce Peninsula. Although these sites are in the Sauble Beach area, none are within the regional boundary of the project.

The Ministry of Culture, Heritage & Libraries Branch of Southwest Ontario region, initially indicated an interest in the study area and informed the Proponent that "after a confirmation of the project site, they will determine what portions of the project, if any, may exhibit potential for impacting heritage resources and requiring an assessment to inventory all heritage resources present and determine what mitigation work, if any, may be required". Later, after review of the submitted information pertaining to the project, the Ministry confirmed that the proposed project will not impact any cultural resources.

### 6.2.5 Local Neighbourhood and Residents

The local neighbourhood of the project includes residences within the 250 m corridor. Residential buildings are located around the both the proposed well and treatment plant site as well as along the watermain transmission routes. Many of the residences are occupied only during the summer season with very few homes being occupied on a year-round basis.

Other land uses within the 250 m corridor include the elementary school, a daycare, some commercial businesses, a gas station, a pet hospital and a fire station on the Sauble Falls Parkway.

### 6.2.6 Local Users of Groundwater

The local users of groundwater in the project study area (250 m corridor as well as 1,000 m regional boundary) are primarily the residents owning cottages and homes as well as business owners. The majority of these residents utilize sand points which obtain water from the water table aquifer. A few of the homes in the area utilize bedrock wells. The largest water user may be the Amabel Sauble School which has the largest capacity water supply well.

With the implementation of this project, the school will no longer be a local user of groundwater since the school's well will become one of the new municipal wells (PW1). The school will receive its potable water from the new water treatment plant.

### 6.2.7 Noise and Vibration

Background noise and vibration levels in the project study area are similar to that of a quiet residential neighbourhood along the transmission watermain route. No specific noise assessments have been completed in the project study area. There are no sensitive receptors (such as schools, hospital, churches, etc.) within the 250 m corridor of along the transmission watermain routes, raw watermain route, or the existing pumphouse locations. At the proposed treatment plant building location, the sensitive receptor is the school, which is subjected to traffic related noise and vibration during the summer period due to the proximity of the school site to Sauble Falls Parkway (County Road #13). During the spring, fall and winter period, man-made noise and vibration levels are much lower due to the absence of tourists and seasonal residents in the area.

At the Amabel Sauble school area, noise levels would be similar to those of a primary and elementary school. During the summer months, the levels are lower due to the closure of the school.

There is no significant industrial or commercial activity in the project study area that would cause background noise and vibration. Based on land usage, actual observations and familiarity with traffic patterns, it is estimated that the existing ambient noise levels for the study area ranges from 60 to 70 dB with periodic increases due to traffic within the urban setting.

The Municipality has a Noise Control bylaw.

### 6.2.8 Public Health and Safety

Residences in the Sauble Beach area and more specifically, the project study area (the raw and treated watermain routes, and seven existing pumphouse locations), currently use septic beds for the treatment of sewage, and sand points or drilled wells for obtaining water supplies for domestic use. In certain areas of Sauble Beach, there may not be adequate separation between the water supply sand points and the septic beds which may have caused an existing public health and safety issue. The local Grey Bruce Health Unit however, is aware of the issue. Flowing ditches in the Sauble area that have been sampled for bacterial contamination confirm the presence of E.coli.

The existing communal water system customers currently receive a chlorinated water supply and after construction of the project, will continue to receive chlorinated water. However, with the implementation of this project, residual chlorine levels in the water will be lower than the current levels since the proposed treatment equipment should reduce chlorine demands. To meet the regulatory requirements, residual chlorine levels in the distribution system, which are currently as high as 1 to 2 mg/L, will be reduced to approximately 0.5 mg/L once the new treatment plant is in operation.

Chlorine is utilized as a disinfection chemical in order to protect public health and safety and is mandated by the Province of Ontario. The other methods of disinfection such as chlorine dioxide and total chlorination are available, but they are not as effective as chlorination or have other safety issues including operator health and safety. The chemical used for chlorination, a 12% sodium hypochlorite solution, is a food grade chemical and is suitable for use in the potable water treatment industry.

### 6.2.9 Worker Health and Safety

The existing seven treatment plants are run by licenced operators who receive an adequate level of training and education to deal with the hazards applicable to the water treatment industry. The hazards in the existing plants relate to the high pressure piping, treatment chemicals, high voltage electrical equipment, MCC, electrical panels, etc.

The existing distribution system and water supply wells maintenance and repair is undertaken by the contractors specialized in the construction and repair of watermains, services and wells. The contractors employ construction methods in accordance with provincial labour laws to ensure worker health and safety.

# 7 ENVIRONMENTAL EFFECTS ANALYSIS AND DETERMINATION OF SIGNIFICANCE

This section of the report provides a summary of the potential environmental impacts of the project on the selected VEC's. The evaluation of environmental effects follows the assessment methodology presented in Section 2.2 of this report. The results of the individual VEC assessments are found in Table 7.3.1 in Section 7.3.1.

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

$ Potential environmental effects
$ Measures to mitigate effects
$ Residual effects
$ Significance of Residual effects

## 7.1 <u>Physical and Natural Environment</u>

### 7.1.1 Ground Water Quantity and Quality

#### 7.1.1.1 Potential Effects on Ground Water Quantity and Quality

<u>General</u>

Environmental effects to groundwater quantity relate to the depletion of the water supply aquifer during the operational phase of the project. Groundwater quality could be impacted by contaminant sources in the capture zone of the water supplying wells, which include septic systems, abandoned fuel storage tanks, private wells not abandoned properly, pesticides and insecticides that have been used in the capture zone area, and accidental spills. These contaminant sources could adversely impact the municipal water supply if they are allowed to migrate or could migrate into the ground and move towards the water supply aquifers. Environmental effects can also pertain to interference with existing private water supplies, and connectivity with the Sauble River and wetlands in the area.

<u>Well Capacity Evaluation Programme</u>

Refer to Section 6.1.1 for information concerning well construction. A well capacity evaluation was undertaken by performing a series of step tests and long-term pump tests. During the pump test on well PW2, drawdown measurements were taken at Well PW1 and the existing Fedy well, which is approximately 745 m east of well PW2. The potential interference to private wells was evaluated by conducting a water well survey within a 500 m radius of Well PW2 and shallow standpipe TH1, which was constructed near Well PW2. Three responses were received from the well survey and all were noted to use sand points for their water supplies. A summary of the short term and long term pump test is provided in Table 7.1.1. The table has been reproduced from the Aquifer Evaluation Report prepared by HPA, and has been simplified for this CSR. A review of this table highlights that several pump tests were undertaken due to the complexity involved in the analysis of water supplying aquifers. Due to the complexities involved, the lower water supplying aquifers were isolated by utilizing packers in order to perform a complete and thorough investigation of the aquifer behaviour.

Drawdown

Well systems are generally designed to allow for sustained pumping from a well to a water elevation approximately 0.5 m above the pump setting depth. If more than one water supply fracture contributes to the well water supply, cascading of the water is prevented due to the possible changes in the water quality which include changes in chemistry, the release of dissolved gases, or an increase in turbidity. The Aquifer Evaluation considered the cascading impact and analysed it by taking water samples during the pump test. Turbidity was not thought to be a serious issue due to the proposed use of a greensand filter during treatment for the removal of iron-related turbidity in the water.

Since the well pump will be placed at a design depth of approximately 76 m below the ground surface, a drawdown up to this depth was considered in the aquifer evaluation for the 20-year design life of this project.

Interference

Potential interference with the existing wells was evaluated by performing simultaneous drawdown measurements in Well PW1 and the Fedy well during the pump testing of Well PW2. As stated earlier, the Fedy well is approximately 745 m east of pumping well PW2. Interference to the Fedy well was noted after pumping for 1,020 minutes at a rate of 916 $m^3$/day (140 IGPM). The water level in Fedy well dropped by 1.66 m. Potential interference was also assessed for the condition when Wells PW1 and PW2 were pumping together at a combined rate of 753 $m^3$/day (115 IGPM). Cascading was permitted in this case. For this scenario, a zero drawdown was noted at a distance of approximately 1,000 m.

Interference with the sandpoints in the water table aquifer was not found. This was confirmed by the monitoring of water levels in shallow standpipe TH1 which was located

**Table 7.1.1**
**Summary of Pumping Test Information**
**for Wells PW1 and PW2**
**Amabel-Sauble School**
**Town of South Bruce Peninsula**

| Date | Well | Pumping Rate | | Duration | Type of Test | Aquifer | Comments |
|---|---|---|---|---|---|---|---|
| | | L/M | (IGPM) | | | | |
| **June 1994** | | | | | | | |
| June 9, 1994 | PW1 | 408.6 | 90 | 24 hours | Driller | Entire | |
| **May 2002** | | | | | | | |
| May 15, 2002 | PW1 | 372.3 | 82 | 2 hours | Constant Rate | Entire | using existing school pump |
| **August 2002** | | | | | | | |
| August 14, 2002 | PW2 | 431.3, 567.5, 794.5 | 95, 125, 175 | 3 x 1 hr steps | Step | Entire | |
| August 15, 2002 | PW2 | 794.5 | 175 | 4 hr 5 min | Constant Rate | Entire | pump @ 60 m (200') |
| | | 567.5 | 125 | 4 hr 25 min | Constant Rate | Entire | Rate decreases to 125 IGPM |
| **September 2002** | | | | | | | |
| September 24, 2002 | PW2 | 227, 340, 454, 567, 681 | 50, 75, 100, 125, 150 | 5 x 2 hr steps | Step #1 | Entire | |
| September 25, 2002 | PW2 | 1135 | 250 | 100 min | Step #2 | Entire | |
| | | 712.8-780.9 | 157-172 | 4 hrs | Constant Head | Entire | |
| | | 635.6 | 140 | 4 hrs | Constant Rate | Entire | |
| September 26, 2002 | PW2 | 635.6 | 140 | 48 hrs | Constant Rate | Entire | pump @ 88.3 m (290') |
| **January 2003** | | | | | | | |
| January 8, 2003* | PW2 | 22.7, 45.4 | 5, 10 | 2 x 2 hr steps | Step | Upper | packer @ 33.5 m (110'), pump @ 27.4 m (90') |
| **February 2003** | | | | | | | |
| February 10, 2003 | PW2 | 22.7, 45.4, 68.1, 90.8, 113.5, 136.2 | 5, 10, 15, 20, 25, 30 | 6 x 2 hr steps | Step | Lower | packer @ 33.5 m (110'), pump @ 76.2 m (250') |
| February 13, 2003 | PW2 | 113.5 | 25 | 24 hours | Constant Rate | Lower | packer @ 33.5 m (110'), pump @ 76.2 m (250') |
| February 19, 2003 | PW2 | 227.0 | 50 | 8 hours | Constant Rate | Upper | packer @ 33.5 m (110'), pump @ 27.4 m (90') |

*The testing on January 8, 2003 was aborted after two (2) step test as the packer configuration would not allow drawdown below the pump.
For testing commencing February 10, 2003, a specialized fabricated packer was employed.

adjacent to the pumping well. Water level measurement actually showed a rise (rather than fall) during the pump test, thereby indicating that the shallow sand aquifer is not connected to the aquifer supplying water to Wells PW1 and PW2.

An assessment of the interference effects following one year of continuous pumping at an approximate rate of 261 $m^3$/day (40 IGPM), which is the anticipated average day pumping rate, predicted a drawdown of 2.3 m.

As previously mentioned, shallow standpipe TH1 that was installed adjacent to the pumping well had a rise in water level during the pump test, which indicated there was no drawdown of the shallow sand aquifer during pumping. This implied that the shallow sand aquifer is not connected to the bedrock aquifer. There will be, therefore, a negligible impact to wetlands due to pumping from the bedrock aquifer, and thus no mitigative measures were indicated in the Aquifer Evaluation Report.

Recharge

The aquifer analysis, based on the short term and long term pump tests, was undertaken based on the most severe environmental assumption of no recharge during the 20-year pumping of the aquifer to allow for a sufficient safety factor and thereby ensuring a reliability of long term water supply from Wells PW1 and PW2. In response to NRCan's observations and recommendation, recharge calculations were undertaken by reviewing Grey and Bruce County's Groundwater Study Final Report dated May 2003, prepared by Waterloo Hydrogeologic, as well as the report entitled "Saugeen-Grey-Sauble-Northern Bruce Peninsula Preliminary Conceptual Water Budget Report", dated 2006 in draft form and prepared by Grey Sauble Conservation Authority. Based the Conservation Authority's report, the estimated recharge of clay/clayey tills in the Bruce County area is 140 mm per year and for impervious bedrock, it is 115 mm per year. In the area where Amabel Sauble School is located, a recharge of 197 to 240 mm per year was proposed. The WHI report for the Grey Bruce Water Study estimated a recharge ranging from 75 mm per year to 150 mm per year across the Counties. The WHI report did not include capture zones for Amabel Sauble School well as it was not yet a municipal well at the time of report preparation. However, the capture zones for Winburk water supply well were provided in the report. The 10-year recharge area for Winburk well is 410,000 $m^2$ and the 25-year recharge area is 1.44 $km^2$. Using approximately 1.1 $km^2$ of recharge area for the 20-year capture zone, the aquifer recharge is estimated to be 82,500 $m^3$ based on 75 mm per year, 165,000 $m^3$ per year based on 150 mm per year and 216,700 $m^3$ per year based on 197 mm per year of recharge for the Sauble area. Therefore, by using a conservative estimate for the Winburk water supply well, the recharge volume is estimated at 165,000 $m^3$ per year. For Amabel Sauble school wells, the capture zone will be approximately the same as the Winburk water supply well. Therefore, a conservative recharge estimate of 165,000 $m^3$ per year can also be utilized for Amabel Sauble wells. This recharge volume is significantly greater than the amount of water that would be withdrawn every year from Amabel Sauble School well, which is estimated at approximately 98,550 $m^3$ per year.

GUDI Status

The Aquifer Evaluation Report concluded that the aquifers which will supply water to Wells PW1 and PW2 are not directly connected to surface water sources. This was based on the monitoring of standpipe TH1 during pump tests, the presence of a relatively impermeable layer of clay and stones above the bedrock aquifer (approximately 9 to 10 m in thickness), as well as the study of groundwater chemistry.

The Sauble River basin is approximately 300 m from the well location. There is approximately 2.5 m to 6.1 m of impermeable clay and stones under the bed of Sauble River and above the bedrock. As a result, the report concluded there was no direct (hydraulic) connection between the Sauble River and bedrock aquifer supplying water to the wells.

Groundwater Quality

Chemical water quality samples were taken from the existing Well PW1 as well as PW2 during pumping tests. In order to evaluate the water quality in the upper and lower aquifers, separate samples were taken. Two water samples from the lower aquifer and two water samples from the upper aquifer only were taken. A summary of selected water quality parameters is provided in Table 7.1.2. The summary highlights that the water quality of the new municipal Well PW2 has similar chemistry to that of the existing Amabel Sauble Well PW1. Chlorides were relatively low in both wells, ranging from 4.9 to 7.0 mg/L. The hardness was found to be elevated, ranging from 172 to 190 mg/L. Turbidity at the end of the 48 hour test was 0.8 NTU. Nitrate was generally non-detectable and organic nitrogen was noted to be less than the operational guideline of 0.15 mg/L. From the bacteriological standpoint, the water quality was good. A complete water quality analysis that was completed for the water sample taken from Well PW2 indicated that all parameters meet the Ministry of the Environment's Ontario Drinking Water Standards, thereby showing good raw water quality. The fluoride level was somewhat elevated in Well PW2 with a reading of 1.2 mg/L, which is below the recommended level of 1.5 mg/L and below maximum acceptable concentration (MAC) of 2.4 mg/L. As shown in Table 7.1.2, fluoride levels were found to be higher in the lower aquifer as compared to the upper aquifer, but were still below the MAC of 2.4 mg/L.

**Table 7.1.2**
**Summary of Selected Water Quality Parameters**
**Amabel-Sauble School Water Wells**
**Town of South Bruce Peninsula**

| Selected Water Quality Parameters | | ODWS Criteria (mg/L) | Well PW1 Existing School Supply Well | | Test Well PW2 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Water Quality Entire Formation | | | | Water Quality Lower Aquifer Below 33.5 m to 82 m | | Water Quality Upper Aquifer Above 33.5 m | |
| | | | March 19 2002 | April 4 2002 | Aug. 15 2002 | Sept. 26 2002 10:00 a.m. | Sept. 26 2002 4:00 p.m. | Sept. 28 2002 9:45 a.m. | Feb. 13 2003 @1 hour | Feb. 14 2003 @24 hours | Feb. 19 2003 @1 hour | Feb. 19 2003 @8 hours |
| Chloride | (mg/L) | 250 | -- | 7.0 | 5.5 | 5.1 | 4.9 | 6.3 | 17.3 | 20 | 5.5 | 5.7 |
| Hardness | (mg/L) | 80.1 | -- | 177 | 190 | 180 | 185 | 172 | 149 | 153 | 213 | 212 |
| Turbidity | (NTU) | 1 NTU | -- | 3.3 | -- | 3.2 | 3.3 | 0.8 | 1.1 | 1.3 | 2.0 | 1.8 |
| Colour | (TCU) | 5 | -- | 2 | -- | ND | ND | ND | 2 | ND | ND | ND |
| Nitrate | (mg/L) | 10 | ND | ND | ND | ND | ND | ND | ND | ND | 0.1 | 0.1 |
| Ammonia | (mg/L) | | -- | 0.21 | 0.37 | 0.34 | 0.35 | 0.36 | 0.22 | 0.20 | 0.32 | 0.33 |
| Fluoride | (mg/L) | 2.4 | 1.6 | 1.8 | 1.1 | 1.0 | 1.1 | 1.2 | 2.3 | 2.3 | 0.8 | 0.9 |
| Iron | (mg/L) | 0.3 | ND | 0.37 | 0.46 | 0.11 | 0.25 | 0.23 | 0.42 | 0.18 | 0.22 | 0.22 |
| Manganese | (mg/L) | 0.05 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Sodium | (mg/L) | 200 | 12.5 | 9.6 | 5.0 | 6.9 | 5.6 | 7.1 | 17.3 | 18.5 | 5 | 6.4 |
| Total Coliform | (cts/100 mL) | 0 | -- | -- | -- | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| E. Coli | (cts/100 mL) | 0 | -- | -- | -- | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Background | (cts/100 mL) | 200 | -- | -- | -- | 6 | 3 | 2 | 0 | 10 | 0 | 0 |
| | | | | | | | | | | | | |
| Pumping Rate | Litres/min Ö | | 373 | 373 | 568 to 796 | 636 | 636 | 636 | 114 | 114 | 227 | 227 |
| From Well | (IGPM) Ö | | (82.3) | (82.3) | (125 to 175) | (140) | (140) | (140) | (25) | (25) | (50) | (50) |

ODWS - Ontario Drinking Water Standards (Ministry of the Environment, 2001)
ND - not detectable

Note: The water samples for Test Well PW2 were taken during various pumping tests. Samples were taken separately for lower aquifer and upper aquifer by installing a packer to separate the two aquifers.

NRCan Comments and Observations

NRCan was requested by the Canadian Environmental Assessment Agency and Industry Canada to review the Aquifer Evaluation Report prepared by HPA, and provided 35 comments and recommendations. This section highlights some of the key issues as identified by NRCan.

$ A small discrepancy was noted in the location of the upper fracture as noted on the driller's log as compared to the downhole video log. The video log report was noted to be more accurate than the driller's report.

$ NRCan disagreed with the analysis by the Consultant relating to the upper fracture response to pumping. The rapid decline in the water levels during the pumping test indicates three important characteristics of the aquifer near PW2. NRCan pointed out that although the report recognizes and describes the first two characteristics, the implications of the third characteristic is not fully appreciated. These characteristics were:

  $ Since the upper fracture provides most of the water to the well, the aquifer above the upper fracture has the highest transmissivity;

  $ The aquifer below the upper fracture has a much lower transmissivity than the aquifer above the fracture; and

  • When the pumping water level drops below the fracture, the water flow through the upper fracture into the well stabilizes and may decrease gradually.

$ NRCan observed that the drawdown for the Fedy well may be over-estimated, which consequently leads to the overestimation of transmissivity of the aquifer.

$ NRCan disagreed with the analysis of the composite drawdown for the upper and lower aquifers by the Consultant for two reasons. The reasons related to the non-acceptance of the superposition principle used by the Consultant for the two aquifers in the same well, and the behaviour of the upper fracture as noted above.

$ NRCan provided comments pertaining to the 120 day yield from the aquifer and also disagreed with the higher recommended pumping rate with cascading. NRCan disagreed with this pumping rate due the upper fracture response to pumping.

