COMPREHENSIVE STUDY REPORT (CSR)
WATER SUPPLY UPGRADE
LENNOX ISLAND
PRINCE COUNTY, PRINCE EDWARD ISLAND
PWGSC PROJECT NO. 315883

Prepared for Indian and Northern Affairs Canada by
Public Works and Government Services Canada
Office of Greening Government Operations
Charlottetown, PEI
March 2007

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

Indian and Northern Affairs Canada (INAC) proposes a water supply upgrade in the Lennox Island First Nation community of Prince Edward Island to update the current drinking water supply, delivery, treatment, and to provide additional flow and volume of water required for fire protection. The design of the water supply system includes several new water wells, connection of the new wells with the distribution system, a new pump control building with standby chlorination, and a potable water storage reservoir.

The Lennox Island First Nation community is a proponent of the project through their contracting of the design engineers, subsequent construction tenders and by proposing the project. INAC proposes to provide funding to enable the proposed Lennox Island Water Supply Upgrade (the Project); additionally the project will take place on Federal Crown land. Pursuant to section 5 of the *Canadian Environmental Assessment Act (CEAA)*, INAC has determined that it is a Responsible Authority (RA) for the project. As such, INAC must ensure that an environmental assessment is conducted as early as is practicable in the planning stages of the project and before irrevocable decisions are rendered.

The Lennox Island Water Supply Upgrade is subject to a comprehensive study (CS) under CEAA, pursuant to paragraph 10 of the *Comprehensive Study List Regulations: ''The proposed construction, decommissioning or abandonment of a facility for the extraction of 200 000 m^3/a our more of ground water or an expansion of such a facility that would result in an increase in production capacity of more than 35 %''*.

The Project will have the capacity to extract more than 200 000 m^3/a of groundwater; furthermore the proposed upgrade would be an increase in production capacity of more than 35%.

The Department of Public Works and Government Services Canada (PWGSC) has prepared this Comprehensive Study Report (CSR) on behalf of INAC for the Project. The CSR presents an overview of the Project and the surrounding environment, a summary of consultations undertaken in relation to the project, and recommendations with regard to mitigation measures designed to eliminate or reduce the significant environmental effects of the Project. This includes an evaluation of the significance of the environmental effects of the Project, based on the opinion of federal and provincial experts, after taking into consideration the implementation of recommended mitigation measures. The CSR is to fulfill INAC's obligations as a RA under CEAA in assessing the environmental implications and the significance of adverse environmental effects resulting from the project development. This CSR has been prepared in consultation with other federal expert departments i.e., Federal Authorities (FAs), provincial agencies and the public.

2.0 PROJECT INFORMATION

Responsible Authority:	Indian and Northern Affairs Canada (INAC)
Responsible Officer:	Ms. Trish King, PWGSC/INAC Telephone: (506) 851-6182
PWGSC Project #:	315883
CEAR Reference #:	06-03-17002
Project Title:	Lennox Island Water Supply Upgrade, Lennox Island, Prince County, Prince Edward Island
Proponent:	Lennox Island First Nation
Contact Person:	Mr. Peter Curley, PWGSC Telephone: (902) 566 – 7594 Mr. Don Maynard, PWGSC Telephone: (902) 566 – 7533
Location:	Lennox Island, Prince County, Prince Edward Island

2.1 Establishment of Responsibility

An environmental assessment of a project is required under the *Canadian Environmental Assessment Act*, SC 1992, c. 37 as amended (CEAA) before a Federal Authority (FA) exercises certain powers or performs certain duties or functions in respect of a project for the purposes of enabling the project to be carried out, in whole or in part.

Under section 5(1) of CEAA, a federal environmental assessment will be required when, in respect of a project, an FA, for the purpose of enabling the project to be carried out in whole or part:

- is the proponent;
- makes or authorizes payment or any other form of financial assistance to the proponent;
- sells, leases or otherwise disposes of lands; or
- issues a permit, or license or other form of approval pursuant to a statutory or regulatory provision referred to in the CEAA *Law List Regulations*.

An FA required to complete an environmental assessment is a Responsible Authority (RA).

The project will take place on Federal Crown land and INAC proposes providing funding to enable the Project and therefore is the RA for the Project. As such, INAC must ensure that an environmental assessment is conducted as early as is practicable in the planning stages of the project and before irrevocable decisions are rendered.

In November 2005, FAs were contacted pursuant to the *Regulations Respecting the Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements* 5(1), to determine their possible roles in the environmental assessment. Environment Canada, Fisheries and Oceans Canada, Natural Resources Canada, and Health Canada, have provided expert advice in relation to the Project. The Canadian Environmental Assessment Agency (the Agency), acts as the Federal Environmental Assessment Coordinator for the Project.