- The above-noted first series of comments accompanied the recommendation advising the Consultant to undertake a modest re-analysis of some of the existing data to provide more realistic estimates of sustainable pumping rates. NRCan also recommended that a contingency plan be developed in the event that Wells PW1 and PW2 could not produce sufficient water for all of the community's needs.

- NRCan completed some of its recommended re-analysis and noted that the combined long-term pumping rate of 327 $m^3$/day would lower water levels below the upper fracture zone after 20 years of pumping Wells PW1 and PW2. They also noted that there will be additional drawdown due to the community's larger summer population use, which had not been correctly evaluated.

- NRCan noted that the use of Winburk well as a contingency measure, as proposed in the provincial Class EA Report and by the Consultant, in response to NRCan's comment was good and advised that the project scope be amended to include the Winburk well and the construction of raw water supply main to the plant site as part of the project design.

- NRCan outlined the need to develop contingency plans that would include the monitoring of water levels in the pumping wells and the analysis of these monitoring results periodically in order to anticipate any future problems.

#### 7.1.1.2 Measures to Mitigate Effects on Groundwater Quantity and Quality

In order to minimize the adverse environmental effects of the project on groundwater quality and quantity, standard construction mitigation measures will be employed during the construction phase, as well as the following specific mitigation measures:

- Groundwater quality should be monitored throughout the operational phase of the project in accordance with the MOE protocols. Remedial measures should be implemented to address any identified problems and additional monitoring and reporting implemented as necessary and in accordance with MOE protocols.

- Following the completion of Source Water Protection Study for the Amabel Sauble School well that is currently being undertaken by the GSCA, the report should be reviewed by the Consultant and a report be provided to the Municipality highlighting the concerns that may result from the report.

$ The well head protection area as identified in the GSCA report, which is based on more accurate three dimensional models, shall be adopted and implemented. The Proponent shall control land use activities in the capture zones in order to eliminate any impacts of water taking from the aquifer that are potentially connected to the aquifer supplying water to PW1, PW2 and the Winburk well. This information shall also be provided to the Ministry of the Environment London office in order that they are aware of issue for any future Permit To Take Water in this area.

$ By way of land use control, as allowed by the existing laws, the Municipality shall ensure that any activities that could interfere with or affect the water quantity and quality of the aquifer supplying water to the production wells are prevented.

$ Implement directional drilling method for the construction of the watermain where the groundwater table is high to mitigate any impact on the sandpoints being used by the residences along the watermain route.

$ The standard construction mitigation measures that are provided in Section 10 shall be incorporated into the contract specifications of the project, the implementation of which will serve to minimize the adverse effects of the project on the groundwater resources.

$ A well water level monitoring and analysis program shall be undertaken as identified in Section 10.2 and a follow-up program as identified in Section 15. The review and analysis shall be undertaken by a professional hydrogeologist and an annual report shall be prepared. This program shall be undertaken initially for a period of 3 years and shall be extended as necessary.

#### 7.1.1.3 Residual Effects

Based upon the findings of the hydrogeologic investigations, the project has the potential to generate residual effects by way of gradual depletion of the groundwater resource in the project study area, if the recharge of the aquifer is not as per the investigations undertaken.

#### 7.1.1.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up and any necessary adaptive management, the implementation of the project is not expected to have a significant adverse environmental effect on groundwater quantity and quality. In this regard, the anticipated residual effect of this project on groundwater quantity and quality would be considered moderate in magnitude after the implementation of the mitigation measures, and based upon the impact criteria presented in Table 7.3.1.

### 7.1.2 Surface Water Quantity and Quality

#### 7.1.2.1 Potential Effects on Surface Water Quantity and Quality

The potential effects of the project on the surface water quality and quantity of local watercourses were considered. The following conclusions were developed from the findings of the analysis:

$ Both Amabel Sauble Wells PW1 and PW2 withdraw water for the municipal water supply from the drilled groundwater wells that are connected to neither the Sauble River, nearby wetlands, nor groundwater table.

$ The results of the aquifer testing, water chemistry test results, and the presence of approximately 9.1 to 10.4 m of overburden comprising of silty sand and clay with a relatively low hydraulic connectivity, all indicate that the well is unlikely to have a significant impact upon surface water features.

$ Accidental chemical, fuel and other deleterious materials spills may impact surface water quality. Refer to Chapter 9: Malfunctions and Accidents for further details.

$ The bedrock aquifer at the well site is not considered GUDI and is not expected to be affected by surface water features.

$ The pumping tests on Well PW2 were completed in a manner which resulted in no direct discharge to surface water bodies. Pumping tests on Well PW1 and the Winburk well following improvements to the well will be undertaken in the same manner.

$ Construction of the transmission watermain across the Sauble River at the Jubilee Bridge crossing can potentially impact the surface water VEC.

For the construction of the raw and transmission watermains, some sections (approximately 2,300 m) will require dewatering. This water will be discharged into roadside ditches. The pumping of significant volumes of water during dewatering could have an impact on the surface water supply by way of its discharge into ditches, which will eventually reach the river. Dewatering for watermain construction would only impact surface water temporarily (up to 9 days) at designated locations. These are identified by the shaded areas on Figure 6.1.1.

Excavation for the new treatment plant building and decommissioning of the existing plant buildings and four wells will have no effects on surface water.

The effects on this VEC are of medium term duration for watermain and long term for plant building, high frequency during construction, localized geographically, reversible and of low magnitude.

#### 7.1.2.2 Measures to Mitigate Effects on Surface Water Quantity and Quality

In order to minimize the adverse environmental effects of the project to surface water quality and quantity, standard sediment and erosion controls will be employed during the construction phase. Section 10.1 summarizes these measures in tabular format.

In addition to standard construction techniques, the following measures (some of which attempts avoidance) will mitigate effects on surface water.

$ Employ the directional drilling method in high water table areas (approximately 2,300 m of watermain length).

$ Construction of the watermain crossing at Jubilee Bridge location is to be achieved by directional drilling.

$ Construct the watermain at shallower depths in high water table areas, and use insulation to prevent the watermain from freezing.

$ In high water table areas, if possible, undertake watermain construction in the late summer period when the water table will be lower.

$ Avoid construction of the watermain during rainy periods when ditches are flowing.

$ Undertake measures to safely discharge flushing wastewater during testing and commissioning of the watermain.

$ Employ licenced contractors to decommission the existing wells.

#### 7.1.2.3 Residual Effects

Given the minimal interaction between the groundwater supply wells and surface water resources, water withdrawal from the aquifer is not anticipated to generate any residual effects on this VEC.

There is minimal interaction between the construction activities associated with the treatment plant building, the demolition of existing pumphouse buildings and decommissioning of the existing water supply wells and the surface water resources. As a result, this component of the project is not anticipated to generate any residual effects on this VEC.

There will be some temporary impact to surface water quality and quantity due to the construction of raw and transmission watermains. However, with the implementation of mitigation, this componenet of the project is not anticipated to generate any residual effect on this VEC.

#### 7.1.2.4 Significance of Residual Effects

With the implementation of the identified mitigation measures including monitoring and any necessary adaptive management, the implementation of the project is not expected to have a significant adverse environmental effect on surface water quality and quantity. In this regard, the anticipated residual effect of this project on surface water resources could be considered negligible in magnitude based on the impact criteria presented in Table 7.3.1.

### 7.1.3 Vegetation

#### 7.1.3.1 Potential Effects on Vegetation

As discussed in Section 6.1.3 of this report, terrestrial vegetation features within the study area are not considered sensitive to development and are commonly found in the local area. Construction related activities will result in temporary removal of approximately 6,900 $m^2$ of vegetation (including roadside grass, shrubs and trees) within the right-of-way for watermain construction, and includes the permanent removal of approximately 1200 $m^2$ of trees and shrubs for watermain installation, and approximately 600 $m^2$ of vegetation (including shrubs and trees) at the Water Treatment

Plant site, due to the construction of the treatment plant and pumphouse facilities. Most of the vegetation to be removed temporarily from the right-of-way will be roadside grasses and shrubs along the raw water and transmission watermain route. Vegetation to be removed permanently in the vicinity of the new Water Treatment Plant and along the watermain route will be trees and shrubs. None of the vegetation species affected by these works are considered sensitive or rare.

#### 7.1.3.2 Measures to Mitigate Effects on Vegetation

In order to minimize the adverse environmental effects of the project on vegetation, standard mitigation measures (e.g., sediment and erosion controls, site clearing restrictions) will be employed during the construction phase (see table in Section 10.1 which summarizes these measures).

The following mitigation measures will also be incorporated into the contract specifications to protect vegetation in the vicinity of the project site:

$ Tree removal is restricted to designated areas. No trees shall be removed unnecessarily.

$ Stripping of topsoil and vegetation shall be restricted to designated areas.

$ Operations shall not cause damage to the trunk or branches of trees, or flooding or sediment deposits on areas where trees are not designated for removal.

$ Equipment and vehicles shall not be parked, repaired or refuelled within the dripline of any tree not designated for removal.

$ Construction materials shall not be stored and earth materials shall not be stockpiled within the dripline of any tree not designated for removal.

$ Branches 25 mm or greater in diameter that are broken shall be cut back cleanly at the break or within 10 mm of their base if a substantial portion of the branch is broken (within five calendar days of damage).

$ Roots 25 mm or larger in diameter that are exposed by construction activities shall be cut back cleanly to the soil surface within five calendar days of exposure.

$ Bark that is damaged by construction activities shall be neatly trimmed back to uninjured bark within five calendar days of damage.

$ All damaged areas shall be restored with topsoil, native grass seed and mulch.

#### 7.1.3.3 Residual Effects

Construction of this project requires site clearing which will result in the permanent removal of approximately 1,800 $m^2$ of trees and shrubs.

#### 7.1.3.4 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 vegetation within the study area. Given the limited scale of the project, as well as the characteristics of the affected vegetation (i.e., common, non-sensitive species), the anticipated residual effect of this project on vegetation would be considered Low in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.1.4 Wetlands

#### 7.1.4.1 Potential Effects on Wetlands

None of the construction activities for any of the project components will have any direct interaction with wetlands or marshlands in the area. All of the transmission watermain construction will also take place away from the wetlands except for a 100 to 150 m section near the Robins water system. At this point, the watermain will not pass through the marshland, but will be adjacent to it. Watermain construction at this location, by open-cut excavation, may impact/affect the wetland/marshland for a short term (7 days approximately) and in a localized manner geographically (100 to 150 m).

#### 7.1.4.2 Measures to Mitigate Effect on Wetlands

In order to minimize the adverse environmental effect of the project on wetland/marshland, the following mitigation measures will be employed during the construction phase in addition to Standard Migration measures as outlined in Section 10.1:

$ Construct the watermain at less than the standard bury depth of 1.8 m at the affected location so that penetrating below the water table is avoided. Use watermain insulation to prevent the pipeline from freezing.

$ Consider using directional drilling at this location to avoid impacts on the marshland.

$ Utilize standard dewatering control measures when discharging of the pumped water into the roadside ditch.

#### 7.1.4.3 Residual Effects

Given the minimal interaction between the various project items and the marshland/wetland, in terms of magnitude, frequency, and geographical extent, the project is not anticipated to generate any residual effect on this VEC.

#### 7.1.4.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, and including necessary adaptive management, the implementation of the project is not expected to have a significant adverse environmental effect upon wetlands within the study area. Given the limited scale of interaction with marshland as well as the nature of environmental effect, the anticipated residual effect of this project on wetlands would be considered negligible in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.1.5 Species at Risk

#### 7.1.5.1 Potential Effects on Species at Risk

The *Species at Risk Act* (SARA) was promulgated in June 2003. Schedule 1 to the SARA lists all species that are considered to be endangered, threatened or of special concern. A search of the Environment Canada Species at Risk website identified the species that have a possible range in the study area. This list is provided in Table 7.1.5.1. Section 6.1.5 of this report summarizes the habitat characteristics of each identified species. As noted in the discussion, the right-of-way, and 250 m corridor for the raw watermain and the transmission watermains are not considered traditional habitat for the identified species. The location of the proposed treatment plant building and the existing plant buildings also are not considered traditional habitat for the identified species. The exception, however, is the Monarch Butterfly, which was noted in the area at some locations. The clearing of vegetation in the right-of-way will temporarily remove the butterfly's habitat (milkweed and wildflowers) for approximately one year. This vegetation removal will be limited to the road allowance areas where the watermain installations occur.

**TABLE 7.1.5.1**

**Possible SARA Species in the Study Area**

| Component | Endangered | Threatened | Special Concern |
|---|---|---|---|
| Mammals | | Grey Fox | |
| Birds | Loggerhead Shrike Migrans Subspecies | Least Bittern | Yellow Rail |
| Reptiles & Amphibians | Spotted Turtle | | |
| Lepidopterans | | | Monarch Butterfly |
| Plants | American Ginseng<br>Butternut | | |

### 7.1.5.2 Measures to Mitigate Effects on Species at Risk

In order to minimize the adverse environmental effects of the project on all forms of vegetation and wildlife, including species at risk, standard mitigation measures, for example pesticides, drainage and noise controls will be employed during the construction phase. The table in Section 10.1 summarizes these measures. With respect to the Monarch Butterfly, vegetation clearance will be completed prior to May 1st, which will mitigate impacts by way of avoidance. Following completion of construction activities and restoration, milkweed and wild flowers will re-establish in the next season, and butterfly is expected to re-inhabit the area.

### 7.1.5.3 Residual Effects

Given the minimal interaction between the various project componenets and species at risk in terms of magnitude, frequency, and geographical extent, the project is not anticipated to generate any residual effect on this VEC.

#### 7.1.5.4 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 species at risk. In this regard, the anticipated residual effects of this project on this VEC would be considered low in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.1.6 Fish and Fish Habitat

#### 7.1.6.1 Potential Effects on Fish and Fish Habitat

As discussed in Section 6.1.6 of this report, fish and fish habitat features within the project study area are not considered sensitive. There is a potential interaction between the watermain construction component and this VEC at the Jubilee Bridge crossing of the Sauble River only. This interaction would be of short term duration (approximately 21 days) and of a temporary nature. The fish species that inhabit the Sauble River at this location are commonly found species in the local area. Construction activities associated with the installation of the transmission watermain at or near the river basin, could discharge deleterious materials (accidental fuel spill, topsoil erosion, pesticide, disturbance to benthic materials, etc.) into the river. Other potential effects could result from the disturbance and removal of riparian vegetation, and clearing and grubbing activities at the crossing site.

The project activities relating to the proposed treatment plant building, the dismantling of the existing plant buildings, and the decommissioning and abandonment of the existing water supply wells will not have any interaction with fish and fish habitat.

#### 7.1.6.2 Measures to Mitigate Effects on Fish and Fish Habitat

In order to minimize the adverse environmental effects of the project on fish and fish habitat, the following mitigation measures will be incorporated into the contract:

$ The watermain near the Jubilee Bridge shall be constructed by way of directional drilling, minimizing riparian vegetation removal and clearing and grubbing.

$ Any dewatering operations shall be subject to standard sediment and erosion control measures to prevent discharge of deleterious materials into the river. Refer to the table in Section 10.1 that summarizes these measures.

#### 7.1.6.3 Residual Effects

Given that the interaction between the project activities and the fish and fish habitat is for a very short duration and at one location only, and the use of directional drilling will be used to achieve the watercourse crossing, this project is not anticipated to generate any residual effects on this VEC.

#### 7.1.6.4 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 fish and fish habitat within the study area. Given the limited scale of the project, as well as the characteristics of the potentially affected fish and fish habitat (common non-sensitive species), the anticipated residual effects of this project on this VEC would be considered negligible in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.1.7 Migratory Birds

#### 7.1.7.1 Potential Effects on Migratory Birds

Section 6.1.7 of this report summarizes the various birds observed or confirmed in the general study area following a field visit by an avian biologist. As discussed in Section 6.1.7, a total of 34 bird species have been confirmed in the general study area.

The construction activities related to all project components could have a potential effect on the migratory birds by way of clearing and grubbing activities, temporarily removing tall grass, shrubs and some trees that provide nesting areas for migratory birds.

The vegetation clearance (roadside grass, trees and shrubs) area is estimated to be 6,900 $m^2$ within the right-of-way for watermain construction, and includes the permanent removal of approximately 1200 $m^2$ of trees and shrubs for watermain construction. Approximately 600 $m^2$ of vegetation (trees and shrubs) shall be removed at the treatment plant building.

#### 7.1.7.2 Measures to Mitigate Effects on Migratory Birds

In order to comply with the *Migratory Birds Convention Act*, which prohibits knowingly destroying or disturbing the nests of migratory birds, and to minimize the adverse environmental effects of the project on migratory birds, the following mitigation measures, as proposed by the avian biologist, are to be implemented:

$ Strategies to ensure compliance include constructing outside of the breeding period, May to July inclusive, and removing all nesting habitat (i.e. trees, shrubs and ground cover) before the nesting period.

$ Conduct a nest search prior to the commencement of construction.

$ Removal of nesting habitat should be completed by the end of April to ensure that no nesting by migrant birds will subsequently occur and that migrant birds will not be present that could be harmed by the removal.

$ The nest search is to be conducted by a Biologist experienced at this task.

$ Flagging and monitoring of any nests found and ceasing construction activity until the nesting activity ceases.

#### 7.1.7.3 Residual Effects

The construction of this project will result in permanent removal of approximately 1,800 $m^2$ (1200 $m^2$ for watermain construction and 600 $m^2$ for plant building construction) of vegetation that provide habitat to migratory birds. Some of the vegetation will be replaced during site restoration and over a one or two year period, grasses and shrubs will grow, restoring migratory bird habitat. Tree removal, however, will be permanent.

#### 7.1.7.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring and necessary adaptive management, implementation of this project is not expected to have a significant adverse environmental effect upon migratory bird species within the study area. Given the significance of the restoration of grass and shrubs, the anticipated residual effect to migratory birds is considered low in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.1.8 Wildlife

#### 7.1.8.1 Potential Effects on Wildlife

The potential environmental effects of the project on the wildlife habitat and biodiversity are as follows:

- The construction of the raw and transmission watermains within the existing road allowances will require the clearing of shrubs and vegetation in an area approximately 6,900 $m^2$ in size. Clearing and grubbing could disturb the habitat of common plant species as identified in Section 6.1.3.

- The habitat loss resulting from the trees and shrubs removal (approximately 600 $m^2$) within the footprint of the treatment plant site will be permanent. There will be a similar habitat loss of approximately 1200 $m^2$ during the watermain construction.

- Sensory disturbance to wildlife resulting from construction noise, air emissions, and potential harrassment of wildlife species by construction activity up to a distance of approximately 200 m from the activity area. This could result in temporary displacement of some species and the potential reduction of nesting activities and breeding activity by some bird species during construction. This disturbance will last up to 90 days during watermain construction and 180 days during the treatment plant building construction. The treatment plant's operational activities would not harm wildlife.

- Project related wildlife injuries and mortalities resulting from accidents with construction equipment and project vehicles, incidences involving wildlife falling into or entering trench excavations for the water transmission mains, and/or increased predation on small birds and mammals by raptors following site clearing.

#### 7.1.8.2 Measures to Mitigate Effects on Wildlife

In order to minimize the adverse environmental effects of the project activities on wildlife habitat, standard mitigation measures, for example, sediment and erosion controls, site clearing restrictions will be employed during the construction phase. The table in Section 10.1 summarizes these measures. A landscaping and revegetation plan will follow construction activities to re-establish terrestrial breeding, nesting and shelter habitat for various wildlife species.

#### 7.1.8.3 Residual Effects

The construction of this project requires site clearing, which will result in permanent removal of 1,800 $m^2$ (1200 $m^2$ along watermain route and 600 $m^2$ at plant building site) of trees and shrubs, which constitute wildlife habitat.

#### 7.1.8.4 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 within the study area. Given the limited scale of the project, as well as the characteristics of the wildlife (common non-sensitive species), the anticipated residual effect of this project on wildlife would be considered low in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.1.9 Air Quality

#### 7.1.9.1 Potential Effects on Air Quality

The potential effects of the project on the air quality are as follows:

$ Operation of the standby diesel generator will contribute to local air pollution levels by emitting oxides of nitrogen (nitrogen dioxide, nitric oxide) and carbon monoxide. The emissions from standby diesel generator will occur only during testing of the generator for 45 minutes every 2 weeks, or in the event of a power outage.

$ The construction related activities associated with the project will generate minor increases in air pollution levels in the vicinity of the right-of-way and corridor of all project components as a result of exhaust emissions from construction equipment. The air pollution levels experienced during the construction period will be typical of road and building construction projects, are temporary in nature and reversible. The construction activities shall last approximately 90 days for watermains and 180 days for the treatment plant building.