The Project type is described in paragraph 10 of the Comprehensive Study List Regulations under CEAA: *The proposed construction, decommissioning or abandonment of a facility for the extraction of 200 000 m^3/a our more of ground water or an expansion of such a facility that would result in an increase in production capacity of more than 35 %.* The Project will have the capacity to extract more than 200 000 m^3/a of groundwater; furthermore the proposed upgrade would be an increase in production capacity of more than 35%, therefore a comprehensive study was initiated.

The comprehensive study process under section 21(1) of CEAA requires preparation of a "project scoping document" that is distributed to the public for formal review and comment, in order to obtain input on the following items:

- The proposed scope of the project for the purposes of the environmental assessment.
- The factors proposed to be considered in its assessment.
- The proposed scope of those factors.
- The ability of the comprehensive study to address issues relating to the project.

Following public consultation, CEAA requires the RAs to then report to the federal Minister of the Environment on the following items:

- Scope of the project, the factors to be considered in its assessment and the scope of those factors.
- Public concerns in relation to the project.
- The potential of the Project to cause adverse environmental effects.
- The ability of the comprehensive study process to address the issues related to the project.

The RAs must also recommend to the Minister of Environment whether to continue the environmental assessment as a comprehensive study or refer it to a mediator or review panel. The Minister of Environment determines whether the assessment will continue as a comprehensive study, or whether the assessment will be referred to a mediator or a review panel.

From February 1 to 21, 2006, the public was invited to comment on the draft scoping document entitled "Lennox Island First Nation: Water Supply Upgrade". No public comments were received; however comments were received by INAC from the expert FAs. INAC then submitted its report and recommendation to the Minister of Environment who subsequently announced on August 9, 2006, that the environmental assessment would continue as a comprehensive study. The final scope of the environmental assessment was issued by INAC following the track decision. The scope

of the project as described is presented in Section 2.24 of this report and the scope of assessment is presented in Section 3.0.

CEAA requires that a CSR be prepared and distributed for public comment. Upon completion of public review, public comments are forwarded to the federal Minister of the Environment. The Minister of the Environment reviews the CSR and any public comments filed in relation to its contents. If the Minister is of the opinion that additional information is necessary or actions are needed to address public concerns, the Minister may request that the RAs address these concerns. Once any such concerns are addressed, the Minister would issue an environmental assessment decision statement that includes:

- the Minister's opinion as to whether the Project is likely to cause significant adverse environmental effects; and
- any additional mitigation measures or follow-up program that the Minister considers appropriate.

The Minister then refers the project back to the RAs for a course of action. If the Minister determines that the project is not likely to cause significant adverse environmental effects, an RA may exercise any power or perform any duty or function, such as providing funding, that would permit the Project, or part of the Project, to be carried out.

2.2 Project Description and Purpose

2.2.1 Project Overview

Indian and Northern Affairs Canada (INAC) proposes to enable and fund a water supply upgrade in the Lennox Island First Nation community of Prince Edward Island. The main purpose of this project is to update an insufficient domestic water system. The majority of the current system was constructed approximately 40 to 50 years ago, lacks a central control system with no proper shut off valve and no ability to flush the system. The proposed project will update the current drinking water supply, treatment, and provide additional flow and volume of water required for fire protection. The design of the water supply system includes several new water wells each of which will be in the 25 to 40 USgpm range, a new pump control building with standby chlorination, and a potable water reservoir.

The original scope of the project included the installation and replacement of water distribution lines throughout the community. In the fall of 2006 during regular water quality monitoring elevated levels of bacteria were discovered and a subsequent water boil advisory was put into effect. After discussions with the Agency INAC decided that this activity would be exempted from CEAA and thus the CSR under Section 7, which reads as follows:

7. (1) An assessment of a project is not required under section 5 or sections 8 to 10.1, where

(c) the project is to be carried out in response to an emergency and carrying out the project forthwith is in the interest of preventing damage to property or the environment or is in the interest of public health or safety.

Lennox Island is located on the north shore in Prince County, Prince Edward Island, in Malpeque Bay, which empties into the Gulf of St. Lawrence. Lennox Island is connected to Prince Edward Island via a bridge with the majority of the Island's population situated on the south side of the island bordering Lennox Channel. Lennox Island is approximately 50 km northwest of Summerside with access via Highway 163. Refer to Figure No. 1 for a site location plan indicating the proposed project location and surrounding areas. Lennox Island covers 1,320 acres (534 hectares) and has an estimated population of 260 permanent residents. (JWEL, January 2004). Currently there approximately 90 residences and 10 businesses located on Lennox Island.

The purpose of the Project is to upgrade the existing water system that is reaching the end of its life capacity. This update will provide a continued supply of high quality water, with disinfection capabilities, in sufficient quantities to satisfy the current and future demands of Lennox Island. Additionally the project will provide additional flows and volumes of water required for improved fire protection and thus improve the current status. The current system is incapable of supplying the flows or volumes required for fire protection via a hydrant system. The proposed project will install fire hydrants and thus allow for more complete fire protection for the community.

2.2.2 Background

The Lennox Island First Nation community consists primarily of single-family residential dwellings, with a school, church, Band Office, medical facility, fire department, wharf and some other small non-residential properties. Refer to Figure No. 2 for an aerial photograph of the proposed project site. On Lennox Island, there are several freshwater wetlands, rivers, and salt marshes. Refer to Figure No. 3 for an aerial view of the island with a GIS-overlay.

A new Wastewater Treatment System for the Lennox Island First Nation Community in Lennox Island, PEI has recently been completed. INAC completed a federal environmental assessment screening on the project and concluded significant adverse environmental effects were unlikely. The design of the sewage collection including sewer lines and lift station(s) and wastewater treatment system project involves the construction of two new 0.72 hectares (ha) facultative cells (1.78 acres), the installation of an ultraviolet (UV) disinfection unit, followed by a free water surface type of wetlands. The Wastewater Treatment facility is located at the end of Eagle Feather Trail, which is located on the eastern side of Lennox Island, approximately 1 km from the proposed well field, pump house and water reservoir. Local residences have had their septic systems decommissioned and have been connected to the treatment system.

2.2.3 Existing Water System

The Lennox Island First Nation community currently operates three production wells, which are controlled by two individual operating control systems located within separate pump house buildings. A shut-off valve located near the Band Office (refer to Drawing No. 1) at the intersection of Sweet Grass Trail and Indian Feather Trail currently separates the two systems. The area to the east of the Band Office is service by the "old" pump house and two production wells. The two existing wells (well #1 and well #2) are approximately 30 to 50 years in age. The tops of the two wells are below ground and therefore prone to possible flooding and are not considered protected. The "new" pump house and one production well (well #3) service the area to the west of the Band Office. The "new" pump control building and well #3 were constructed in 1994.

The current flow from each of these wells is unknown as the wells are not equipped with flow meters; however, based on reports of pump motor sizes the pumps are expected to vary in flow from 10 US gallons per minute (USgpm) to 30 Usgpm per well, with well #3 being the largest.

The piping distribution system from the Community consists of six-inch diameter polyvinyl chloride (PVC) mains along Eagle Feather Trail from Oyster Trail to Sweet Grass Trail and along Sweet Grass Trail to Pine Ridge Path. The remainder of the system consists of two-inch diameter piping, some of which is galvanized.

The existing municipal water system was designed to provide for domestic water use only. Portions of the current distribution network are dated, having been constructed approximately 40 years ago, and are in need of replacement. There have also been some pressure problems associated with the old system. Due to the lack of water storage and the small diameter water mains, the current system is incapable of supplying the flows or volumes of water required for fire protection. Presently fires are fought using tanker trucks from the Lennox Island Fire Department.

Delcom Engineering conducted the design of the water supply system upgrade, which is complete with large diameter water mains, hydrants, several new wells, new pump control building, standby chlorination and a potable water storage reservoir. All these components will contribute to an improved water supply system that will provide quality drinking water, disinfection capabilities and fire protection to the complete community.

2.2.4 Project Components

The proposed scope of the project refers to the various components of the proposed undertaking that are considered as part of the project for the purpose of the environmental assessment. The scope of the project includes undertakings in relation to the physical works or physical activities related to the construction and operation of the proposed new well site. Specifically, the scope of the project determined by INAC for the environmental assessment of the Lennox Island Water Supply Upgrade is:

- Decommissioning of existing production wells #1 & #2;
- Construction of several new production wells north (inland) of the existing well field;
- Construction of an access road leading to the proposed wells.

- Construction of a water reservoir;
- Decommissioning and demolition of the two existing pump house facilities;
- Construction of a new pump control building near the new water reservoir;
- Connection of the water distribution system to the new wells;
- Operation and maintenance of the new wells, pump house, treatment processes, water reservoir; and
- Decommissioning of the well site at the end of the project's operational life.

Phase I – Production Well field

Several new production wells, with an individual footprint of less than 1 m^2 and each enclosed by a 9 m^2 chain link fence, are proposed to be constructed north (inland) of the existing well field (See Drawing No. 1 and Figure No. 4). An access road will be installed leading to the well field. The footprint of the access road will be approximately 200 m long by 15 m wide. It is proposed that existing wells #1 and #2 be decommissioned. Currently it is anticipated that existing well #3 will remain in commission and will either be used as a water source or as an observation well, however there is the possibility that it will be decommissioned. Two new wells (New Well# 4 and # 5) were installed in 2005 to a depth of 46.3 m as part of the Hydrogeological Study performed by Delcom Engineering in preparation of the project design and comprehensive study (see Figure No. 4). Following the study, Delcom capped the wells but did not decommission them, as they will be used in the future as part of the Water Supply Upgrade. The two new wells were located approximately 75 metres apart and it is projected that future wells will follow the same line with a 75 m separation.