$ A spill of water treatment chemicals such as sodium hypochlorite, dechlorination chemical, or potassium permanganate.

#### 7.1.9.2 Measures to Mitigate Effects on Air Quality

To minimize the adverse environmental effects of the project on air quality, standard mitigation measures will be employed during the construction phase. The table in Section 10.1 summarizes these measures. In addition, the following measures will also be implemented during the construction and operational phases of the project:

- Contract specifications shall include provisions to coordinate the use of pesticides and herbicides with affected landowners and the local pesticide control officer.
- Dry materials and rubbish shall be covered or wetted down to prevent blowing of the dust and debris.
- On-site open burning of organic materials, wood, refuse, or other excavated materials from the clearing and grubbing of the site will be prohibited.
- Operational emission levels will be mitigated significantly through the project design. For the standby diesel generator, dispersion modeling will be conducted to evaluate the operational impacts of the unit on adjacent receptors and by complying with MOE criteria of maximum half hour point of impingement consideration for NOx and CO.
- The standby diesel generator at the treatment plant building shall be tested as prescribed by the manufacturer.
- Exhaust pipe of the standby diesel shall be installed in a manner to meet the Ministry of Environment criteria in relation to NOx and CO.
- All chemical tanks will include secondary containment, adequate ventilation and provide for the use of spill absorbent materials or neutralizing chemicals.

#### 7.1.9.3 Residual Effects

Given that low contaminant emission rates are anticipated from the treatment plant building on an intermittent basis, the project will not generate any residual effects on air quality in the study area.

#### 7.1.9.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring and any necessary adaptive management, the implementation of the project is not expected to have a significant adverse environment effect upon air quality in the study area. Given the limited scale of the project, as well as the characteristics of the background air quality, the anticipated residual effect of this project would be considered low in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.1.10 Soil Quality

#### 7.1.10.1 Potential Effects on Soil Quality

Soils in the project study area, during the construction phase, could be contaminated by the fuel spills while re-fueling construction equipment. The soil may also be contaminated from the chemical spills during the construction or operational phases of the project. Similarly, diesel fuel could also contaminate soils by way of spillage during the construction, testing and operation of standby diesel generator. Soil stratification will be affected by excavation, backfilling and restoration operations during construction of watermains and the treatment plant building in localized areas. The disturbance to soil stratification will be of low magnitude, but irreversible.

#### 7.1.10.2 Measures to Mitigate Effects on Soil Quality

To minimize the adverse environmental effects of the project on soil quality, standard mitigation measures will be employed during the construction phase. The table in Section 10.1 summarizes these measures. In addition, the following measures will also be implemented:

$ Undertake all measures necessary to prevent accidental spills.

$ If accidental spills do happen, notify the Ministry of the Environment promptly and undertake remedial actions in accordance with the Ministry requirements. Ensure there are adequate supplies of containment and/or absorbent materials on-site.

$ In the event of a spill, take samples around the spill site to determine the extent of contamination horizontally and vertically and in consultation with the MOE. Remove contaminated soils and dispose of at an approved landfill. Restore the excavated areas with native material as much as possible.

$ Establish proper chemical and fuel filling procedures and implement them.

$ Incorporate into the design chemical fill piping and valves so that the chemical tanks can be filled from the building exterior. Incorporate in the design features the ability to purge the piping after delivery of the chemical.

$ Minimize the disturbance to the soil stratification by preventing over-excavation of areas required for construction. Reuse select native material when backfilling trenches as much as possible.

$ Strip and re-use native topsoil to restore all disturbed areas.

#### 7.1.10.3 Residual Effects

The construction of this project will require excavation and backfilling of approximately 20,000 $m^2$ of area, which will be restored with using native topsoil. Approximately 5,000 $m^3$ of the native soils shall be removed during the construction of raw and transmission watermains and plant building, which will be disposed of locally, or used to re-grade the sites.

#### 7.1.10.4 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 soil quality within the study area. Given the limited scale of the project, as well as the characteristics of affected soil, the anticipated residual effect of this project on soil quality would be considered negligible in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

## 7.2 Socioeconomic and Cultural Environments

### 7.2.1 Adjacent Land Uses

#### 7.2.1.1 Potential Effects on Adjacent Land Uses

Activities associated with the construction and operation of this project has the potential to have an effect on the land use as follows:

$ The construction of the treatment plant building will affect the student play area temporarily during construction as the student activities will have to be restricted.

$ The construction equipment noise and vibrations at the new plant site, along the raw water and transmission watermain route, and at the locations of the existing treatment plant buildings will temporarily affect the lawns and driveways of residences adjacent to these activity areas.

$ Along the raw water and the transmission watermain route, there will be temporary impacts to local traffic movement, as well as access to the driveways.

$ The adjacent land use will return to normal levels after the completion of construction phase.

$ During the operation phase of the project, the watermains will be flushed once per year for proper maintenance that may impact minimally on residences in the area.

$ The proposed treatment plant building at the school site will permanently change the land use from a natural to a built-up area.

$ The demolition of the existing plant buildings at four locations will permanently change the site from a built-up area to a natural area.

#### 7.2.1.2 Measures to Mitigate Effects on Adjacent Land Uses

The potential impact on adjacent land uses will be mitigated by undertaking the following measures:

$ Plan the construction of the treatment plant building (i.e. excavations for construction of underground tankage), if possible, at a time when the schools are closed to avoid impacts to students playground area.

$ Undertake backfilling of the trenches and restoration along the watermain routes following the construction of watermain to minimize inconvenience to the residents.

$ Consider re-opening the eastern entrance to the school site for use by the plant operators in order to minimize impacts to school children and school activities.

#### 7.2.1.3 Residual Effects

The construction of this project will have a permanent residual effect inthat a new treatment plant building will be adjacent to the school building. However, that has already been accepted by the School Board officials by offering to sell the land to the Municipality.

The existing treatment plant buildings as well as the water supply wells at four sites shall be dismantled and removed and the sites restored to a more natural setting, which will be a permanent residual effect.

#### 7.2.1.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring and any necessary adaptive management, the implementation of the project is not expected to have a significant adverse environmental effect upon adjacent land uses within the study area. Given the limited scale of the project, as well as the characteristics of the affected adjacent land uses, the anticipated residual effect of this project would be considered low in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.2.2 Aesthetics

#### 7.2.2.1 Potential Effects on Aesthetics

The potential effects from this project will be the following:

$ A new permanent view at the treatment plant site due to the construction of the treatment plant building.

$ Slightly modified view along the transmission watermain route due to the clearing of trees and vegetation. This effect will be of long term duration.

$ A new permanent view at the existing treatment plant locations following the dismantling of the existing buildings.

#### 7.2.2.2 Measures to Mitigate Effects on Aesthetics

The following mitigative measures shall be utilized:

$ The impact from the view of the new treatment plant building will be mitigated by utilizing an attractive architectural style which will blend in with the existing natural environment, as well as compliment the existing architecture of the school building.

$ Areas disturbed during construction at the plant site shall be rehabilitated by planting native species of shrubs and grass.

$ The disturbed areas along the watermain route shall be restored by using hydroseeding and mulch. The native organic soil shall be stripped and stockpiled before the excavation of the trench. After the backfilling of the trenches, the stripped organic matter and topsoil shall be utilized for covering the trenches prior to the hydroseeding. The re-utilization of the native soils will help in the regrowth of the native species which will aid in restoring the aesthetics.

#### 7.2.2.3 Residual Effects

The construction of this project will create a new permanent view at the treatment plant site, however, that view will utilize similar architecture as of the school building. There will be some permanent removal of approximately 1,800 $m^2$ of manicured lawns, trees and shrubs for the construction of raw and transmission watermains. The trees cannot be replaced economically. However, the native grasses and shrubs will grow back, creating a minimal residual effect.

At the existing treatment plant building sites, the removal of the buildings and restoration of the sites will provide a more natural look to the area.

#### 7.2.2.4 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 aesthetics within the study area. Given the limited scale of the project, as well as the characteristics of the affected aesthetics, the anticipated residual effect of this project on aesthetics would be considered negligible in magnitude based upon the impact criteria and its analysis presented in the Table 7.3.1.

### 7.2.3 First Nations

None of the project activities shall be undertaken on or adjacent to First Nation's lands. This project, therefore, is not likely to result in any adverse environmental effect on the First Nations community.

### 7.2.4 Heritage and Historical Cultural Resources

#### 7.2.4.1 Potential Effects on Heritage and Historical Cultural Resources

The proposed project is not anticipated to create an environmental effect on the heritage and historical cultural resources. The Ministry of Culture, Heritage and Libraries Branch was contacted during the provincial Environmental Assessment process. In their correspondence, they have indicated that the proposed project is not anticipated to impact heritage and cultural resources.

#### 7.2.4.2 Measures to Mitigate the Effect on Heritage and Historical Cultural Resources

The measures to mitigate the effect on heritage and historical cultural resources, if required, shall be undertaken by implementing all steps as required by the provincial Ministry of Culture, Heritage and Libraries Branch. Typically, the presence of deeply buried archaeological resources, if encountered during construction, requires notification of the Ministry of Culture and the implementation of all measures as required by them.

#### 7.2.4.3 Residual Effects

In view of the above discussion, it is anticipated that impacts, if any, will be mitigated to the Ministry's requirements and consequently, the project is not anticipated to generate any residual effects upon heritage and historical cultural resources.

#### 7.2.4.4 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 negligible in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.2.5 Local Neighbourhood and Residents

#### 7.2.5.1 Potential Effects on Local Neighbourhood and Residents

Activities associated with the construction and the operation of the facilities has the potential to have an effect on the local neighbourhood and residents as follows:

- The construction of the treatment plant building will affect the student activities during construction (approximately 120 days) as the activities will have to be restricted.

- During the construction phase, the construction equipment noise and vibrations at the plant building site, along the raw water and transmission watermain route, and at the locations of the existing treatment plant buildings, which will be of long duration but temporary, will affect the residences adjacent to these activity areas.

- Along the raw water and the transmission watermain route, there will be impacts to local traffic movement, as well as access to the driveways. These impacts will be temporary in nature and will last approximately 30 days on a particular road section. Watermain flushing, pressure testing and disinfection operations will have a minimal impact on the local neighbourhood.

- There can be potential adverse impacts from chlorinated water on residential septic beds. Water customers of the proposed project already receive a chlorinated water supply with residual chlorine wells levels of 0.8 to 1.0 mg/L or higher. These levels will be reduced to 0.2 to 0.4 mg/L. Since the chlorine depletes rapidly, no adverse impact is likely.

- During the operational phase of the project, watermains will be flushed once per year for proper maintenance. This will have minor impact on residences due to discharging of flushed water in ditches near their properties.

- The proposed treatment plant building at the school site will permanently change the school's neighbourhood as plant operators will access the plant building for operation and maintenance on a routine basis.

- The new Amabel-Sauble water system could change the character of the community by way of significant growth in population, which then would require converting natural areas into subdivisions and commercial complexes. This however will not happen as a result of this project, as the available raw water supply and treatment capacity is for the already committed lots in existing subdivisions. There is no surplus water supply that would trigger additional development as a result of this project.

#### 7.2.5.2 Measures to Mitigate Effects on Local Neighbourhood and Residents

The potential impact on local neighbourhood and residents shall be mitigated by undertaking the following measures:

$ If possible, plan the construction of the treatment plant building (for eamaple excavation for the construction of underground tankage) at a time when the schools are closed to avoid impacts on students.

$ Use traffic control by utilizing traffic control flagmen and confining the construction operations to one lane only.

$ Undertake backfilling of the trenches and restoration along the watermain routes following the construction of watermain to minimize any inconvenience to residents.

$ Cordon off the construction site at the school location.

$ Consider re-opening the eastern entrance to the school site for use by the plant operators to minimize impacts on school children and school activities.

$ Provide fencing around the treatment plant site.

$ Dismantle existing treatment plant buildings and decommission the existing wells after the Labour Day weekend to minimize any inconvenience to residents.

#### 7.2.5.3 Residual Effects

The construction of this project will have a permanent residual effect by way of a new treatment plant building adjacent to the existing school building

The existing treatment plant buildings at four sites and the associated water supply wells that shall be dismantled and removed, thereby changing the area from a built-up to a natural area.

The activities in local neighbourhoods as well as residential activities will return to normal levels after the completion of construction phase.

#### 7.2.5.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring and any necessary adaptive management, the implementation of the project is not expected to have a significant adverse environmental effect upon local neighbourhood and residents within the study area. Given the limited scale of the project, as well as the characteristics of the affected local neighbourhood and residents, the anticipated residual effect of this project would be considered low in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.2.6 Local Users of Groundwater

#### 7.2.6.1 Potential Effects on Local Users of Groundwater

Impacts to local users of groundwater may result from dewatering operations during the construction of the raw and transmission watermains in the areas where the local water table is high (refer to Figure 1.8.1). The dewatering operation could also result in the septic seepage in trenches if the old septic beds are located close to the property limit. Indiscriminate dewatering operations could have a significant impact on the availability of water from the sand points as well as possible contamination due to the migration of contaminates towards them.

The effect on local users will be limited to a few days during the construction phase of the project when the watermain is being installed adjacent to their properties. There will be no impacts during the operational phase of the project.

Activities associated with construction of the new treatment facility and the existing treatment plant sites are not expected to affect local users of groundwater.

As noted in Section 6.1.1, the bedrock aquifer is not hydraulically linked to the water table aquifer. As a result, operation of the new treatment facility is not anticipated to affect local users of groundwater.

#### 7.2.6.2 Measures to Mitigate Effects on Local Users of Groundwater

The potential impacts will be mitigated by using:

$ An alternative method of construction (directional drilling) for the watermain. Since directional drilling does not require dewatering, it will eliminate any impacts on groundwater quality and supply to the sand points and the concerns relating to septic seepage.

$ During tender process, test pits will be dug along the watermain route to document additional information concerning the groundwater levels. This information will supplement previously collected water table information and will be provided to the contractor. In addition, it will be incorporated as an addendum to the contract specifications in order to inform the contractor about the construction methods that will be required.

$ During the dewatering operations, the water levels will be monitored to ensure that it does not result in loss of water supply to the residents.

$ Obtain temporary Permit To Take Water from MOE prior to dewatering operations and implement all measures as prescribed in the permit.

$ If the project affects residential well supplies quantity or quality during the construction period, the Town will supply residents with potable water for the duration of the period that the wells are affected.

#### 7.2.6.3 Residual Effects

The construction of this project will have a negligible residual environmental effect from the project as the groundwater table will recharge following precipitation.

#### 7.2.6.4 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 the local users of groundwater within the study area. Given the limited scale of the project, and its activities, as well as the characteristics of the affected groundwater table area, the anticipated residual effect of this project on local users of groundwater would be considered negligible in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.2.7 Noise and Vibration

#### 7.2.7.1 Potential Effects from Noise and Vibration

The potential effects from noise and vibration are:

$ Higher than normal background noise and vibrations levels are expected during the construction period including excavation for construction of the inground water storage tank, the raw and transmission watermain trenches, and for the well improvements. Adverse impacts of noise on the school however, will be reduced due to the distance between the school building and the proposed treatment plant site. Vibrational impacts at school site are anticipated to be negligible due to dampening effects.

$ Excavation related activities which would cause noise and vibration at the school site are anticipated to last from seven to ten working days. Similarly, backfilling operations are also anticipated to last seven to ten working days.

$ They may be a minor increase in traffic related noise due to workers using their automobiles.

$ Noise and vibration may also occur at the four existing plant locations during demolition of the buildings and the abandonment of the wells.

$ Noise and vibrational impacts, other than operation of diesel generator, will be limited to construction periods at the locations where construction equipment would operate.

$ Noise from the standby diesel generator, during the operational phase of the project, will occur when it is tested once a month for 45 minutes and once a year for a 180 minute load test in accordance with established safety standards (CAN/CSA C282) and in the event of a power outage. Noise levels from the generator will be in excess of 100 dB at the source.

$ The project involves the operation of vertical turbine pumps, as well as the use of chemical metering pumps. Without attenuation, the operation of these pumps could generate a moderate level of noise pollution ranging from 55 to 70 dB at the source.

#### 7.2.7.2 Measures to Mitigate Effects from Noise and Vibration

To minimize the adverse environmental effects of the project from noise and vibration, standard mitigation measures will be employed during the construction phase. The table in Section 10.1 summarizes these measures. In addition, the following measures will also be implemented:

$ School Board officials and the school principal shall be contacted and if necessary, heavy equipment used for excavation could be restricted to either weekends or after the schools hours to avoid noise and vibration.

$ The noise from the standby diesel operation will be reduced by incorporating in the design a high efficiency noise silencer, acoustic treatment on the walls and ceiling, and the use of acoustical louvres on the intake and exhaust dampers to reduce source decibel levels to a sensitive receptor level as required by the Ministry of the Environment.

$ The vertical turbine pumps, chemical feed pumps and other pumps shall be designed to be located in the rear area of the plant building and away from the lab, office area and the school building. The pump bay area will not have any operable window to allow sound (noise) waves to escape the building. The vertical pumps during commissioning shall be checked to ensure compliance with vibrations and noise levels specified in the contract specifications.

#### 7.2.7.3 Residual Effects

**Construction Activities**

Accurately predicting construction noise is difficult due to the variability of several factors including the amount and type of construction equipment, construction methods, and scheduling of work. Though precise information on these factors is not available, some general conclusions can be made based on the types of construction work anticipated and the similarities of the equipment.

Typically, the construction activities anticipated for this project can be classifeed into the following five phases:

$ **Site Preparation**: Involves the stripping/removal of topsoil and vegetative cover from the site. Typically a dozer, excavator, and dump truck would be used for this operation. This activity will take between two to three days at the plant site.

Along the watermain route, it will be undertaken in small sections, and each section will typically take one to two days.

$ **Earthwork and Excavation**: Involves the excavation of the subsurface soil to the required depth of the underside of the reservoir and building structure. This activity will take between two and three days. Along the watermain route, this activity will be taken in sections. The contractor will typically install 50 to 75 m of watermain per day including backfilling.

$ **Building Erection**: Involves the actual construction of the reservoir and building and involves aspects of construction such as concrete forming, carpentry and masonry work. Very little heavy equipment is required for this aspect of the work apart from the occasional delivery of materials such as concrete, prestressed concrete roof beams, concrete block and mechanical piping and equipment. Upon erection of the building walls, they will be backfilled to grade using equipment such as an excavator, compaction hoepac, and a dump truck. The entire backfilling procedure will take between two to four days.

$ **Site Servicing**: Involves the installation of the underground services including a watermain, storm water drainage ditching, electrical conduits/ductwork and communication conduits. This aspect of the project will usually occur concurrently with the building erection and the installation of the piping. It will likely occur intermittently over one to two weeks. Equipment typically consists of an excavator, dump truck and compaction equipment (vibratory roller or hoepac).

$ **Site Restoration**: Following completion of all of the underground servicing and the erection of the building, the area will be graded and restored. Disturbed areas will be restored with topsoil and grass seed. The construction of these works will require the use of an excavator, dozer and vibratory roller.

Most construction equipment operates with a noise level between 75 and 90 dBA as measured at a distance of 15 m. The noise levels generated by the types of construction equipment anticipated to be used in relation to this project are shown in Table 7.2.7 (source: United States Environmental Protection Agency):

**Table 7.2.7**
**Noise Generation Table:**
**On-Site Construction Equipment**

| Equipment | Noise Level (Decibels)* |
|---|---|
| Bulldozer | 80 |
| Excavator | 85 |
| Dump truck | 86 |
| Concrete truck | 85 |
| Concrete pump | 82 |
| Concrete vibrator | 76 |
| Vibratory Roller | 73-75 |
| Tamper | 74-77 |

* *Noise levels at distance of 15 m*

Noise levels from a point source such as a piece of construction equipment will attenuate 6 dBA per doubling of distance over a hard surface such as a parking lot. Thus if a piece of construction equipment generates 86 dBA at 15 m, the noise level at 60 m would be 74 dBA. In this regard, the only sensitive receptor, the school which is 60 m from the treatment plant site, will have a noise level of approximately 74 dB near the building.

**Operational Activities**

Testing and operational procedures associated with the standby generator will periodically increase ambient noise levels. The key considerations in this regard are as follows:

$ The generator will be tested once a month for 45 minutes and once a year for a 180 minute load test in accordance with established safety standards (CAN/CSA C282).

It is recognized that the long term operation of the generator would increase ambient noise levels in the immediate study area (i.e. school). However, this situation would likely only arise during a major power disruption. The expected noise levels during the operation of standby generator together with the operation of vertical turbine pumps and chemical feed pump, at the school building, which is a sensitive as well as the nearest receptor, will be 42 dbA.