It is expected that future wells will be constructed using the following procedures:

- Drill a pilot hole approximately 18 inches in diameter to a depth of 12.2 m;
- Install temporary outer casing to hold back overburden as needed;
- Install well casing with drive shoe and centralizers, and hammer casings into bedrock;
- Align casing to plumb vertical;
- Grout casing into bedrock with grout pump/tremie method (minimum 25% to 30% solids) from bottom of hole to 1.5 meters below grade;
- Drill to a depth of approximately 45 meters;
- Develop borehole with air for a minimum of 2 hours; and,
- Disinfect all boreholes upon completion.

The two existing pump houses, each of which is smaller than 50 m^2, will be decommissioned. The existing pump house located west of Indian Feather Path along Sweetgrass Trail will be demolished and disposed of in a provincially approved manner. The second pump house, which currently contains the existing wells #1 and #2, is located at the intersection of Sweetgrass Trail and Eagle Feather Trail. It will be decommissioned and possibly demolished. If the building is demolished it will be disposed of off reserve in a provincially approved manner. The proposed pump control building will be constructed in the same location as the first pump house using standard construction materials and means. The new pump control building, with a an approximate footprint of 50 m^2, will house all controls, meters and miscellaneous electric components required to

operate the new proposed wells. Also enclosed in the new pump control building will be a standby sodium hypochlorite disinfection system (liquid chlorine). The proposed chlorination system will be flow proportionate to the output of the production wells and be equipped with monitoring equipment.

Phase II – Water Reservoir

The proposed potable water reservoir will be constructed alongside the proposed pump house, which is west of Indian Feather Path along Sweetgrass Trail, see Drawing No. 1. The reservoir will arrive on site in prefabricated sections and will be assembled using a crane. The structure will be situated on a concrete foundation with an approximate footprint of 150 m^2 and will be surrounded by a chain-link fence creating an enclosed area of approximately 300 m^2. The reservoir will be approximately 82 meters in diameter and 358 meters high and be made from bolted steel construction. The reservoir will have a capacity of 392,700 US gallons, a free board of 11.5 meters, an overflow pipe 3.3 meters above finished grade sized for 500 USgpm and a dedicated 6“ inlet pipe that would discharge approximately 164 meters above the tank floor to promote circulation of water in the standpipe. The reservoir will also be equipped with a 12“ discharge water main, exterior ladder complete with safety cage, 24“ diameter roof hatch, a 30” diameter shell manhole and a chain link fence to encompass the entire structure.

Currently, the average flow for the community, outside of a fire event, is approximately 17 USgpm. Based on Lennox Island’s 20-year population projection for their community, future demand is predicted at 38USgpm. These flows are currently capable of being pumped by the existing system. However, in order to achieve the flow rates required for fire protection new wells would need to be installed. The target capability of extraction, from the sum of the well field, is expected to be approximately 210 USgpm (it should be noted that the total extraction capability would include at least one (1) redundant well). Furthermore, water extraction in excess of the current 17 USgpm would only be required to replenish the new reservoir within 30 to 36 hours following a fire situation.

Operation/Maintenance

The lifespan of the project is expected to be in the range of 20 to 30 years, which is a function of the durability of infrastructure such as the pipelines, wellhead chambers and the level of general operation and maintenance attention. The lifespan of the reservoir is expected to last 50 years. The life of the project is not expected to be limited by groundwater yield. Mechanical equipment will likely have to be replaced or upgraded after a period of approximately 20 years.

Operation of the water supply system will involve pumping from the well field and chlorinating. Operation of the well field will be automatically controlled by the water level in the water reservoir. As the water level drops, additional well pumps are automatically turned on, and vice versa as the tank fills. The feed rate of the chlorine, in the form of a water solution, will be automatically adjusted in relation to the flow of water pumped from the well field. Chlorine dosage is expected to be relatively low (i.e., 1mg/L or less) since the water has a very low chlorine demand and the intent is simply to

maintain a measurable residual at the distribution extremities. As the water does not require additional treatment, there are no sludge or backwash water management and disposal issues related to the operation of the system.

Aquifer drawdown in the production and monitoring wells will be monitored by the Lennox Island Band Council to ensure the aquifer is not being stressed and to allow optimum selection of the operating wells.

System maintenance activities are expected to include the following:

- Maintenance of submersible well pumps
- Calibration and maintenance of the instrumentation (e.g. flow meter, level sensors)
- Maintenance of the various valves
- Maintenance of the chlorination system, including calibration of the automatic feed rate adjustment system
- Transmission main flushing

Decommissioning and Abandonment

Decommissioning and abandonment of the system will simply involve filling and capping the wells, plugging the piping and removing the water reservoir, chlorination equipment and building.

Wells will be decommissioned in such a manner sufficient to prevent the vertical movement of water into the well. Approval of the proposed method of sealing is required by an inspector prior to undertaking the work.