#### 7.2.7.4 Significance of the Residual Effects

With the implementation of the identified mitigation measures, including monitoring and any necessary adaptive management, the implementation of the project is not expected to have a significant adverse environmental effect as a result of noise and vibration within the study area. Given the limited scale of the project, as well as the characteristics of the noise and vibration background, the anticipated residual effect of this project on noise and vibration would be considered low in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.2.8 Public Health and Safety

#### 7.2.8.1 Potential Effects to Public Health and Safety

The project may have the following potential effects on the public health and safety:

$ Public safety concerns during the construction of the raw and transmission watermains, the proposed treatment plant building, demolition of the existing treatment buildings, and the well drilling contractor's operations.

$ The construction of watermain will reduce traffic to one lane creating a potential danger to public health and safety.

$ Open trenches along the watermain route is a potential hazard to the residents and the excavated area at the school site for the construction of new treatment plant is a safety concern for the school children.

$ The use of chlorine in the water treatment processes for disinfection could have a potential health and safety concern.

#### 7.2.8.2 Measures to Mitigate Effects to Public Health and Safety

To minimize the adverse environmental effects of the project to Public Health and Safety, standard mitigation measures will be employed during the construction phase. The table in Section 10.1 summarizes these measures. In addition, the following measures will also be implemented:

$ Mitigate the impact arising from construction-related traffic and reducing traffic to one lane, by including in the contract specification the requirement to use traffic control flagmen and enforce requirement strictly.

$ Trenches will not be left open at the end of the day's work as far as possible. All open trenches and open excavations shall be suitably barricaded.

$ Inspection of the site by site inspector at the end of day's work.

$ At the school site, the construction site shall be protected by constructing a durable construction fence to keep children out of the construction area.

$ Conduct a meeting with the School Board and school officials to request their cooperation, which could be in the form of keeping the children indoors during certain construction activities when there could be concern for children's safety.

$ In regards to chlorine effect, keep chlorine levels at approximately 0.35 mg/L in the distribution system. Higher $Cl_2$ levels form TTHM which are carcinogenic in nature and could have an impact in the long term.

$ Operate and maintain chlorine levels in compliance with Ontario's *Safe Drinking Water Act* requirements. Chlorine levels are to be maintained at approximately 0.35 mg/L in the distribution system since higher chlorine levels can form trihalomethanes which are carcinogenic in nature.

#### 7.2.8.3 Residual Effects

Given the foregoing discussion, the project will not generate a significant adverse environmental effect to public health and safety after construction is completed. Residual chlorine levels in the treated water supply will not be a new residual effect as the existing water customers already receive a chlorinated water supply prior to construction of the proposed project. In addition, as noted in Section 6.2.8, residual chlorine levels will be significantly reduced as a result of this project.

#### 7.2.8.4 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 public health and safety within the study area. Given the limited scale of the project as well as the characteristics of the affected public health and safety issues, the anticipated residual effect of this project on public health and safety would be considered negligible in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

### 7.2.9 Worker Health and Safety

#### 7.2.9.1 Potential Effects to Worker Health and Safety

The potential worker health and safety impacts are as follows:

$ Safety hazards could occur during the construction of treatment plant building, the construction of the raw and treated transmission watermains, or during the demolition of the four existing treatment buildings and the decommissioning and abandonment of their wells. Hazards could be of various types including the operation heavy machinery or excavation equipment, working in trenches, handling chemicals, while installing treatment equipment or high voltage wiring.

$ Operators work with the water treatment chemicals such as sodium hypochlorite and dechlorination chemicals sodium metabisulphite. Exposure to these chemicals is long term and recurring.

$ Plant Operator's long term exposure to rotating equipment such as pump motors, diesel generator set, etc.

$ Periodic exposure to ultraviolet light.

$ Periodic exposure to high voltage electrical equipment and panels.

$ Exposure to confined spaces during construction and after construction completion to operators.

$ Slippery floor surfaces in the plant after commissioning, as a result of condensation.

$ Occasional drowning hazard in underground water storage tanks.

#### 7.2.9.2 Measure to Mitigate Effects to Worker Health and Safety

The following mitigation measures will reduce the potential effects on the worker health and safety:

$ The construction worker safety, which is the responsibility of the contractor, is regulated by the Ministry of Labour. During the construction, the Municipality's Site Inspector will have the authority to modify the contractor's operation if unsafe methods are employed.

$ In the worst case scenario, the Site Inspector, through the authority of the Project Manager, can stop the work and report the matter to the Ministry of Labour.

$ Design and construct chemical handling and usage facilities in a manner to minimize exposure to the chemicals and provide safety glasses, breathing apparatus, protective apparel, etc. Arrange for and provide Materials Safety Data Sheets to the operators.

$ Reduce plant operator exposure to rotating equipment by providing safety shields around the rotating parts and establishing lockout procedures while working with such equipment.

$ Reduce the potential effects of ultraviolet light by arranging for proper training for the operators by the manufacturer's representatives. Include a supply of all protective measures for the UV equipment.

$ Mitigate any confined spaces hazard during construction by enforcing prescribed practices in the Occupational Health & Safety Act.

$ Incorporate in the design, proper access measures to confined spaces by the plant operators.

$ The Operating Authority, who employs the operators, is responsible for providing continuing education and training for dealing with the hazards of operating water treatment plants. This is also a provincial regulatory requirement.

$ Provide in-plant safety items such as an eyewash, drench showers, and first aid kits. Mount fire extinguishers in the plant building to deal with the fire hazards.

$ Include a dehumidifier in the plant design to reduce wet floor hazards.

#### 7.2.9.3 Residual Effects

Given the foregoing discussion, the project will not generate any significant residual effect to worker health and safety, other than the hazards that construction workers and operators are exposed to in their normal working environments.

#### 7.2.9.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring and necessary adaptive management, the implementation of the project is not expected to have a significant adverse environmental effect upon worker health and safety within the study area. Given the limited scale of the project, as well as the characteristics of the worker health and safety issues, the anticipated residual effect of this project to worker health and safety would be considered negligible in magnitude based upon the impact criteria and its analysis presented in Table 7.3.1.

## 7.3 Summary of Environmental Effects, Analysis and Residual Effects

Table 7.3.1 provides, for each of the VEC's identified in Section 7.1 and 7.2, a summary of the environmental effects, impact characteristics based on evaluation criteria identified in Section 2.5, and the overall environmental effect.

The table also provides an indication of the benefits that the mitigation measures had on the environmental effects. Mitigation measures that were identified for the individual VEC's in Sections 7.1 and 7.2, as well as the standard mitigation measures identified in Section 10.1, were quantified in the Mitigation Measures column of the table. This was completed by using best judgment based on experience and knowledge gained from the implementation of similar projects. When there was doubt in determining a mitigation value, or if the quantification of the mitigation measures was complex due to conflicting factors, a more conservative mitigation value was assigned.

The last column in the table shows the residual environmental effect after mitigation.

A review of this table demonstrates that the environmental effects to all VEC's, after the implementation of mitigation measures, are reduced to a negligible or low impact level (except for groundwater which has a moderate impact level). This indicates that the project will not have a significant adverse environmental effect on any of the identified VEC's.

## TABLE 7.3.1

## Summary of Potential Environmental Effects before and after Mitigation

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Groundwater** | | | | |
| Impacts on groundwater quantities | $ Magnitude: High (+15) - one private bedrock well identified within 500 m radius; negligible impact on the wetlands. Many sand points along the watermain construction route, that possibly will be affected by dewatering, depletion of aquifer<br><br>$ Geographic Extent: Local (0) - distance drawdown graphs show negligible interference effect beyond ∀ 100 m distance.<br><br>$ Duration: Long-term (+2) - as groundwater withdrawals will be in effect during operation phase of Project, lasting 20 years or more.<br><br>$ Frequency: High (+2) - as groundwater withdrawal will be ongoing during Project operation.<br><br>$ Reversibility: No (0) - Recharge calculations are higher than withdrawal. Use (0) conservatively. | High (+19) | (-8)<br><br>Mag: (-8)<br><br>Mitigation by:<br>- Directional Drilling<br>- Shallower watermain with<br>- Winburk backup well and<br>- Detailed post construction monitoring and follow-up program | Moderate (+11) |

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Surface Water** | | | | |
| Impacts on levels in the Sauble River | $ Magnitude: Low (+6) - Groundwater withdrawals from the well will not impact flow in river. Dewatering operations could impact the river.<br>$ Geographic Extent: Local (0) - No influence of groundwater withdrawals on river.<br>$ Duration: Short-term (0)<br>$ Frequency: Low (0)<br>$ Reversibility: Yes (-3) | Negligible (+3) | (-5)<br>Mag (-5)<br>Mitigation by:<br>- Directional Drilling<br>- Shallower watermain with insulation | Negligible (-2) |

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Vegetation** | | | | |
| Impact caused by clearing of the site for watermain and plant building construction | $ Magnitude: Low (+7) clearance quantity much smaller as compared to what exists overall. No SAR.<br><br>$ Geographic Extent: Local (0) - since footprint of building would be limited to approximately a 25 m x 30 m area, most of which is only partially vegetated due to previous disturbances. Water transmission line shall be laid, as much as possible, on previously cleared and disturbed areas within municipal road allowances.<br><br>$ Duration: Medium term (+1) - since clearing of vegetation for collector well and water transmission mains will likely be undertaken in less than 60 days.<br><br>$ Frequency: Low (0) - since clearing activities will be limited to a one-time event at the start of construction.<br><br>$ Reversibility: No (+3) - some permanent vegetation clearance at plant site and along watermain route. | Moderate (+11) | (-4)<br><br>Mag: (-3)<br><br>Rev: (-1)<br><br>Mitigation by:<br><br>- Restoration<br><br>- Minimization and avoidance | Low (+7) |

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Wetlands** | | | | |
| | $ Magnitude: Negligible (5). Insignification impact on wetlands due to watermain construction at Robins Pumphouse.<br>$ Geographic Extent: (0)<br>$ Duration: short term (0)<br>$ Frequency: low (0)<br>$ Reversibility: yes (-3) | Negligible (+2) | Mag: (-5)<br>Mitigation by:<br>- using Directional Drilling<br>- Shallower watermain with | Negligible (-3) |
| **Species at Risk** | | | | |
| | $ Magnitude: Low (+8) - due to Monarch Butterfly<br>$ Duration: medium (+1)<br>$ Frequency: moderate (+2)<br>$ Reversibility: yes (-3) Milkweed and wildflowers habitat will reverse the temporary damage. | Moderate (+8) | (-5)<br>Mag: (-5)<br>Mitigation by:<br>- Habitat restoration and avoidance<br>- Butterfly is special concern | Low (+3) |

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Fish Habitat** | | | | |
| Fish and fish habitat | $ Magnitude: Neg. (0) - No construction activity in river or wetland.<br><br>$ Geographic Extent: Local (0)<br><br>$ Duration: short term (0) - water transmission main construction across Sauble River will be completed in less than 45 days.<br><br>$ Frequency: Low (0) - 1 crossing only.<br><br>$ Reversibility: N/A. Watermain under river shall be constructed by directional drilling. | Negligible (0) | Nil | Negligible (0) |
| **Migratory Birds** | | | | |
| | $ Magnitude: Low (+5) construction activity will impact birds by way of noise, dust, vibration, etc. No SAR.<br><br>$ Duration: long term (+2) construction activity will be > 90 days<br><br>$ Frequency: High (+2)<br><br>$ Reversibility: yes (-3) birds will return after noise, dust, vibration impact is finished, and habitat is restored. | Low (+6) | (-2)<br><br>Mag: (-2)<br><br>Mitigation by:<br><br>- clearing before nesting season<br><br>- habitat restoration | Low (+4) |

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Wildlife Resources** | | | | |
| Loss of wildlife habitat and disturbance to wildlife resources | $ Magnitude: Low (6) - since the footprint of the pumphouse and water transmission line corridors do not support SAR wildlife habitats.<br><br>$ Geographic Extent: Local (0) - entire project is within a 2 km radius.<br><br>$ Duration: Long term (+2) - greater than 90 days.<br><br>$ Frequency: High (+2) - disturbance during site clearing and excavation activities throughout construction of building and water transmission mains.<br><br>$ Reversibility: No (+3) - since once the building is constructed, it will occupy an area which is currently vegetated, and restorations for watermain will not completely restore habitat for all wildlife. | Moderate (+13) | (-4)<br><br>Mag: (-3)<br><br>Rev: (-1)<br><br>Mitigation by:<br><br>- restoration of habitat<br><br>- some restoration at building | Low (+9) |
| **Air Quality** | | | | |
| | $ Magnitude: Moderate (+12) due to dust, emissions, fumes.<br><br>$ Duration: Long term (+2). Impact shall be over period > 90 days<br><br>$ Frequency: High (+2)<br><br>$ Reversibility: Yes (-3) | Moderate (+13) | (-5)<br><br>Mag: (-5)<br><br>Mitigation by:<br><br>- dust control measures | Low (+8) |

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Soil Quality** | | | | |
| | $ Magnitude: Low (+6) there is potential for soil contamination by accidental spills<br>$ Duration: Long term (+2)<br>$ Frequency: High (+2). Spills could happen frequently.<br>$ Reversibility: Yes (-3) mostly except pipe bedding material soil | Low (+7) | (-5)<br>Mag: (-4)<br>Freq: (-1)<br>Mitigation by:<br>- standard mitigation | Negligible (+2) |
| **Adjacent Land Uses** | | | | |
| | $ Magnitude: Low (+6) will impact play area at school<br>$ Duration: Long term (+2)<br>$ Frequency: High N/A<br>$ Reversibility: No (+3). Permanent change at school locations and existing plant building. | Moderate (11) | (-4)<br>Mag: (-3)<br>Rev: (-1)<br>Mitigation by:<br>- improvement at existing well locations<br>- standard mitigation measures | Low (+7) |

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Aesthetics** | | | | |
| | $ Magnitude: Low (+6)<br>$ Duration: Long term (+2)<br>$ Frequency: N/A<br>$ Reversibility: No (+3) Permanent change at plant location and existing plant site(s). | Moderate (+11) | (-7)<br>Mag: (-6)<br>Rev: (-1)<br>Mitigation by:<br>- pre-consultation with Board<br>- complimentary architecture<br>- improvement at existing sites | Negligible (+4) |
| **First Nations** | | | | |
| Impact on traditional land use activities by First Nation | $ Magnitude: Negligible (0)<br>$ Geographic Extent: Local (0)<br>$ Duration: Short-term (0)<br>$ Frequency: Low (0)<br>$ Reversibility: N/A | Negligible (0) | N/A | Negligible (0) |

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Local Neighbourhoods and Residents** | | | | |
| | $ Magnitude: High (+15) - high impact<br>$ Duration: long term (+2)<br>$ Frequency: High (+2)<br>$ Reversibility: Yes (-3) | High (+16) | (-10)<br>Mag: (-10)<br>Mitigation by:<br>- maintaining access to homes<br>- keeping one lane open<br>- notification | Low (+6) |
| **Local Users of Groundwater** | | | | |
| | $ Magnitude: Low (+6) possible impact during dewatering, septic seepage<br>$ Duration: short term (+2) construction near residence would be short<br>$ Frequency: Moderate (+1)<br>$ Reversibility: Yes (-3) | Low (+6) | (-6)<br>Mag (-6)<br>Mitigation by:<br>- directional drilling<br>- supply water to affected users | Negligible (0) |

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Noise and Vibration** | | | | |
| | $ Magnitude: High (+15)<br>$ Duration: Short term (+2)<br>$ Frequency: Moderate (+1)<br>$ Reversibility: Yes (-3) | Moderate (+15) | (-8)<br>Mag: (-8)<br>Mitigation by:<br>- standard construction<br>- design features to reduce noise levels | Low (+7) |
| **Public Health and Safety** | | | | |
| | $ Magnitude: Medium (+10)<br>$ Duration: Long term (+2)<br>$ Frequency: High (+2)<br>$ Reversibility: Yes (-3) | Moderate (+11) | Mag: (-8)<br>Mitigation by:<br>- standard mitigation<br>- maintaining proper chlorine levels in water supply | Negligible (+3) |

| Issue | Impact Characteristics | Environmental Consequence (prior to mitigation) | Mitigation Measure | Residual Effect (after Mitigation) |
|---|---|---|---|---|
| **Worker Health and Safety** | | | | |
| | $ Magnitude: Low (+5)<br>$ Duration: Long term (+2)<br>$ Frequency: High (+2)<br>$ Reversibility: Yes (-3) | Low (+6) | (-3)<br>Mag: (-3)<br>Mitigation by:<br>- standard mitigation | Negligible (+3) |
| **Heritage and Historical Cultural Resources** | | | | |
| | **$** Magnitude: Low (+5)<br>**$** Duration: Long term (+2)<br>**$** Frequency: Low (+2) probability of interacting with heritage importance site is low<br>**$** Reversibility: n/a | Moderate (+9) | (-7)<br>Mag: (-5)<br>Rev: (-2)<br>Mitigation by:<br>- implementation of measures per Ministry's requirements | Negligible (+2) |

# 8 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

## 8.1 Seismic Activity

### 8.1.1 Potential Effects of the Seismic Hazards

The project area, including the right-of-way and corridor of the watermains, treatment plant building site, and existing plant building sites are not located in an area identified as being highly susceptible to seismic activity. In this regard, the Ontario Building Code designates the Sauble Beach area as requiring compliance of the following criteria:

| | |
|---|---|
| Sa(0.2) = 0.13 | (Appendix A, OBC 2006) |
| Site Factor = D | (7 m of sand on clay) |
| Fa = 1.3 | (Table 4.1.8.4B) |

The environmental condition of the area of concern places very little risk on the project. Historically, seismic occurrences in this area would not place stress on the system in excess of that already accounted for in the structural design. The criteria above provide an S(0.2) value of 0.17 which engineering judgement says will not govern any structural designs over Snow and Wind loading.

The presence of sand provides little chance of liquefaction unless there is a high presence of silt due to its free draining characteristics. It will also provide excellent bedding for any in ground piping due to its lack of cohesion and shear characteristics. The chosen pipe materials for this project are PVC and PE which are highly resistant to fracture and are ideal in these types of conditions. These factors will insure that fracture of the piping does not occur.

### 8.1.2 Measures to Mitigate Effects of Seismic Hazards

No mitigation measures are required for this project, since the design of the pumphouse does not have to account for any additional seismic loading standards.

Measures will be taken to prevent the contamination of the wells during any seismic activity by lining the wells with steel to a depth of 1.0 m into the underlying rock and grouting behind the steel against the rock. This will prevent material from entering the well.

### 8.1.3 Residual Effects

Given the foregoing, seismic hazards should not generate any residual effects upon any of the project components.

### 8.1.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring, follow-up and any necessary adaptive management, seismic activity is not expected to impact on the project in a manner that could result in significant adverse environmental effects. In this regard, the anticipated residual effect of seismic activity on the project would be considered minimal in magnitude.

## 8.2 Climate Change

### 8.2.1 Potential Effects of Climate Change

Environment Canada has compiled data produced from global climate change models to forecast the potential impacts of climate change in Ontario over the next 50 years. The key concerns with climate change in relation to this project are as follows:

$ Heat waves in southern Ontario will increase in frequency, intensity and duration. The total number of days in excess of 30 degrees Celsius will likely increase from 10 to 30. The number of cold weather days will likely decrease.

$ Extreme weather events, including severe thunderstorms, freezing rain and very hot days (i.e. greater than 35 degrees Celsius), will all increase.

$ Lake levels will be lower than current conditions, potentially by more than one metre. Smaller and earlier spring runoff events will also be evident.

$ The availability of drinking water might decrease as water sources are threatened by drought. Less rainfall events could also increase the need for irrigation in southwestern Ontario.

### 8.2.2 Measures to Mitigate Effects of Climate Change

Given the above-noted considerations, it is predicted that climate change could impact upon two key operational aspects of this project; ground water recharge rates and water consumption rates. Each matter is discussed below and mitigation measures are presented:

$ Ground Water Recharge Rates - The hydrogeological study work completed for this project demonstrates that the bedrock aquifers associated with the municipal well supplies will sustain the Amabel Sauble water system on a long-term basis given the projected water demands and current ground water recharge rates. It is anticipated that the aquifer recharge characteristics will be not significantly impacted by climate change over the design period. The Winburk well, which has been included in the project as a backup well will also be used. Should ground water recharge rates decline to levels which cannot sustain municipal water demands, additional hydrogeological investigations will be required to explore mitigation options (e.g., upgrading the existing well supplies, identifying new water sources, implementing stringent water conservation measures).

$ Water Demands - Water supply and storage facilities have been designed in a conservative manner to provide a measure of protection against long-term fluctuations in water demands. In this case, a much higher water demand per household has been used in comparison to the existing water demands when calculating storage requirements for the faciltiy. It is anticipated that the water supply and distribution system will be capable of accommodating an increase in household water consumption attributable to climate change over the design period. Should water demands increase appreciably during the time frame, additional water supply and storage facilities may be required.

### 8.2.3 Residual Effects

Given the foregoing, climate change should not generate any residual effects upon the project.

### 8.2.4 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 the project in a manner that could result in significant adverse environmental effects. In this regard, the anticipated residual effect of climate change on the project would be considered Low in magnitude.

## 8.3 Icing and Winter Operations

### 8.3.1 Potential Effects of Icing and Winter Operations

The key concerns with the icing and winter operations in relation to the project are as follows:

$ Severe winter conditions on South Bruce Peninsula causes frost penetration to a depth of up to approximately 1.2 m, which creates a risk for the watermain pipe to freeze, as well as have an adverse effect on the foundations of the buildings.

$ Extreme cold temperatures may cause a significant loss of heat from the building which, if not designed properly, could interfere with the operators' duties, and could cause equipment failure since many of the instruments are designed to operate within a certain temperature range and can malfunction when subjected to a temperature variation beyond their design limits.

$ Road access to the sites during construction, as well as after the construction is completed. Access to the plant building by operators is a potential concern due to icing and winter conditions. The water treatment plant is considered an essential service within the municipality.

$ Icing and the winter weather conditions can severely affect construction activities relating to the watermain installation and plant building construction.

$ Icing and heavy winter snowfalls occur regularly during the winter which has a duration of approximately 3 months.

### 8.3.2 Measures to Mitigate the Effects of Icing and Winter Operations

Given the above noted considerations, the mitigation measures include design considerations, avoidance, as well as controls as follows:

$ Frost penetration impacts to buried watermains can be mitigated by placing the watermain at a bury depth of approximately 1.8 m. Where this depth cannot be achieved, it will be placed at 1.4 m with insulation surrounding the pipe.

- Frost penetration impacts to the footings will be avoided by placing the footings at a minimum depth of 1.2 m and by placing insulation to a depth of 1.2 m below the ground level.

- Accessibility to the site during construction, as well as daily normal operation of the plant is the Municipality's responsibility, which is well equipped to handle extreme weather situations including snowsqualls and ice storm events. It maintains a sufficient budget to clear all major and arterial roads within the Municipality.

- Adequate stocks of treatment chemicals and the diesel fuel for standby diesel generator are to be maintained over the winter months in order ensure continuous operation of the facility during inclement weather conditions.

- Construction of pipeline is to be completed before frozen ground conditions which normally occur anytime after the first week of December. The underground tank and the building superstructure will be completed by November by undertaking the tendering and construction early in the season and by preventing construction during winter months.

- The heat loss from the building will be prevented by properly insulating the building and providing adequate heating within the facility.

### 8.3.3 Residual Effects

Given the foregoing discussion, icing and winter operations will not generate any residual effect upon the project.

### 8.3.4 Significance of Residual Effects

With the implementation of the identified mitigation measures, including monitoring and any necessary adaptive management, icing and winter operations is not expected to have a significant adverse environmental effect on the project. Given the limited scale of the project, as well as characteristics of the effect of icing and winter operations on the project, the anticipated residual effect of this project would be considered minimal in magnitude.

# 9 MALFUNCTIONS AND ACCIDENTS

There is a possibility that malfunctions or accidents could occur during any phase of the project. These malfunctions or accidents could potentially cause adverse environmental effects.

## 9.1 Construction Phase

### 9.1.1 Potential Environmental Effects

An assessment was conducted to identify the potential effects of accidents and malfunctions on 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 problem. Table 9.1 summarizes the findings of the assessment.

**Table 9.1**

**Malfunctions and Accidents (Construction Phase): Environmental Effects Analysis**

| Valued Ecosystem Component | Incident | Environmental Effect |
|---|---|---|
| Groundwater quantity and quality | - Contaminant spill/accident involving construction equipment or transported materials | - Adverse water quality in shallow/deep aquifers |
| Surface water quantity and quality | - Contaminant spill/accident<br>- Siltation (due to high rainfall in construction activity area) | - Adverse water quality in nearby drains or watercourses |

| Valued Ecosystem Component | Incident | Environmental Effect |
|---|---|---|
| Vegetation | - Contaminant spill/accident<br>- Equipment fire<br>- Siltation | - Damage/destruction to native species and habitat |
| Species at Risk | - Contaminant spill/accident<br>- Equipment fire<br>- Siltation<br>- Unintended damage to habitat | - Damage/destruction to identified species and habitat* |
| Migratory Birds | - Contaminant spill/accident<br>- Equipment fire<br>- Unintended damage to habitat | - Damage/destruction to native species and habitat |
| Wildlife, Wetlands | - Contaminant spill/accident<br>- Equipment fire<br>- Siltation<br>- Unintended damage to habitat | - Damage/destruction to native species and habitat |
| Noise & Vibrations | - Equipment malfunction (e.g., failed exhaust pipe) | - Elevated noise and vibration levels near the project site |
| Air Quality | - Contaminant spill/accident<br>- Equipment fire<br>- Equipment malfunction | - Deteriorated air quality near the project site |
| Local users of ground water | - Contaminant spill/accident | - Adverse water quality in sand points and private wells |
| Heritage and historical cultural resources | - None anticipated | - Not applicable |

| Valued Ecosystem Component | Incident | Environmental Effect |
|---|---|---|
| Fish and Fish Habitat | - Contaminant spill/accident<br>- Siltation | - Damage/destruction to fish species and their habitat |
| Soil Quality | - Contaminant spill/accident | - Soil contamination |

* 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.

### 9.1.2 Mitigation Plans

A number of formal plans have been 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 contractor will be required to adhere to these plans to ensure that the construction phase of the project does not have significant adverse environmental effects on the identified VEC's.

#### 9.1.2.1 Emergency Response and Spills Contingency Plan

The contractor will be required to adhere to specific emergency response and spill contingency protocols mandated within the contract specifications. The key specifications will include:

$ Submit procedures for interception, rapid clean-up and disposal of spillages that may occur to the Contract Administrator for review, prior to commencing work.

$ Be prepared at all times to intercept, clean-up and dispose of any spillage that may occur.

$ Keep all materials required to clean-up spillages readily accessible on-site.

$ Report any spills causing damage to the environment immediately to the Grey Bruce Owen Sound Health Unit and the MOE Spills Action Centre.

$ Provide the necessary first aid items and equipment prescribed under the First Aid Regulations of the Worker's Compensation Act.

#### 9.1.2.2 Traffic Management Plan

In order to prevent malfunctions or accidents, the project will require an efficient traffic management plan.

Contract specifications will include a stipulation that the contractor develop a traffic management plan in accordance with the *Ontario Traffic Manual Book 7 (Temporary Conditions).* This plan will be subject to approval by the Municipality. The traffic plan developed for this project will incorporate all measures necessary.

The following measures, as a minimum, will be incorporated into traffic management procedures:

$ Provision of standard signage identifying construction work and lane restrictions.
$ Placement of barrels delineating the construction area and lane restrictions.
$ Provision of flagpersons to direct traffic during construction.
$ A requirement that affected roadways remain open at all times during construction and that private access is maintained.
$ A requirement that the contractor retain responsibility for grading, maintaining and restoring any streets used as haul roads.

#### 9.1.2.3 Health and Safety Management Plan

The contractor will be required to adhere to specific health and safety protocols mandated by existing legislation and identified within the contract specifications. The key specifications will include:

$ 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.
$ Receipt of a Clearance Certificate from the Workplace Safety and Insurance Board.

#### 9.1.2.4 Hydrostatic Pressure Testing and Hydraulic Testing Plan

Contract specifications will stipulate that the Contractor must carry out hydrostatic testing of all installed pipelines (buried piping as well as piping inside the treatment plant building) in accordance with the applicable OPSS and hydraulic testing of the water storage structure in accordance with applicable AWWA specs. The key components of this testing exercise will include:

$ Hydrostatic and hydraulic testing shall be conducted under the supervision of the Contract Administrator.

$ A test section shall be either a section between valves or the completed pipeline. Test sections will be filled slowly with water and all air shall be removed from the pipeline. The water will be supplied through a temporary connection which shall include an appropriate cross-connection control device. A 24-hour absorption period will be allowed before the start of the test.

$ Swabbing is required prior to pressure testing of the main. A minimum of two new swabs will be passed through each section of the main to ensure there is no blockage or debris.

$ Test pressures must be in accordance with the applicable OPSS. The test section shall be subjected to the specified continuous test pressure for two hours.

$ The measured leakage shall be compared with the allowable leakage as calculated for the test section. If the measured leakage exceeds the allowable leakage, all leaks shall be located and repaired and the test section shall be retested until a satisfactory result is obtained.

$ Once satisfactory pressure testing results are obtained and all other testing requirements have been met, the Contract Administrator must request approval from the municipality for the main to be connected to the existing 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.

$ The water storage tank, to be tested, shall be filled slowly to the overflow level. A 24 hour absorption period will be allowed before the start of the test. No leakage shall be allowed.

$ The Contractor must prepare a method of dewatering in order to protect the final connection from contamination of the new or existing pipeline and water storage structure from foreign material or ground water.

## 9.2 Operations Phase

### 9.2.1 Potential Environmental Effects

An assessment was conducted to identify the potential effects of malfunctions and accidents on the identified VEC's during the operations phase of the project. This assessment involved a review of potential problems which could arise during the operation of the planned waterworks, as well as an evaluation of the potential environmental effects resulting from the identified problems. Table 9.2 summarizes the findings of the assessment.

**Table 9.2**

**Malfunctions and Accidents (Operations Phase): Environmental Effects Analysis**

| Valued Ecosystem Component | Incident | Environmental Effect |
|---|---|---|
| Ground water quantity and quality | $ Contaminant spill / accident involving on-site chemicals or operator vehicles<br>$ Low water levels | $ Adverse water quality in shallow/deep aquifers<br>$ Water shortages |
| Surface water quantity and quality | $ Contaminant spill/accident | $ Adverse water quality in nearby drains / watercourses |

| Valued Ecosystem Component | Incident | Environmental Effect |
|---|---|---|
| Vegetation | $ Contaminant spill / accident<br>$ Equipment fire | $ Damage or destruction to native species and habitat |
| Species at risk | $ Contaminants spill / accident<br>$ Equipment fire | $ Damage or destruction to identified species and habitat |
| Migratory Birds | $ Contaminant spill / accident<br>$ Equipment fire | $ Damage or destruction to identified species and habitat |
| Wildlife/Wetlands | $ Contaminant spill / accident<br>$ Equipment fire | $ Damage / destruction to native species and habitat |
| Noise & Vibration | $ Equipment malfunction<br>$ Equipment fire | $ Elevated noise and vibration levels near the project site |

| Valued Ecosystem Component | Incident | Environmental Effect |
|---|---|---|
| Air quality | $ Contaminant spill / accident<br>$ Equipment fire<br>$ Equipment malfunction | $ Deteriorated air quality near the project site |
| Local users of ground water | $ Contaminant spill<br>$ Equipment malfunction | $ Adverse water quality in the sandpoint and private wells<br>$ Personal injury<br>$ Water shortages |
| Heritage and historical cultural resources | $ None anticipated | $ Not applicable |
| Fish and Fish Habitat | $ Contaminant spill / accident | $ Damage/destruction to fish species and habitat |
| Soil Quality | $ Contaminant spill / accident | $ Soil contamination |

### 9.2.2 Mitigation Plans

A number of formal plans will be developed to address the potential environmental effects which could occur during the operations phase. These plans are summarized below. The Town will adhere to these plans to ensure that the operational phase of the project does cause a significant adverse environmental effect to the identified VEC's.

#### 9.2.2.1 Operations Plan

The proposed Operations Plan for the Amabel-Sauble Water Works, that will provide operations personnel with a reference document detailing the requirements for system operation and maintenance, as well as measures to address emergency situations (e.g. accidents, spills, equipment failures), will be prepared. The manual will incorporate a general overview of system equipment and procedural activities, as well as additional requirements prescribed by Regulation 903, Regulation 170, and the C of A. The Municipality will implement the Operations Plan and will adapt the plan to reflect the equipment and procedural requirements associated with the operation of the Amabel Sauble water works.

Table 9.3 provides a general summary of the procedural requirements that will be stipulated within the Operations Plan. The purpose of these requirements is to operate the water works in accordance with established MOE standards, particularly with respect to the requirements for water quality.

**Table 9.3**

**Amabel Sauble Water Works Operations Plan:
Summary of Relevant Procedures**

| | |
|---|---|
| Water Disinfection/ Treatment/ Monitoring | $ Sodium hypochlorite solution is injected into water at rates appropriate to meet treatment objectives. The injection rate must both satisfy the oxidant demand of the water and meet the standard for disinfection residual.<br><br>$ As raw water flows through the header, 12% sodium hypochlorite is injected full strength under pressure. The sodium hypochlorite, which is stored in a 200 L drum, is injected into the raw water by a chemical metering pump. The pump is installed above the storage tank. The operator controls the chlorine dosage by manually setting the stroke of the chemical pump. Treated water chlorine residual is constantly monitored in the treatment plant by an on-line analyzer. The operation of the chemical metering pump is interlocked with the operation of the well pumps. Whenever a well pump operates, the chemical metering pump also starts. This interlock prevents unchlorinated water from being pumped into the distribution system.<br><br>$ The treatment plant has green sand filter system which utilizes potassium permanganate (injected under pressure) to remove iron. The chemical is stored in a 200 L tank and injected into the water by a chemical metering pump. The operator controls the chemical dosage by manually setting the stroke of the chemical pump. |

| | |
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| | $ The owner shall ensure that both the sodium hypochlorite and potassium permanganate meet American Water Works Association (AWWA) quality criteria and American National Standards Institute (ANSI) safety criteria and have NSF approvals. The owner is required to have documentation available to prove these requirements.<br><br>$ The treatment plant is equipped with a chlorine analyzer, a colour analyzer and a turbidity analyzer that provide continuous monitoring of chlorine residual and turbidity of the treated water leaving the treatment plant and entering the distribution system. Each analyzer shall be connected to an alarm system which is triggered in the event of an adverse condition for either of these two parameters. Sodium hypochlorite usage and chlorine residuals shall be reported in the daily operations log and shall be available for the Annual Operating Report. Additional daily readings include flow meter reading, turbidity and free chlorine residual and colour levels.<br><br>$ In the case of a failure signal from the chlorination systems, an alarm will be generated and the operator shall be notified by way of a telephone dialler. Alarms for the low and high chlorine residual levels in the treatment plant shall be set at 0.35 mg/L and 1.2 mg/L. The optimal free chlorine residual leaving the treatment plant shall be 0.85 mg/L.<br><br>$ A spare chemical metering pump will be available should the lead unit fail. If the chlorine residual analyzer detects too low a free residual to ensure 0.20 mg/L at extremities of the distribution system, the operator must visit the facility immediately to confirm the status of the chlorinator and the chlorine analyzer.<br><br>$ The treated water must always meet the MOE's Procedure for Disinfecting Drinking Water in Ontario by ensuring that the proper treatment equipment is supplied and the disinfection facilities are operated and maintained to specific standards. |

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| Filter Backwash Waste Treatment | $ The filter backwash wastewater, generated as a result of backwashing of the greensand filter, flows into the backwash waste treatment tank, where it is clarified by way of sedimentation. The supernatant after the settling time is decanted and discharged into the ditch. De-chlorination using sodium metabisulphite injection is provided if required.<br><br>$ The decanting time is operator adjustable to improve the settling performance and to ensure that the suspended solids concentration in the treated effluent meets the Certificate of Approval requirements.<br><br>$ Composite samples of effluent are taken on a monthly basis and analyzed for compliance with Certificate of Approval requirements.<br><br>$ The Certificate of Approval likely will provide a limit of 25 mg/L of suspended solids, based on the Consultant's experience with similar projects. |
| UV Disinfection | $ The UV reactors shall be operated in accordance with the manufacturer's requirements.<br><br>$ The UV treatment equipment shall be initiated to warm up approximately 8 minutes before commencing the flow of water to be treated in the UV reactor.<br><br>$ UV reactor shall be continuously monitored by UV intensity sensors and the control panel to ensure that the required UV dosages are maintained.<br><br>$ In the case of problem with the UV lamps or sensors, an alarm shall be sent to the operator and the standby UV reactor will be placed into service. |

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|---|---|
| Distributed Water | $ Records shall be maintained of the daily maximum flow rate and the maximum daily volume of water conveyed into the system from each well source. Records shall also be kept of any exceedance of these flows. The records shall include the amount, date, time and duration of the exceedence.<br><br>$Water quality in the distribution system shall be monitored according to the MOE requirements. The following represent key sampling and testing parameters and testing periods defined by the regulations:<br><br>**Parameter** — **Minimum Sampling Requirements**<br><br>Free chlorine residual — Daily<br>E.Coli or fecal coliforms, total coliforms, general bacteria population — Weekly<br>Trihalomethanes — Every three months<br>Lead — Yearly<br>Nitrites and nitrates — Every three months<br>Inorganic parameters — Every three years<br>Organic parameters — Every three years<br>Sodium — Every five years<br>Fluoride — Every five years<br><br>$ If any sample result from the organic, inorganic or lead testing exceeds ½ of the maximum acceptable concentration (MAC), testing frequency shall be increased to quarterly.<br>$ A record shall be made of all samples collected and tested. All records and information related to, or resulting from, the monitoring, sampling and analyzing activities shall be retained for five years.<br>$ The distribution system shall be flushed on an annual basis and swabbed whenever microbial contamination becomes a recurring problem.<br>$ All hydrants shall be exercised twice per year and pumped out in the fall to avoid freezing. All other valves in the distribution system shall be exercised annually. |

| | |
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| Well Maintenance | To ensure that production wells and all of their components are maintained in a suitable condition from the standpoint of water safety, the following inspection tasks shall be completed and documented.<br><br>$ Conduct an initial inspection and develop a summary for all production wells (including production, standby, test or monitoring wells) within the immediate (50 day) capture zone of the production wells. This summary should document:<br>$ Casing diameter and wall thickness<br>$ Depth of well<br>$ Type of well<br>$ Material of casing<br>$ Age of well<br>$ Presence of annular seal<br>$ Drainage around casing<br>$ Extension of grade<br>$ Well cap description<br>$ Complete a below-grade visual inspection of all wells to establish a baseline condition. Determine the date of the previous well video for each well supply or arrange for a new inspection (if the video inspection is over 5 years old or was not completed).<br>$ The operating authority shall inspect all above grade well components on an annual basis. As part of the inspection work, the authority shall:<br>$ Record any deficiency that might affect the performance of the pumping equipment.<br>$ Record any new potential sources of contamination within the 5 year capture zone.<br>$ Record any deficiency that might potentially allow contaminants to enter the well.<br>$ Review bacteriological and chemistry data for changes or trends.<br>$ Document the inspection and remedial action(s) taken, if applicable. |

| | |
|---|---|
| | • A qualified professional shall visually inspect the condition of the well casing below grade every ten years. If there are concerns identified during the well inspection, or if the frequency of occurrence of contaminated raw water samples increases, a qualified engineer or Hydrogeologist shall be consulted.<br><br>• Remedial action shall be implemented when an inspection indicates non-compliance with respect to regulatory requirements and/or a risk to water quality. All remedial actions shall be documented. |
| Treatment Plant Monitoring | $ A regular preventative maintenance plan will identify issues before problems become evident. A record of maintenance checks and equipment repairs is recommended for each well.<br>$ Daily inspections performed on the plant should include the following maintenance and inspection procedures:<br>  $ Inspect for any security breach - e.g. door unlocked or ajar, window broken<br>  $ Ensure heat is on in cold weather<br>  $ Check all fittings and piping for leaks<br><br>$ Other maintenance should include:<br>  $ Exercise and lubricate valves monthly<br>  $ Calibrate flow meters annually<br>  $ Clean the turbidimeter and chlorine anlayzer chamber monthly<br>  $ Calibrate the turbidimeter quarterly or as recommended by manufacturer.<br>  $ Whenever maintenance is performed on the piping or other equipment in direct contact with drinking water in the pumphouse, MOE procedures will be followed. |

#### 9.2.2.2 Contingency Plan

The Contingency Plan for the Amabel-Sauble water works shall include action plans to address problems and emergencies related to the operation of the project. The Ontario Clean Water Agency (OCWA), as the operator of the system, shall be required to adhere to the procedures defined in the document (a copy of which will be placed in the plant building).