2.2.5 Project Schedule

The schedule for the proposed Lennox Island Water Supply Upgrade is for the work to commence in the spring of 2007 and span approximately 18 months. There is no phase-specific construction sequence required. Individual phases can be completed independently of one another and tied in to the adjacent phase upon its completion. It should be noted that the above project schedule is dependent on the completion date of the CSR by INAC, the available working conditions during the spring of 2007 and the availability of funding.

2.3 Project Alternatives

2.3.1 Alternatives to the Project

"Alternatives to" the project is defined as functionally different ways to meet the project need and achieve the project purpose. This can include the “do nothing” approach. For this Project, “alternatives to” the project could include maintaining the existing domestic water supply and distribution systems, and fire-fighting system; however, this would not meet the identified project purpose of ensuring continued water supply for projected community growth and providing required flows and volumes for fire protection.

The objective of the project is to supply high quality water, with disinfections capabilities, in sufficient quantities to satisfy the current and future demands of Lennox Island, including the flows and volumes of water required for fire protection. Alternatives were considered to the project, however it was concluded that there are no economically or environmentally friendlier alternatives to the project.

2.3.2 Alternative Means of Carrying Out the Project

Section 16.2(b) of the Act states that every comprehensive study of a project shall include a consideration of alternative means of carrying out the project that are technically and economically feasible and the environmental effects of any such alternative means.

<u>Well Field</u>

Given that this project is taking place on an island there are limited options available for the upgrading of the existing water supply. An alternative means of developing the well field on Lennox Island would be to develop a well field on the mainland, specifically in or around the Ellerslie-Biddeford or Tyne Valley area, and transport water to Lennox Island via pipe distribution lines. This option was rejected for several reasons, which include but are not limited to the following:

- The proposed water supply upgrade is being funded by INAC and is therefore scheduled to take place on federal lands. There are no federal lands in the adjacent areas on the mainland.
- Closest possible mainland location would be approximately 1 km directly across the Malpeque Bay.
- The Malpeque Bay, which the water distribution pipelines would have to cross, is characterized by shallow ice covered waters in the winter and therefore damage to the distribution lines would be likely. To mitigate against ice scouring and

subsequent damage, the distribution lines would need to be trenched in the seafloor. Trenching would likely result in the requirement of an Authorization under section 35.2 of the *Fisheries Act* for the Harmful Alteration, Disruption or Destruction (HADD) of Fish Habitat. This activity was considered to have a greater negative impact than the currently proposed project and would not likely be economically feasible.

It is not a feasible option to tie into an existing municipal well field. The nearest municipal water supply system is located approximately 50 kilometres away in Summerside. This alternative is cost prohibitive.

Source of Water for Fire Fighting

The Project proposes a water reservoir be constructed, filled from groundwater supply and then used for both fire fighting situations and domestic water supply. An alternative to this would be to use salt water from Malpeque Bay for fire fighting. This type of system is characterized by dry or dry barrel hydrants, which have an intake line extending to a saltwater environment. This system relies on a power source, mostly generators, to power the pumps located in the marine environment. A separate water distribution network is required for this system to ensure domestic water supply does not become impacted by salt water. It is considered to be a high maintenance system requiring regularly scheduled maintenance of the pumps and generators, cleaning of water intake screens of bio-fouling and flushing of the system. This system has been rejected for several reasons, which include but are not limited to the following:

- Increase cost associated with a separate water distribution network, power supply and pumps.
- Very intensive maintenance to the system to ensure the power supply and pumps are in working order and cleaning of the water distribution network to ensure it is not fouled with debris and marine organism i.e., barnacles.
- Not as reliable as the currently proposed system due to power and distribution requirements i.e., generators and pumps.
- Potentially negative effects to fish and fish habitat.

The option of using salt water from Malpeque Bay for fire fighting is considered to be unreliable, high maintenance and cost prohibitive. Another option would be to stay with the current system and not supplement the fire fighting capacity of the local Fire Department, however this would not help to reduce insurance premiums or provide extra protection to the community.

Water Storage Structure

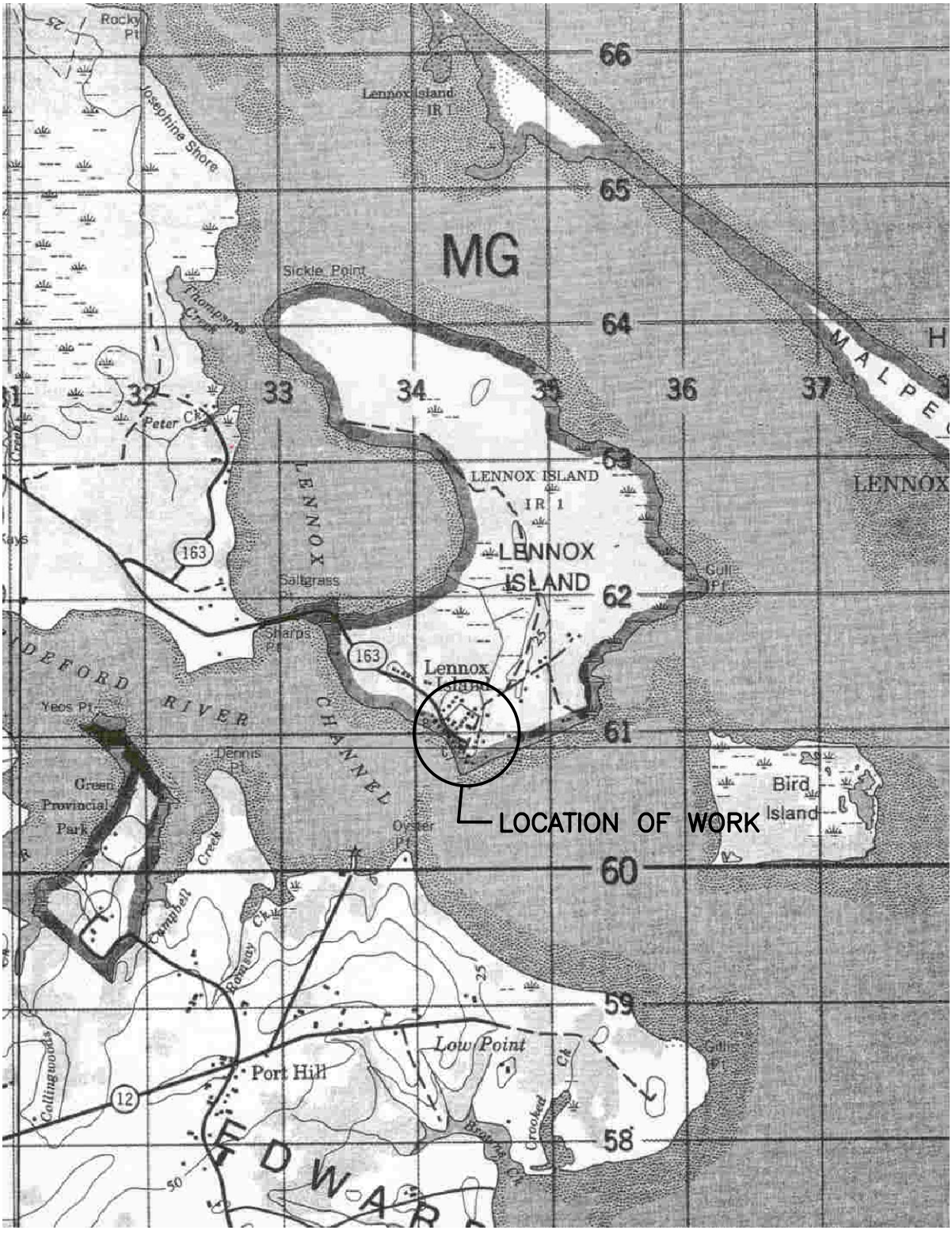
An alternative means of supplying the required water would be in a different type of storage structure or a structure with different specifications (height and width).

A Cultural Resource Survey (Lennox Island Ecotourism Centre, 2004) was conducted on Lennox Island for both the Water Supply and the Wastewater Treatment Facility projects. The primary purpose of this survey was to identify the possibility of disturbing cultural resources. During the survey a few community members inquired if the proposed water

reservoir could be reduced in height and made wider. The rationale for the required height is provided in the following text:

The height of the reservoir has been determined based upon the following: First, in order to maintain a normal operating pressure of 35-45 pounds per square inch (psi) within the community, the height of water within the reservoir is required to be 311 meters above ground level. Secondly, based on 1,200 USgpm being required for a two-hour fire event, 144,000 US gallons will need to be stored above an elevation that will result in a minimum pressure of 20-22 psi at the completion of the fire event. The required elevation for the water to be stored is 199 meters above ground level in order to overcome friction losses within the water mains and any geodetic grade differences. The volume of water required for a two hour 1,200 USgpm fire event represents approximately 128 meters of storage within the reservoir. Therefore the minimum height of water to be stored in the reservoir for fire fighting is 326.5 meters. With an allowance for 19.7 meters of daily fluctuation within the standpipe and 11.5 meters of freeboard, the final required height of the proposed reservoir is 358 meters.

Due to the required physical dimensions of the reservoir to provide the minimum water pressure, as described above, there were no dimensional alternatives available.



Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

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date:

drawn by: dessiné par: R.L.F.

approved by: approuvé par:

Drawing title: Titre du dessin:

LOCATION PLAN

scale: échelle: N.T.S.

project no.: no. du projet:

315883

date: 2007–02–23

revisions:

dwg no.: dessin no.:

Fig. No. 1

WATER SUPPLY UPGRADE
LENNOX ISLAND
PRINCE CO., PEI

Plot Scale: 1:1

PWGSC A4

EDRM Document No. 137116 Version 1

AERIAL PHOTO

Public Works and Government Services Canada

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LENNOX ISLAND
WATER SUPPLY UPGRADE
LENNOX ISLAND
PRINCE COUNTY, PEI

Drawing title: Titre du dessin:

AERIAL PHOTO

scale: échelle: N.T.S.

date: revisions:

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designed by: conçu par: date:

drawn by: dessiné par: C. BANKS

approved by: approuvé par:

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dwg no.: dessin no.:

FIG. No. 2

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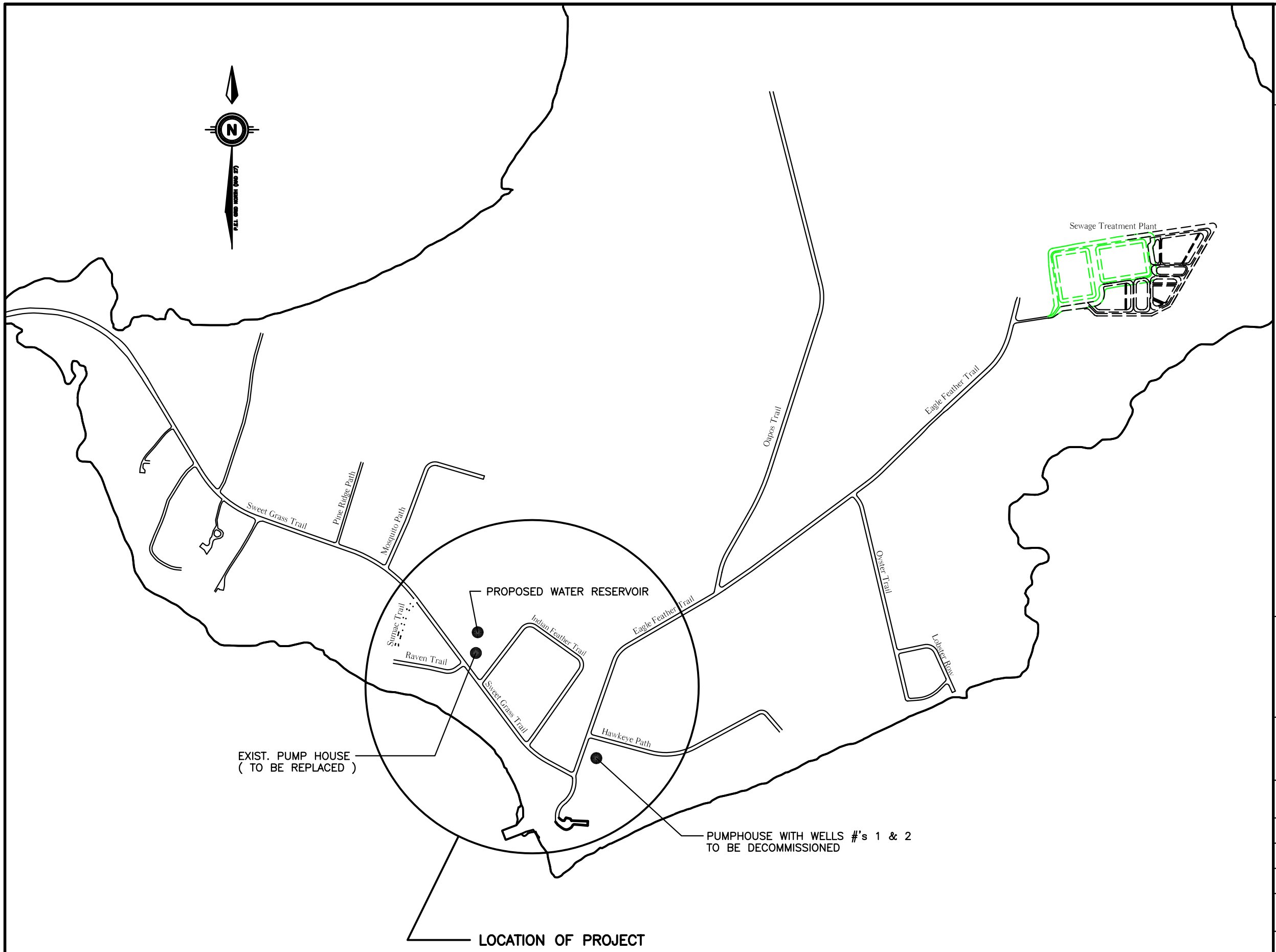
Fig No. 3. Aerial photo of southern Lennox Island with GIS wetland overlay.