The Contingency Plan shall establish appropriate courses of action to mitigate the adverse effects for the following general situations:

$ Supply and treatment (e.g. adverse water quality test results, failed chlorinator)
$ Distribution system problems (e.g. critical watermain break, damaged hydrant)
$ Storage facility problems (e.g. loss of storage, structural failure)
$ Emergency conditions (e.g. breach of security, fire or explosion)
$ Any other situation as required by MOE during annual inspections

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 contact and support agencies, notify the public (as needed), 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 Grey Bruce Owen Sound Health Unit and the MOE Spills Action Centre.

Table 9.4 summarizes the most predictable environmental problems to be encountered during the operational life of the water system, as it will be set out in the Contingency Plan.

**Table 9.4**
**Potential Environmental Changes:**
**Amabel-Sauble Well System**

| Component | Environmental Change | Triggers |
|---|---|---|
| Water Quantity | Low water levels | • Well level during pumping is below normal values<br>• Pumping rate is decreasing as observed on metering<br>• Observation<br>• Telephone call<br>• Interference with other wells<br>• Storage decreasing<br>• Loss of pressure<br>• Alarms |
| | Excessive Consumption | • System pressure is dropping to critical levels<br>• Customer complaints<br>• Underground tank level is dropping to critical levels<br>• Interference with other wells |
| Water Quality | Bacteriological Contamination | • Routine analysis<br>• Observation |
| | Foreign Matter In Well Supply | • Routine analysis<br>• Observation |
| Climatic Conditions | Frozen Watermain | • Customer complaint<br>• Loss of service to an area<br>• Lower than normal pressures |
| | Power Failure | • Observation in pumphouse<br>• Power failure alarm<br>• Telephone call regarding loss of pressure<br>• Pump alarm |
| | Flooding | • Weather report<br>• Flood warning<br>Telephone call |

| | | |
|---|---|---|
| Well Interference | Low Water Levels | • Excessive drawdown possibly as a result of interference from other wells in the area, though unlikely – undertake evaluation by a professional hydrogeologist. |
| Other Natural Problems (.e.g Seismic Activity) | Watermain Breaks | • Observation<br>• Loss of pressure<br>• Public input |
| | Structural Failure | • Observation<br>• Telephone call |
| | Fire or Explosion | • Observation<br>• Phone call<br>• Alarm |

The Contingency Plan shall include remedial action plans to mitigate the 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 by way of contacting required personnel, consulting with the general public, procuring all necessary materials and services, and undertaking necessary repairs. Additional action strategies shall be 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, for example an additional backup water supply well.

The implementation of the corrective measures set out in the Contingency Plan will address environmental hazards occurring in the short-term (e.g. chemical spills, frozen watermains). These measures will 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 ground water levels, steadily increasing iron concentrations or any other contaminant in the well water). The Contingency Plan can be subsequently implemented, as required, 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).

## 9.3 Decommissioning Phase

### 9.3.1 Potential Environmental Effects

An assessment was conducted to identify the potential effects of accidents, malfunctions and adverse conditions on the identified VEC's during the decommissioning phase. The assessment involved a review of potential problems which could arise during the abandonment of the planned waterworks, as well as an evaluation of the potential environmental effects resulting from the identified problems. Table 9.5 summarizes the findings of that assessment:

**Table 9.5**
**Malfunctions and Accidents (Decommissioning Phase): Environmental Effects Analysis**

| Valued Ecosystem Component | Incident | Environmental Effect |
|---|---|---|
| Groundwater quantity and quality | - Contaminant spill / accident involving construction equipment or transported materials | - Adverse water quality in shallow / deep aquifers |
| Surface water quantity and quality | - Contaminant spill/accident<br>- Siltation (due to high rainfall in construction activity area) | - Adverse water quality in nearby drains / watercourses |
| Vegetation | - Contaminant spill / accident<br>- Equipment fire<br>- Siltation | - Damage / destruction to native species and habitat |
| Species at Risk | - Contaminant spill / accident<br>- Equipment fire<br>- Siltation<br>- Unintended damage to habitat | - Damage / destruction to identified species and habitat |

| Valued Ecosystem Component | Incident | Environmental Effect |
|---|---|---|
| Migratory Birds | - Contaminant spill / accident<br>- Equipment fire<br>- Unintended damage to habitat | - Damage / destruction to native species and habitat |
| Wildlife, Wetlands | - Contaminant spill / accident<br>- Equipment fire<br>- Siltation<br>- Unintended damage to habitat | - Damage / destruction to native species and habitat |
| Noise & Vibrations | - Equipment malfunction (e.g., failed exhaust pipe) | - Elevated noise and vibration levels near the project site |
| Air Quality | - Contaminant spill / accident<br>- Equipment fire<br>- Equipment malfunction | - Deteriorated air quality near the project site |
| Local users of ground water | - Contaminant spill / accident | - Adverse water quality in sand points and private wells |
| Heritage and historical cultural resources | - None anticipated | - Not applicable |
| Fish and Fish Habitat | - Contaminant spill / accident<br>- Siltation | - Damage / destruction to fish species and their habitat |
| Soil Quality | - Contaminant spill / accident | - Soil contamination |

### 9.3.2 Mitigation Plans

It is likely that no part of the Amabel Sauble water will be decommissioned at the completion of the 20-year design life of the project. As a result, no formal decommissioning plan has been prepared for the waterworks and servicing infrastructure associated with this project. Decommissioning of the project, when required, will be carried out in accordance with applicable regulations and with regard for all municipal contingency plans in effect at that time (e.g., spills contingency plans, occupational health and safety procedures). Completion of abandonment activities in this manner should ensure that the decommissioning phase of the project does not have significant adverse environmental effects on the identified VEC's.

# 10 MITIGATION MEASURES

## 10.1 Construction Activities

Table 10.1 summarizes a series of standard mitigation measures for the construction phase of this project. Implementation of these measures will serve to minimize any potential adverse effects of this project on ground water resources, as well as the other identified VEC's.

**Table 10.1**
**Amabel Sauble Well System Upgrade Project – Constuction Plan**
**Standard Construction Mitigation**

| Environmental Component Potentially Affected | Planned Mitigation |
|---|---|
| Vegetation, Wildlife / Habitat, Species at Risk, Migratory Birds | $ Minimize stripping of topsoil and disturbance to existing vegetation.<br><br>$ Undertake clearing and grubbing prior to May 1st to prevent nesting in the construction area and to avoid direct impacts to the Monarch Butterfly.<br><br>$ Advise contractor that harassing or harming a migratory bird is prohibited.<br><br>$ Standard tree protection measures should be implemented as necessary.<br><br>$ Restrict tree removal to areas designated by the Contract Administrator.<br><br>$ Equipment or vehicles shall not be parked, repaired, refuelled near the dripline area of any tree not designated for removal. Construction and earth materials shall also not be stockpiled within the defined dripline areas.<br><br>$ Disturbed areas should be stabilized and revegetated upon project completion and restored to a predisturbed state.<br><br>$ Native grasses, shrubs, etc. shall be planted to match existing species growing on site. |

| Environmental Component Potentially Affected | Planned Mitigation |
|---|---|
| | $ If there is insufficient time (at least four weeks) in the growing season remaining for the seeds to germinate, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.<br><br>$ Coordinate the use of pesticides and herbicides with affected landowners and the local pesticide control officer.<br><br>$ Proponents must be aware of and comply with Section 32(1) of the *Species at Risk Act* which states “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”.<br><br>$ If the foregoing cannot be avoided the proponent should cease work and contact Environment Canada, Environmental Policy & Assessment Division, Great Lakes & Corporate Affairs Office, Ontario Region, P.O. Box 5050, 867 Lakeshore Road, Burlington, ON, L7R 4A6 (905)336-4950 to discuss management options to minimize, reduce or control adverse effects or compensatory mitigation and environmental effects monitoring. |

| Environmental Component Potentially Affected | Planned Mitigation |
|---|---|
| Fish and Fish Habitat | $ Sediment and erosion control measures should be implemented prior to work while working near watercourses and maintained during the work phase, to prevent entry of sediment into the water.<br><br>$ Measures should be inspected regularly during the course of construction and until any required re-vegetation has established to ensure they are functioning properly.<br><br>$ All necessary repairs should be made for the purpose of site preparation and project completion, and should be operated and stored in a manner that prevents any deleterious substance (i.e. petroleum products, silt, etc.) from entering the water.<br><br>$ Measures should be used to prevent deleterious substances, such as ditch sediment and preservatives from entering the watercourse.<br><br>$ Materials to be used should not be taken from shoreline.<br><br>$ Follow any other instructions provided by local conservation authority for the project. |
| Public Health and Safety<br><br>Worker Health & Safety | $ The contractor shall prepare and submit a traffic plan to the Project Engineer for review and acceptance.<br><br>$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. |

| Environmental Component Potentially Affected | Planned Mitigation |
|---|---|
| | $ 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.<br><br>$ Adequate safety barriers and signs to protect public safety around the work site.<br><br>$ All workers involved in construction, and installation activities, etc. must wear appropriate protective equipment (e.g. safety boots, hard hats, protective eye wear, safety vests as appropriate).<br><br>$ An individual trained in Emergency First Aid/CPR will be present at all times and have access to appropriate First Aid materials during all project related activities.<br><br>$ A plan should be developed and in place that safely directs traffic.<br><br>$ All operators should receive necessary training and education to know hazards relating to their job.<br><br>$ All operators to have required certification levels to operate various plant components.<br><br>$ Provide proper fencing at school site to keep out children.<br><br>$ Excavate trenches and tankage sites with proper and safe slope. Use shoring, trench-box as necessary.<br><br>$ Use “buddy system” to enter confined spaces during construction and operation of the plant. |

| Environmental Component Potentially Affected | Planned Mitigation |
|---|---|
| Accidents and Malfunctions | $ Re-fuelling activities (machinery, vehicles, etc.) or activities involving deleterious substances should be undertaken well away from watercourses.<br><br>$ Develop a spill prevention and contingency plan and keep at site.<br><br>$ Proper spill management equipment (i.e. spill kit) should be located on site at all times during project.<br><br>$ Immediately contain and clean up spills in accordance with provincial regulatory requirements and contingency plan.<br><br>$ Report spills to Ontario Spills Action Centre at 1-800-268-6060.<br><br>$ Adequate safety barriers and signs for safety of workers and public. The contractor will be required to implement a Health and Safety Plan (OHSA 1990).<br><br>$ Construction shall occur under ideal weather conditions, and designed with appropriate specifications to withstand variable weather conditions. |
| Effects of Environment on Project | $ All project components will be constructed under ideal weather conditions, and designed with appropriate specifications to withstand variable weather conditions. |

| Environmental Component Potentially Affected | Planned Mitigation |
|---|---|
| Surface Water<br>Groundwater<br>Soils & Sediments | $ All materials and equipment used for the purpose of site preparation and project completion shall be operated and stored in a manner that prevents any deleterious substance (e.g. petroleum products, silt, etc.) from entering the water.<br><br>$ Sediment and erosion control measures shall be implemented prior to work and maintained during work, and until the site has been stabilized, to prevent entry of sediment into waters frequented by fish.<br><br>$ Stabilize any waste materials and/or materials needed for project work to prevent them from entering and impacting the watercourse.<br><br>$ Minimize disturbance to existing vegetation so as to limit disturbance to soils and/or sediments.<br><br>$ Disturbed areas should be stabilized and revegetated upon project completion and restored to a predisturbed state. Native grasses, shrubs, etc. can be planted to match existing species growing on site.<br><br>$ Stormwater management is necessary so as to avoid erosion and runoff, and to avoid subsequent impacts to water quality (i.e. sedimentation, runoff of contaminants, etc.) and to fish and fish habitat.<br><br>$ Identify, contain and remove any contaminated soils or other contaminated materials off-site to a licenced disposal facility.<br><br>$ Following demolition of the pumphouse buildings, monitor to determine the presence of residual contamination in the soils. If results indicate that contaminants are present, conduct further testing to determine and prevent their migration to surface and groundwater. |

| Environmental Component Potentially Affected | Planned Mitigation |
|---|---|
| | $ Identify suitable locations for designated refuelling and maintenance areas (e.g. away from watercourses, storm inlets, and natural areas).<br><br>$ Refuelling or maintaining equipment will not occur within 30 m of a watercourse. Spillage and reporting plans are required. |
| Air Quality | $ Use new or well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles and engine covers.<br><br>$ Comply with operating specifications for heavy equipment and machinery.<br><br>$ Minimize operation and idling of gas-powered equipment and vehicles, in particular, during smog advisories.<br><br>$ Minimize vehicle traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material.<br><br>$ Avoid excavation, and other construction activities with potential to release airborne particulates, during windy and prolonged dry periods.<br><br>$ Stabilize stockpiled excavated soils in areas that are upwind of sensitive receptors.<br><br>$ Cover or otherwise contain loose construction materials that have potential to release airborne particulates during their transport, installation or removal. |

| Environmental Component Potentially Affected | Planned Mitigation |
|---|---|
| | $ Spray water, as appropriate, to minimize the release of dust from gravel, paved areas and exposed soils. Use chemical dust suppressants only where necessary on problem areas.<br><br>$ Restore disturbed areas as soon as possible to minimize the duration of soil exposure.<br><br>$ Avoid the use of chemical dust control products adjacent to wetlands and watercourses.<br><br>$ Develop a site dust management plan identifying all potential fugitive emission sources from construction operations. Identify all haul roads, prevailing wind direction, open areas, etc., incorporate wind fencing as necessary.<br><br>$ Compact disturbed soils with rollers or similar equipment to reduce erosion potential.<br><br>$ Eliminate open burning.<br><br>$ Where possible, reduce certain activites during windy conditions.<br><br>$ Properly schedule the delivery of materials to minimize storage time and reduce potential for emissions.<br><br>$ The contract specifications shall include provisions requiring motorized equipment to meet design specifications for emission controls consistent with provincial Drive Clean Standards.<br><br>$ Secure loads on haul trucks to minimize fugitive dust emissions. Use partial enclosures as needed.<br><br>$ Clean the county road to remove accumulated gravel, dirt or similar debris deposited on paved road and shoulders at the end of each work day. |

| Environmental Component Potentially Affected | Planned Mitigation |
|---|---|
| Noise/Vibration | $ Vehicles, machinery and equipment should be in good repair, equipped with emission controls, as applicable, and operated within regulatory requirements.<br><br>$ Site procedures should be established to minimize noise levels in accordance with local by-laws.<br><br>$ Provide and use devices that will minimize noise levels in the construction area.<br><br>$ Night time or Sunday work shall not be permitted, except in emergency situations. |
| Local Terrain and Topography | To minimize impacts (erosion, flooding or subsidence) of the trench work on the local terrain:<br><br>$ If dewatering is required, avoid discharging onto areas that are prone to flooding or erosion.<br><br>$ Apply wet weather restrictions on construction activities to reduce surface run-off from exposed work areas and to minimize the risk of inundated trenches.<br><br>$ Backfill and compact excavations as soon as possible. Optimize the degree of soil compaction to minimize erosion and where possible, allow for vegetation to re-establish.<br><br>$ Provide additional clean backfill in areas that are prone to subsidence. |

## 10.2 Post-Construction Environmental Monitoring

Following construction completion, the environmental monitoring will be continued to ensure the preservation of natural resources and to determine the success of remedial actions taken during and after construction. The following is the list of post-construction environmental monitoring mitigation measures:

$ Automated continuous water level monitoring and recording (by using transducers) in the observation and water supply wells. This will be an ongoing requirement.

$ Summarize water monitoring levels by recording average monthly water levels in the production and observation wells; analyze them and maintain records for review by MOE and the Responsible Authority as required.

$ Sampling and analysis of raw water supplies from the wells. Currently, the Ministry of Environment requires routine sampling that is comprised of bacteria analysis, turbidity analysis and some other parameters that indicate short term fluctuations in water quality. The provincial Drinking Water Protection Regulation (DWPR) requires sampling and analysis for metals, volatile organics, pesticides and PCBs, etc. that are indicative of long term contamination. The sampling will be carried out in compliance with DWPR.

$ Continuous analyzers will be utilized for ensuring the potable water supply quality prior to its distribution to the water customers. Monitoring includes turbidity, residual chlorine, colour, etc. In addition, weekly bacteriological testing and analysis will be undertaken for water samples from the distribution system piping.

$ Records will be kept of the water withdrawn from the water supply wells and the water supplied to the distribution system in irder to account for the water used. Annual Water Budget reports shall be prepared to keep account of water withdrawal and its utilization for annual review by MOE. Records will be provided to Federal RA as required. Also refer to Section 15.2 regarding data analysis by hydrogeologist.

$ Prepare an annual Operations and Maintenance Report documenting plant operations, customer complaints, difficulties experienced in operations, repairs and upgrades required to maintain the equipment in proper operating condition, etc. The report will be submitted to the Ministry of Environment and also be reviewed by the Municipal officials and presented to Council in order that a proper operations and maintenance budget is provided.

$ Following completion of the construction phase of the project, the proponent will evaluate the effectiveness of site restoration and reclamation works.

$ Evaluate the success rate, survivability and general health of existing vegetated and newly planted areas on an annual basis.

$ Monitoring of the survivability of the revegetation will be conducted by municipal personnel. The post-construction monitoring program will examine all of the restored areas, documenting failures in reseeding.

## 10.3 Operational Activities

The operation of the water system requires knowledge, experience and proper training of the operators to ensure that the operation of the water works is undertaken in a safe and reliable manner. The following measures shall be utilized to achieve the safe operations:

$ Utilize experienced and licenced operators for the safe operation of the treatment work. Provide all required training to the operators for the safe handling and operation of all of the treatment equipment including, but not limited to the pumps, clarifiers, filters, chemical injection systems, monitoring instruments, electrical panels, and chemicals.

$ Implement a continuing education program to keep the Operators informed about the changes in legislation, industrial safe practices, etc.

$ Introduce and maintain a “buddy” system when entering confined spaces. Implement and use confined space entry forms duly signed by a responsible and trained Operator.

$ Provide all proper tools and instruments to maintain the treatment equipment in good operating condition, and prepare schedules for the inspection of instruments and equipment by trained tradespeople to ensure the reliability of the treatment plant.

$ Flush the watermains repaired after watermain breaks. Follow methods as prescribed in AWWA and CSA standards, and MOE regulations.

$ Clean the clearwell every three years. Increase this frequency if monitoring results warrant more frequent cleanings.

## 10.4 Contingency Planning

Contingency plans will be prepared and discussed with the Operators to ensure that they are familiar with and aware of the measures that should be used in the event of an emergency. The contingency measures document will be reviewed and updated as required. The contingency plan will include, but not be limited to the following:

$ The handling of chemical spills and proper reporting procedure.

$ The breakdown of critical equipment which could include raw water supply pumps, water distribution pumps, UV disinfection equipment and filters.

$ Significant drop in chlorine residual levels in the water supply to the distribution system.

$ High turbidity levels in the water supply to the distribution system.

$ Unexpected changes in the raw water supply that cannot be treated by the treatment equipment provided in the treatment plant.

$ Unusual variation in water levels in the water supply wells and monitoring wells.

# 11 CUMULATIVE ENVIRONMENTAL EFFECTS

## 11.1 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 actions, between actions and the environmental setting and 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).

## 11.2 Assessment Methodology

The following procedure was carried out to evaluate the nature and magnitude of these cumulative impacts within the context of the existing environment setting and future community development:

$ Assessment of existing land use activities, infrastructure, and natural features 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.

## 11.3 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 Amabel-Sauble 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 that the operational plan associated with the new well supply assumes that the new well site will be in operation far beyond the 20-year timeframe, 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.

## 11.4 Potential Projects Considered for Cumulative Effects Assessment

### 11.4.1 Construction of a water transmission pipeline from Wiarton to Sauble Beach

This project would require the construction of approximately 22 km of water transmission pipeline from Wiarton to Sauble Beach via Hepworth, the upgrading of Wiarton Filtration Plant, and the construction of a new standpipe in Sauble Beach area. Project cost is in the range of $32 million. The Municipality has lobbied both the provincial and federal governments to secure funding, and submitted applications under the Canada-Ontario Municipal-Rural Infrastructure Fund (COMRIF) program, but has not been successful.

Without senior level government funding, it is safe to assume that the possibility of this project taking place in the near future is remote.

### 11.4.2 Replacement of watermains within the existing seven subdivisions

Under the Canada-Ontatio Infrastructure Pprogram (COIP), there was not sufficient funding available to consider the replacement of watermains in the seven subdivisions. The Municipality, in order to keep the cost per household affordable, after senior government funding, decided against the replacement of the existing watermains with new fire flow capable and larger sized watermains.

Although the distribution watermains will need replacing at some point, this will occur only if the project to construct the water transmission pipeline project (noted above) is implemented. As a result, any watermain replacements are not anticipated to overlap temporally or spatially with residual effects from this project.

### 11.4.3 Downtown Core Area (DCA) Communal Sewer System

Construction of the DCA communal sewer system will likely proceed in the future (timeline is unknown) but is not anticipated to cause any environmental effects that would act in a cumulative manner with this project for the following reasons:

$ due to opposition by property owners, the connections to the sewage system would be limited to those in the DCA of Sauble Beach. As a result, none of the subdivisions affected by this project will be connected to new communal sewage system; and,

$ although the site of the new sewage treatment plant has not been chosen, it is unlikely to be located near the Amabel-Sauble or Winbruk well sites, avoiding any impacts to the bedrock aquifer.

### 11.4.4 New Residential Construction

The construction of any new residential homes is not anticipated to cause any environmental effects that would act in a cumulative manner with this project for the following reasons:

$ residential construction in the Sauble Beach area consists of the in-filling of existing vacant lots in approved subdivisions, which proceeds at a gradual pace;

$ there are no other approved subdivisions or applications for new subdivisions that are in the process of receiving approval;

$ any new residential construction, outside of the existing seven subdivisions, would not be connected to the Amabel-Sauble water system as this system has been designed to service only these subdivisions. In addition, since most residences not connected to the municipal water system utilize sand points for their water supply, no additional water takings from the same bedrock aquifer are likely.

## 11.5 Identification of Potential Cumulative Effects

Based on a review of the projects considered in Section 11.4, there are no projects that would have environmental effects that would act in a cumulative manner with the environmental effects from this project.

## 12 SUSTAINABILITY OF THE RESOURCE

The Amabel Sauble water system will utilize a groundwater resource. Water will be withdrawn from the bedrock aquifer which is a renewable resource.

A detailed and extensive water pumping program was undertaken to fully understand the aquifer parameters and to determine the reliability of the water supplying aquifer on a long term basis. A total of eleven short term and long term pumping tests were undertaken. During testing, the possible impacts to the water table aquifers, which are widely utilized in the surrounding area, were evaluated. The investigation concluded by stating "the data shows that there is no drawdown of shallow sand aquifer during pumping, that the aquifer is not connected to the bedrock aquifer, that there will be negligible impact on the wetlands due to the pumping of the bedrock aquifer, requiring no mitigative measures". (Source: Aquifer Evaluation Report, Amabel Sauble School Wells PW1 and PW2, Town of South Bruce Peninsula, Volume I & II, by Henderson Paddon & Associates Limited, May 2003.)

During the aquifer evaluation, the well capture area for 50 days, 1 year, 5 years and 20 years were determined. As suggested by NRCan, a review was undertaken of recharge calculations. The review was based on two reports: the "Saugeen-Grey Sauble-Northern Bruce Peninsula Preliminary Conceptual Water Budget Report", 2006 (in draft form) that was being prepared by the Grey-Sauble Conservation Authority (GSCA); and, the "Grey and Bruce County's Groundwater Study Final Report, May 2003", prepared by Waterloo Hydrogeologic (WHI). The GSCA report indicates that the estimated recharge for clay/clayey till in the Bruce County area is 140 mm per year and for impervious bedrock, 115 mm per year. In the area of Amabel Sauble wells, a recharge of 197 to 240 mm per year has been proposed (See Map 18; Recharge from the GSCA report in Appendix B). The WHI report estimated a recharge ranging from 75 mm per year to 150 mm per year across the Counties, which was based on calculations using the 22 MODFLOW models in the report.

Although the WHI report did not include a capture zone for the Amabel Sauble School well as it was not yet a municipal well, it did provide the capture zone for Winburk water supply well. The 10 year recharge area for the Winburk well is 410,000 $m^2$ and the 25 year recharge area is 1.44 $km^2$. By using approximately 1.1 $km^2$ as the recharge area for a 20 year capture zone, the aquifer recharge is estimated to be 82,500 $m^3$/year based on 75 mm of recharge per year, 165,000 $m^3$/year based on 150 mm per year and 216,700 $m^3$/year based on 197 mm per year for the Sauble area (see Map 18 in Appendix B). Therefore, by a conservative estimate, the recharge volume for Winburk water supply well is estimated to be 165,000 $m^3$/year baased on a recharge rate of 150 mm/year.

Since the capture zone for Amabel Sauble School well will be approximately the same size as the Winburk well, a conservative estimate of 165,000 $m^3$/year of recharge can also be utilized for Amabel Sauble well. This recharge volume is significantly greater than the estimated amount of water that would be withdrawn each year from the Amabel Sauble wells (98,550 $m^3$/year). Based on this estimate, the recharge rate required for the Amabel Sauble well would be 89.6 mm/year. This implies that the sustainability of the renewable water supply resource should not be significantly affected by the project.

# 13 CONSULTATION

## 13.1 Public Information Distribution and Consultation Responses

### 13.1.1 Comprehensive Study Process

To date, the public consultation program developed for the comprehensive study has incorporated the following components:

• A public registry was established for the project and listed on the Canadian Environmental Assessment Registry (reference number 04-03-8130)

$ A public notice was prepared detailing the public comment period for the draft scoping document and notifying the public of the availability of project funding for participation in the study.

    $ The notice was circulated in two local community newspapers; the Owen Sound Sun Times and the Wiarton Echo (circulation date: January 18, 2006).

    $ The notice was also posted to the COIP and the Canadian Environmental Assessment Agency websites.

    $ Copies of the draft scoping document were made available electronically on the Industry Canada and the Canadian Environmental Assessment Agency websites, with hard copies made available at the South Bruce Peninsula municipal office and the public library in Sauble Beach.

    $ A 21-day review period was provided for comments. Three written comments were received.

• A public notice was prepared detailing a second public comment period and provided the public with the opportunity to submit comments or concerns related to the environmental implications of the project.

    $ The notice was circulated in two weekly community newspapers; the Owen Sound Sun Times and the Wiarton Echo (circulation date: September 20, 2006).

$ The notice was also posted to the COIP and the Canadian Environmental Assessment Agency websites.

$ A 21-day period was provided for comments. No written or oral comments were received.

Table 13.1 summarizes the comments received from the public during the consultation process:

**Table 13.1**

**Comprehensive Study Public Consultation Program: Summary of Comments Received from the Public**

| Public Comment/Concern | Comment |
|---|---|
| Whether the proposed water system has the ability to supply 328 households, as opposed to the current 222 households, which is the full buildout potential of the affected subdivisions. | This point was addressed as part of Ground Water Quality and Quantity Sections. It was further addressed in Section 12.0 “Sustainability of the Resource”. |
| What effects the water usage could have on private septic systems and it resulting impacts to the Sauble Beach area in general? | This point was addressed as part of Ground Water Quality and Quantity, and Local Users of Ground Water in sections 7.1.1 and 7.2.6. |
| What are the potential effects of the project on the character of the community? | This point was addressed as part of the Local Neighbourhood and Residents in section 7.2.6. |
| Whether the project will have any effects on the Sauble River. | This point was addressed as part of Surface Water Quantity and Quality in section 7.1.2. |
| What are the health effects of using chlorine in water treatment? | This point was addressed as part of Public Health and Safety in section 7.2.8. |
| A request for a review panel. The rationale | Although the proponent applied for |

| Public Comment/Concern | Comment |
|---|---|
| for this request is that since the proponent has applied for funding under the Canada-Ontario Municipal-Rural Infrastructure Fund (COMRIF) to construct a water transmission pipeline from Wiarton to Sauble Beach, which may connect with the transmission water main being constructed as part of the proposed project, the project scope should be widened to include this and both projects should be assessed under a review panel. | COMRIF funding for the pipeline project, it will not proceed unless senior government funding is secured (The application was not successful and it is unknown if a future application would be successful). During the Provincial Municipal Class Environmental Assessment process, this alternative was rejected because of cost considerations. A review panel is not required as the comprehensive study was able to adequately address all environmental concerns for the proposed project. |
| Feasibility of constructing a regional water system without a second project to sewage treatment in Sauble Beach | This was included as part of the request for a review panel. This request was not addressed in this report as it goes beyond the scope of this project which is the construction of an upgraded water supply system in Sauble Beach. |
| Fiscal impacts to property owners as a result of this project and the proposed pipeline project. | Direct fiscal impacts (capital and operating costs) do not fall within the scope of the environmental assessment and were not dealt with as part of the comprehensive study. |
| Fiscal impacts to property owners of the Amabel-Sauble Community School receiving treated water from the new plant at no cost to the school board | This is part of a contractual agreement between the Town of South Bruce Peninsula and the local school board. This issue does not fall within the scope of the environmental assessment and was not dealt with by the comprehensive study. |

A third 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 provide written comments on the project to the Canadian Environmental Assessment Agency. Notices detailing the completion of the report and the review periods will be advertised in local community newspapers. All comments received from the public will be distributed to the expert federal authorities and the Agency for consideration.

### 13.1.2 Provincial Class EA Investigation

#### 13.1.2.1 Public Consultation Process

During Phases 1, 2 and 3 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 and alternative design concepts 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:

$ Publication in local newspapers a Notice of Study Commencement outlining the problem definition and an outline of provincial/federal funding program for the project. The alternative solutions for the upgrading of groundwater supply and treatment systems were also published. This notice was issued on December 21, 2001.

$ A public meeting was held on October 12, 2002 at the Amabel Sauble Community School. Notice for the public meeting was published on September 27, 2002 in the local newspapers.

$ Comment sheets were provided to those present at the meeting and those present were encouraged to provide their input by completing up the form and sending it to the municipal or engineer’s office.

$ A public consultation centre was held on September 19, 2003 at the Amabel Sauble Community School where the design concept for the preferred alternative, as outlined at the previous public meeting, was presented.

$ For the public consultation centre, a notice was advertised in the local newspapers on September 19, 2003.

$ Comment sheets were also provided at the second public consultation centre and those present were encouraged to provide their input by filling out the form and sending it to the municipal or engineer's office.

$ Notice of both public meetings was also provided by bulk mailing due to seasonal occupancy of many cottages in the area.

$ A report entitled "Environmental Study Report Class Environmental Assessment Schedule C, Upgrading of Sauble Beach Area Water Supply and Treatment Systems, Town of South Bruce Peninsula", dated January 2004 was prepared and made available to the public and interest groups.

$ An electronic copy of the report was made available on the Town of South Bruce Peninsula's website as well as that of the Consulting Engineer, Henderson Paddon & Associates' website.

## 13.2 First Nations Consultation

As noted earlier in Section 7.2.3, the Amabel Sauble water system does not service Saugeen River First Nation community or have any component of the project adjacent or close to the community. The proposed water system will not have surplus water supply capacity that could supply treated water to the community.

A communication was sent to Saugeen First Nation while undertaking the investigation of the regional water system that included a water supply from the Wiarton Filtration Plant to the Sauble Beach area. In 2002-03, the municipalities of the Town of South Bruce Peninsula, Arran-Elderslie and Municipality of Brockton jointly investigated undertaking a regional water system that would supply water to the communities in Hepworth, Sauble Beach, Tara, Chesley, Elmwood and Walkerton. During this investigation, Saugeen First Nations were also contacted to determine their interest in a regional water system that could provide them potable water from an upgraded Wiarton

Filtration Plant. The Saugeen First Nations verbally declined to participate in that project.

## 13.3 Government

### 13.3.1 Provincial Class EA Investigation

The government agencies at the County, provincial, and federal level were contacted regarding the project. The government agencies that were contacted regarding the project included the following:

$ Ontario Ministry of Agriculture, Food & Rural Affairs, Agricultural Land Use Branch, Guelph, Ontario

$ Ministry of Environment, Environmental Assessment and Approvals Branch, Toronto, Ontario

$ Ministry of Natural Resources, Midhurst, Ontario

$ Ministry of Culture, Heritage & Libraries Branch, Southwest Archaeological Field Office, London, Ontario

$ Department of Fisheries & Oceans Canada, Bayfield Institute, Burlington, Ontario

$ Department of Fisheries & Oceans Canada, Coast Guard, Sarnia, Ontario

$ County of Bruce, Planning & Economic Development Department, Wiarton, Ontario

$ Ontario Small Town & Rural Affairs, Guelph, Ontario

$ Ministry of Environment, Owen Sound Area Office, Owen Sound, Ontario

$ Ministry of Environment, London, Ontario

$ Grey Sauble Conservation Authority, Owen Sound, Ontario

$ Grey Bruce Health Unit, Owen Sound, Ontario

$ County of Bruce, County Roads Department, Walkerton, Ontario

$ Ministry of Natural Resources, Fish & Wildlife Biologist, Owen Sound, Ontario

These agencies were provided copies of information packages outlining the various alternatives that were investigated for the construction of Amabel Sauble water system during provincial Environmental Assessment. After the completion of the Phase I and Phase II Environmental Assessment Report, a copy of the report was also provided to the agencies who requested one.

### 13.3.2 Consultation with NRCan

NRCan reviewed the Aquifer Evaluation Report and provided their comments on September 28, 2006. The comments generally disagreed with the analysis results and conclusions provided in the report. In summary, they were concerned that the two pumping wells, PW1 and PW2, may not be able to sustain the short term (summer maximum) and long-term (20-year average) pumping rates suggested in the report, and presented a conceptual explanation for the aquifer response observed in the study results. They noted some technical problems regarding the analysis by the consultant, the assumptions implicit to the analysis, the interpretations of the results. NRCan recommended a modest re-analysis of some of the existing data to provide more realistic estimates of sustainable pumping rates and recommended the development of a contingency plan in the event Wells PW1 and PW2 could not produce sufficient water for all the community's needs.

On November 9, 2006, NRCan provided additional nine comments and re-confirmed the need for modest re-analysis as recommended by them earlier.

In response to HPA's letter dated December 6, 2006, NRCan provided an additional eight comments and concluded that the Consultant had not responded to all of NRCan's comments and did not address the issue that elevated pumping rates did not take into account the long term decline in the pumping water level due to average pumping. NRCan recommended a detailed contingency plan as part of the follow-up program that would include a monitoring program and securing one or more backup wells that meet MOE Regulations and could be brought online to prevent significant water shortages in the community.

# 14 SUMMARY OF ENVIRONMENTAL EFFECTS

**Table 14.1** summarizes the potential environmental effects, impact mitigation and residual effects associated with this project.

## TABLE 14.1

## Environmental Effects Summary Checklist

| Environmental Component | Potential Project Effects | | | | | | Residual Effects | |
|---|---|---|---|---|---|---|---|---|
| | Potential Adverse Effects | | | Can it be Mitigated? | | | Is it Significant? | |
| | Yes | No | Uncertain | Yes | No | Uncertain | Yes | No |
| **Physical and Natural Environment** | | | | | | | | |
| - Groundwater quantity and quality | T | | | | T | | | T |
| - Surface water quantity and quality | T | | | T | | | | T |
| - Vegetation | T | | | | T | | | T |
| - Wetlands | | T | | | | | | N/A |
| - Species at risk | T | | | T | | | | T |
| - Fish and fish habitat | T | | | T | | | | T |
| - Migratory birds | T | | | T | | | | T |
| - Wildlife | T | | | T | | | | T |
| - Air quality | T | | | T | | | | T |
| - Soil quality | T | | | T | | | | T |
| **Socio-economic & Cultural Environment** | | | | | | | | |
| - Adjacent land uses | T | | | T | | | | T |
| - Aesthetics | T | | | T | | | | T |

| Environmental Component | Potential Project Effects | | | | | | Residual Effects | |
|---|---|---|---|---|---|---|---|---|
| | Potential Adverse Effects | | | Can it be Mitigated? | | | Is it Significant? | |
| | Yes | No | Uncertain | Yes | No | Uncertain | Yes | No |
| - First Nations | | T | | | | | | N/A |
| - Heritage & Historical Cultural Resources | | T | | | | | | N/A |
| - Local uses of groundwater | T | | | T | | | | T |
| - Noise and vibration | T | | | T | | | | T |
| - Public health and safety | T | | | T | | | | T |
| - Worker health and safety | T | | | T | | | | T |
| **Other Factors** | | | | | | | | |
| - Accidents and malfunctions | T | | | T | | | | T |
| - Effects of environment on the project | T | | | T | | | | T |
| **Cumulative Effects** | | | | | | | | |
| - Groundwater | | T | | | | | | N/A |
| - Surface water | | T | | | | | | N/A |
| - Species at risk | | T | | | | | | N/A |
| - Migratory birds | | T | | | | | | N/A |
| - Wildlife | | T | | | | | | N/A |

# 15 FOLLOW-UP PROGRAM

## 15.1 Need for a Follow-up Program

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 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.

## 15.2 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 Fedy and Forbes wells which will be modified into observation wells, will be conducted to further assess the impacts resulting from the pumping of Wells PW-1 and PW-2. This exercise will be carried out during the initial 36-month period of well operation to confirm the validity of the hydrogeologic study work with respect to ground water quantity. Data gathered during this period will provide information on the initial conditions of existing wells within the general cone-of-influence. This information will be used to monitor impacts associated with well pumping and, as necessary, to respond to adverse impacts over the operational phase of the project (e.g., excessive drawdown of the Wells PW-1 and PW-2 and Winburk well). If significant drawdown problems are found, remedial measures will be taken to address the identified problems and additional monitoring and reporting will occur, as necessary and as set out in an operational contingency plan. The contingency plan will incorporate a specific well identification, evaluation and reporting mechanism, as well as a strategy for corrective action.

$ The annual water consumption from each well, water level variations on monthly basis, as well as the record of the lowest water level during summer use will be reviewed by a professional hydrogeologist to study the behaviour of water supply wells PW1 and PW2 as well as the Winburk well, if used, and the observation wells. These findings will be compared with the analysis utilized for the preparation of the report entitled “Aquifer Evaluation Report”, May 2003 by HPA. A summary of the findings from each year’s analysis will be documented in a report, which will be provided to NRCan as requested. The report will include an assessment of the impacts predicted in Comprehensive Study Report and will also provide a discussion on the effectiveness of the mitigation measures adopted.

$ Additional monitoring of chemical and microbiological parameters will be completed in accordance with MOE sampling requirements. This will confirm the validity of the hydrogeologic study work with respect to ground water quality. If water quality problems are encountered over the operational phase of the project, remedial measures will be taken to address the identified problems and additional monitoring and reporting will occur, as necessary, and in accordance with MOE protocols.

## 15.3 Timelines of Follow-up Program

Monitoring activities associated with the Follow-up Program will be carried out for a period of three years. The results of the monitoring exercises will be summarized in annual reports.

## 15.4 Reporting to Industry Canada and the Canadian Environmental Assessment Agency on Follow-up

Industry Canada and the Canadian Environmental Assessment Agency will be provided with the annual reports for further evaluation. The availability of the findings from the follow-up program will be posted on the CEA Registry.

## 16 CONCLUSIONS AND RECOMMENDATIONS

In its analysis of the environmental effects of the upgrading of *Amabel Sauble Well System Upgrade Project*, Industry Canada, as Responsible Authority under CEAA, has taken into consideration the information provided by the Town of South Bruce Peninsula, expert advice provided by Federal Authorities, and results of feedback acquired through the public consultation process.

The environmental effects of the project were evaluated, including but not limited to those effects associated with accidents and malfunctions, effects of the environment on the project, alternative means of carrying out the project, 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 proposed *Amabel-Sauble Well System Upgrade Project* will not likely have 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.

# APPENDIX A

# COMPREHENSIVE STUDY SCOPING DOCUMENT

<u>**Comprehensive Study – Project Scoping Document**</u>

**Town of South Bruce Peninsula: Upgrading of the Amabel-Sauble 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 Amabel-Sauble 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 (Agency), as the federal environmental assessment coordinator, has also determined that 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 Amabel-Sauble 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 (Minister), 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 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 will decide whether to refer the project back to the responsible authority so that they may continue the comprehensive study process, or refer the project to a mediator or review panel.

If the Minister 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 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

Sauble Beach, in the Town of South Bruce Peninsula, is located along the shore of Lake Huron approximately 25 kilometres northwest of Owen Sound (see general location map in Appendix 1). The proposed project is located entirely within the limits of the community of Sauble Beach. The individual well sites are shown in Appendix 2.

To comply with the Ontario Drinking Water Systems Regulation and to address capacity issues within the community for a 20-year planning period, the Town of South Bruce Peninsula, the project proponent, submitted a proposal to upgrade the Sauble Beach well systems.

The proposed project involves the upgrading and combining of seven small water systems (Fedy, Forbes, Gremik, Robins, Thompson, Trask, and the Winburk (Burton) well supplies) into the newly named Amabel-Sauble water system. Major works for this proposed project would include: the construction of a new well and the upgrading of the existing well at the Amabel Community School site; the construction of a new treatment building and associated site works at the school site; the decommissioning of the existing seven wells and pumphouses; and, the construction of approximately 6.7

kilometres of transmission water main to connect the seven distribution systems to the new treatment building.

**Background**

The Sauble Beach area does not have a primary water supply. Instead, the Town of South Bruce Peninsula owns and operates seven small communal groundwater systems. The systems, Fedy, Forbes, Gremik, Robins, Trask, Thomson, and Winburk, are in relatively close proximity to each other. Six of the seven water systems are located west of the Sauble River, which generally flows through the community from south to north in the project area before turning west and discharging to Lake Huron. Only the Robins well system is located east of the Sauble River.

Each of the water systems services a small residential subdivision. The well sites are situated within the residential subdivision it was designed to serve. Surrounding land uses at each of these sites is residential in nature. Only the properties that are connected to these well systems are serviced by municipal water in the Sauble Beach area. There is no communal sewage service provided by the Town in Sauble Beach.

Raw water at each well system is presently disinfected, using sodium hypochlorite, prior to being pumped directly to distribution. The Engineer's Reports for each of the systems indicate that the systems do not meet provincial water treatment requirements because they do not provide sufficient disinfection time prior to distribution.

Engineer's Reports, which were prepared for all of the water systems in 2000 and 2001, identified the following issues:

- Raw water from the wells have had poor turbidity and bacteriological problems, with evidence of total coliforms and high background counts being found over the period from 1998 to 2002;
- Iron concentrations in three wells, Robins, Fedy, and Winburk, is high and the iron sequestration treatment utilized has not always proved to be effective as treated water turbidity is still higher than provincial requirements at times;
- All of the wells have been identified as being potentially groundwater under influence of surface water (GUDI). Because of this, any treatment solution utilizing these wells would require an upgraded level of treatment, such as the use of an ultraviolet disinfection system; and,
- All of the systems do not provide disinfection of the raw water that meets the requirements of "Procedure for Disinfection of Drinking Water in Ontario", a reference document adopted by Ontario Regulation 170/03 under the Ontario *Safe Drinking Water Act*, 2002.

The proposed project will require work at eight sites and along road allowances within Sauble Beach for the distribution watermain installation. Major works for this project include: the construction of a new well and the upgrading of the existing well at the Amabel Community School site; the construction of a new treatment building and associated site works at the school site; the decommissioning of the seven existing wells and pumphouses; and, the construction of approximately 6.7 kilometres of transmission water main to connect the seven distribution systems to the new treatment building.

None of the well sites, existing or proposed, is located within 30 metres of a watercourse. The project requires only one watercourse crossing as part of the distribution watermain installation. The proponent proposes to accomplish this watercourse crossing by installing the watermain on the underside of the existing bridge at the site.

The seven water systems being decommissioned are all small, with their maximum treatment capacities ranging in size from 69 $m^3$/d to 328 $m^3$/d. The systems service a total of 222 households, although with a full build-out of these subdivisions, 328 households could be connected to the proposed water system. Six of the seven wells will be properly abandoned while the seventh, the Winbruk well, will be retained as a possible future source of raw water for the new treatment plant.

The new treatment facility will have a treatment capacity of 687 $m^3$/d (250,755 $m^3$/a). The design of the plant will allow the capacity to increase by an additional 262 $m^3$/d by pumping raw water from the existing Winburk well supply (not part of existing project).

**Project Schedule**

It is anticipated that the project will commence construction in 2006. It will take approximately one year to bring the project into service following the start of construction.

This schedule has been largely dependent on the completion of the design for the new well, treatment facility, transmission watermains and associated works; the completion of the hydrogeology study; and the approval of permits to take water.

**Environmental Assessment Schedule**

The responsible authority expects to submit its report and recommendation to the Minister in the spring of 2006 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 summer 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 in the fall of 2006 for the environmental assessment decision statement.

## 2.0 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 a new well site and transmission watermain, and modifications to or decommissioning of seven well sites within Sauble Beach.

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

**Transmission watermain installation:**

- Construction of approximately 6.7 km of transmission watermain within existing road allowances to connect the seven distribution systems, including all hydrants (approximately 39 to be installed);
- Operation and maintenance of the watermain;
- Construction equipment access, laydown areas;
- Site rehabilitation; and
- Decommissioning of the watermain at the end of the project's operational life.

**Fedy, Forbes, Gremik, Robins, Thompson, and Trask Well Sites**:

- Decommissioning and abandonment of the wells;
- Removal and disposal of equipment and chemicals;
- Possible demolition of the pumphouse buildings;
- Construction equipment access, laydown areas; and
- Site rehabilitation.

**Winbruk Well Site**:

- Decommissioning of the well;
- Removal and disposal of equipment and chemicals;
- Construction equipment access, laydown areas; and
- Site rehabilitation.

**Amabel-Sauble School Site**:

- Construction of well components (two wells) capable of providing a supply of at least 687 $m^3$/d (250 755 $m^3$/a);
- Construction of a pumphouse, approximately 14.8 m by 16.4 m in size, including all aspects of treatment and pumping equipment, an in-ground reservoir and a process wastewater treatment system;
- Construction of discharge watermains to connect to the distribution system;
- Operation and maintenance of the well, pumphouse, treatment processes, and the connecting watermains;
- Construction equipment access, laydown areas;
- Site rehabilitation; and
- Decommissioning of the site at the end of the project's operational life.

## 2.2 Scope of Assessment

### 2.2.1 Factors to Be Considered

The *Canadian Environmental Assessment 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 factors to be considered in the environmental assessment and the scope of those factors.

**Physical and Natural Environment**

- ground water quantity and quality, including:
  - natural groundwater quality;
  - potential contaminant sources in the study area;
  - potential for contaminant migration to the wells during the operational life of the project;
  - potential for septic seepage
- surface water quantity and quality;
- vegetation, including wildlife habitat and biodiversity;
- wetlands, if applicable, and their functions;
- species at risk;
- fish and fish habitat;
- migratory birds, particularly with respect to the potential for disturbance or destruction of migratory birds or their nests;
- wildlife;
- air quality - local and downwind airborne emissions (including odours and volatiles);
- soil quality (including any contaminated soils).

**Socio-Economic and Cultural Environments**

- adjacent land uses;
- aesthetics;
- First Nations;
- heritage and historical cultural resources;
- local neighbourhood and residents;
- local users of groundwater (including issues related to septic seepage);
- noise and vibration;
- public health and safety (including health effects from using chlorine in the water treatment process);
- worker health and safety.

**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;
- transmission water main breaks; and,
- 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; and,
- icing and winter operations.

**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 proposed replacement and/or installation of new water mains within the community;
- the proposed construction of a water transmission pipeline from Wiarton to Sauble Beach;
- the existing septic/sewage systems within Sauble Beach;
- other developments that are planned within the Sauble Beach area 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 entirely within the limits of Sauble Beach. 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 seven existing well sites, the new well site at the Amabel-Sauble School, all roadways affected by the installation of the transmission watermain, 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 around beyond the right-of-ways. The corridor also includes possible effects, including accidents and malfunctions (for example, 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 will include an area beyond the Sauble Beach community boundary, 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), and operational activities (possible negative effects of draw down because of the system's groundwater withdrawal).

The following are proposed temporal boundaries for the project:

- The short term temporal boundary of the project would last approximately one year and includes the construction and commissioning phases of the project. It can include activities such as: the construction and commissioning of the wells and treatment plant; the installation of the transmission watermain; and, the decommissioning and abandonment of the existing wells and pumphouses. 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 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, failure of the new transmission watermain, chemical spills, 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 20 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, failure of the new transmission watermain, chemical spills, 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 Sauble Beach water system and File Number 597 on your submission. Comments must be received by the close of business February 10, 2006. 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 Programs
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.

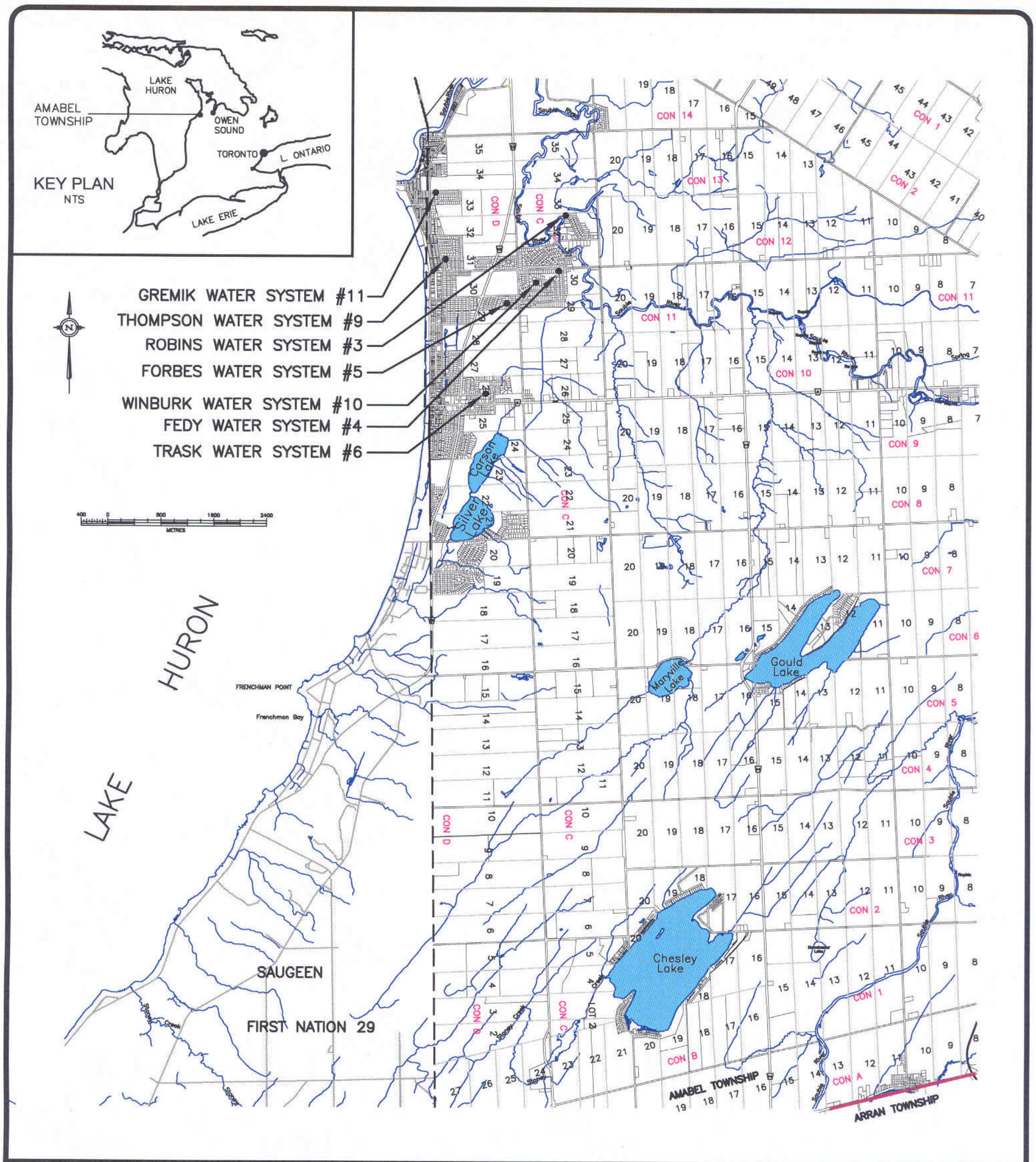
The public will also have opportunities to participate in the review, should the project be referred to a mediator or a review panel.

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 Agency for members of the public to participate in the environmental assessment.

## References

Henderson, Padden and Associates Limited, *Class Environmental Assessment, Schedule C, Upgrading of Sauble Beach Area Water Supply and Treatment Systems, Town of South Bruce Peninsula – Environmental Study Report*, 2004

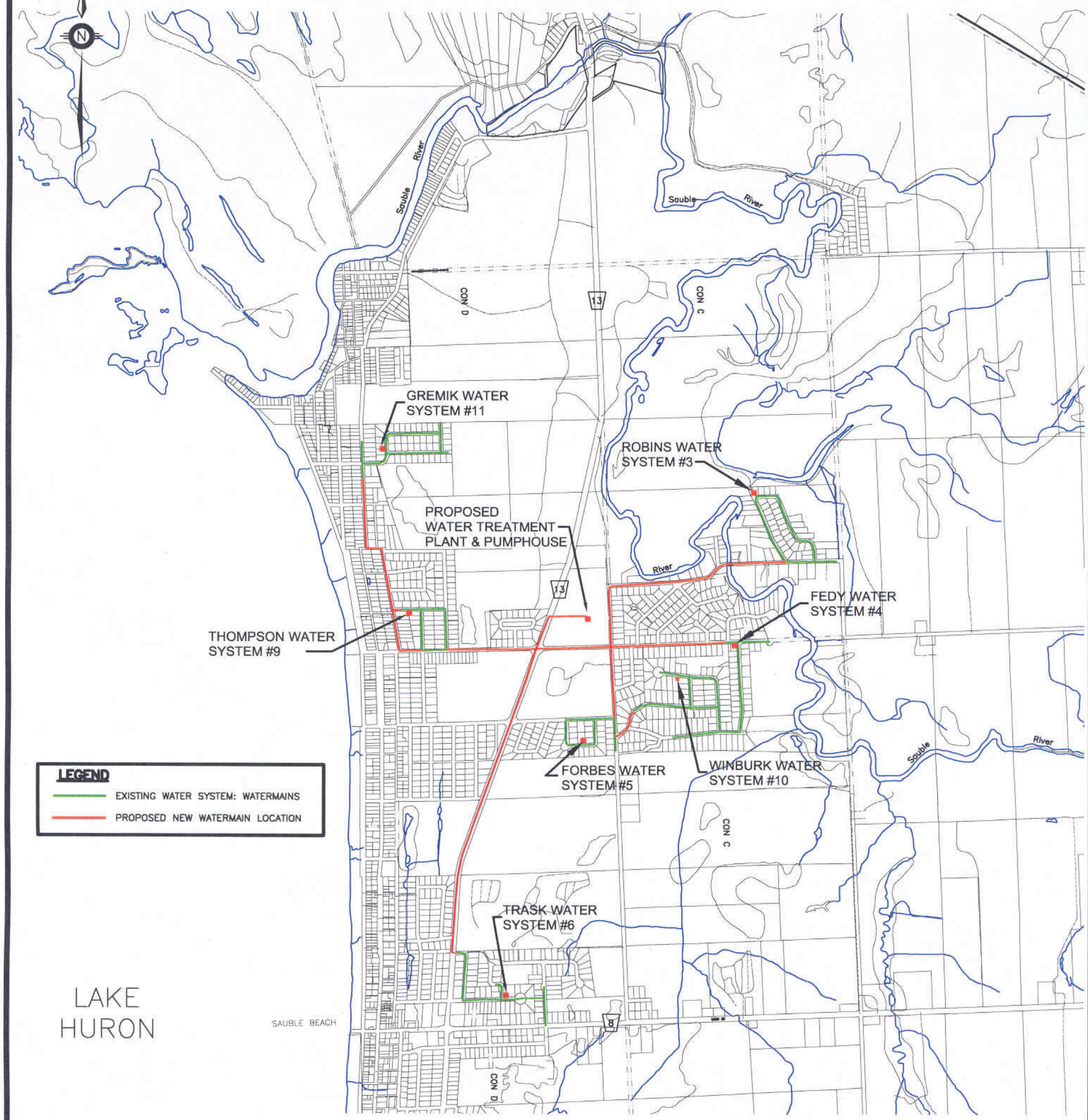
Henderson, Padden and Associates Limited, *Aquifer Evaluation Report, Amabel-Sauble School Wells PW1 and PW2, Town of South Bruce Peninsula*, 2003




Community of Sauble Beach
Town of South Bruce Peninsula
General Location Plan

Appendix 1

Scale
1 : 80,000



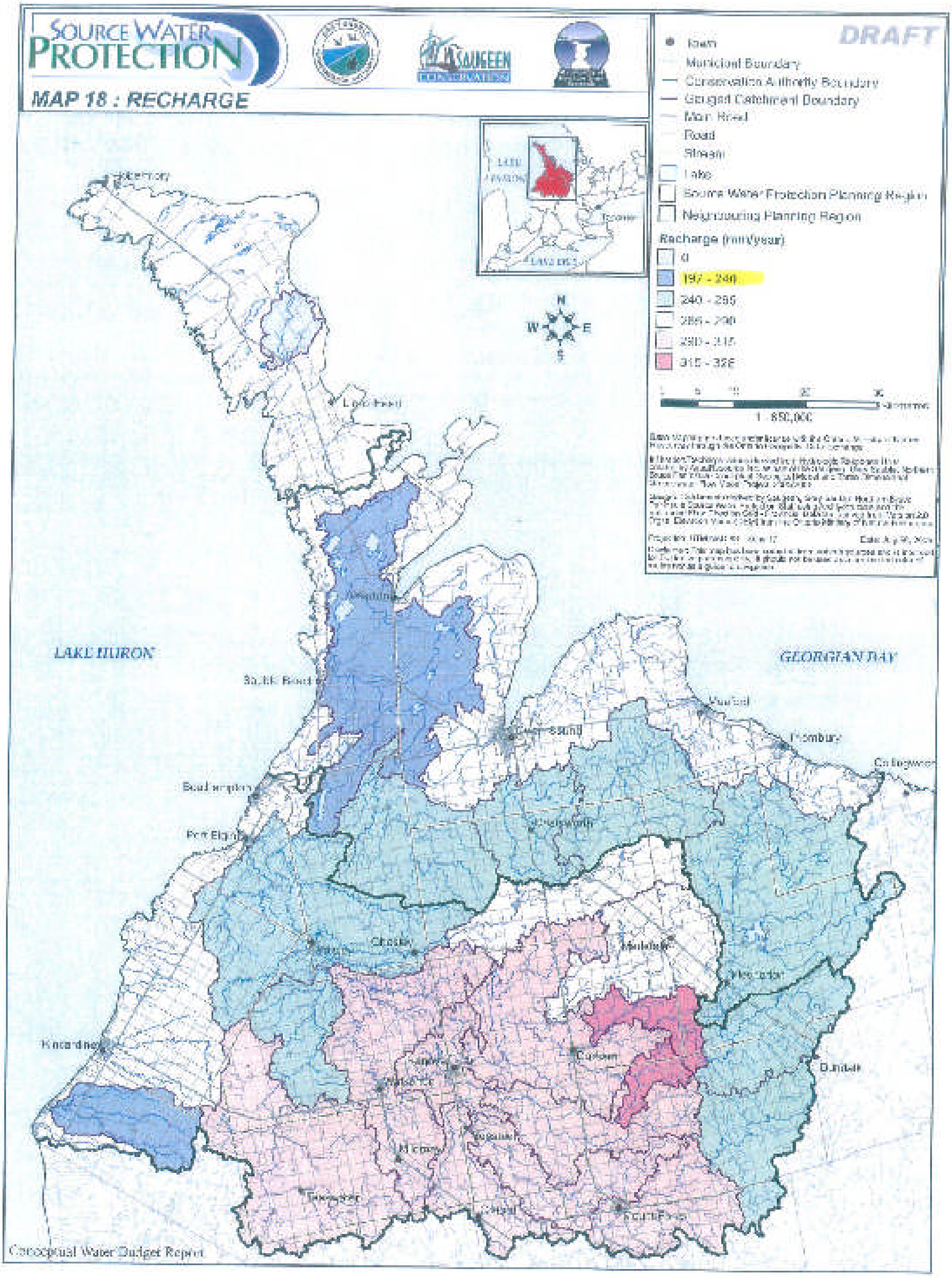

Community of Sauble Beach
Town of South Bruce Peninsula
Existing and Proposed Water Supply Facilities

Appendix 2

Scale
1 : 30,000

# APPENDIX B

# SOURCE WATER PROTECTION MAP 18: RECHARGE, GREY SAUBLE CONSERVATION AUTHORITY


SOURCE WATER PROTECTION
SAUGEEN CONSERVATION
MAP 18 : RECHARGE
DRAFT
Town
Municipal Boundary
Conservation Authority Boundary
Gauged Catchment Boundary
Main Road
Road
Stream
Lake
Source Water Protection Planning Region
Neighbouring Planning Region
Recharge (mm/year)
0
197 - 240
240 - 265
265 - 290
290 - 315
315 - 328
1 : 850,000
N
W
E
S
LAKE HURON
GEORGIAN BAY
Lion's Head
Wiarton
Sauble Beach
Owen Sound
Meaford
Thornbury
Collingwood
Southampton
Port Elgin
Chesley
Kincardine
Markdale
Durham
Dundalk
Mildmay
Teeswater
Conceptual Water Budget Report