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WATER SUPPLY UPGRADE
LENNOX ISLAND
PRINCE CO., PEI

Drawing title: Titre du dessin:

PROJECT LOCATION

scale: échelle: NTS

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Dwg. No. 1

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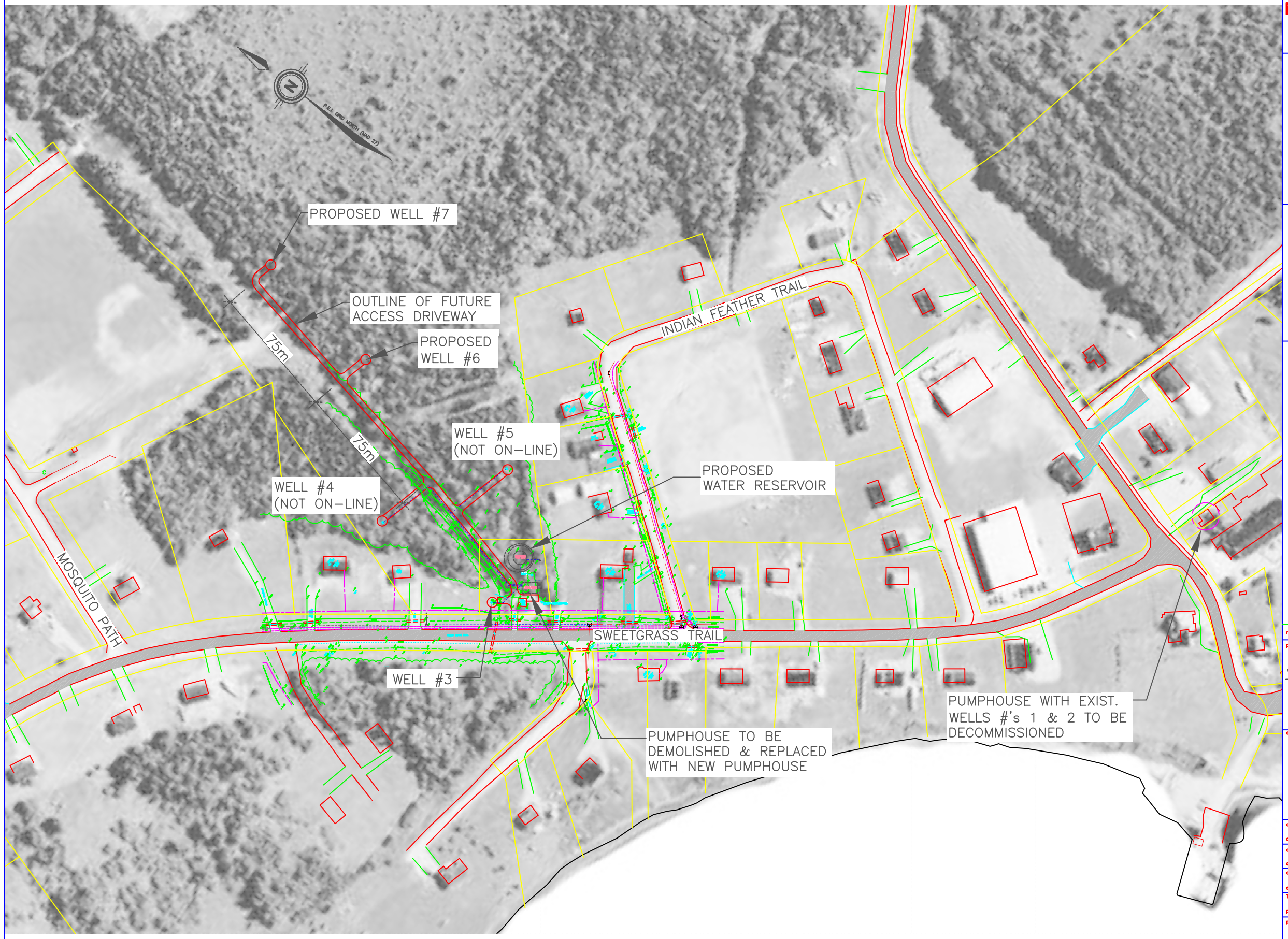
EDRM Document No. 137116 Version 1



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WATER SUPPLY UPGRADE
LENNOX ISLAND
PRINCE CO., PEI

drawing / dessin

ENLARGED SITE PLAN

designed / conçu
date

drawn / dessiné: R.L.F.
date: 2007-02-23

approved / approuvé
date

Tender / Soumission
PWGSC Project Manager / Administrateur de projets TPSGC

project number / no. du projet: 315883

drawing no. / no. du dessin: Fig. No. 4

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3.0 SCOPE OF ASSESSMENT

3.1 Factors to be Considered

The 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 the 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.*

In accordance with subsection 16(1)(e) of the Act, this environmental assessment as part of the comprehensive study will also include a consideration of the "need for" the project and "alternatives to" the project.

3.1.1 Scope of Factors to be Considered

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

3.1.2 Physical and Natural Environment

- Soil (surface and subsurface) quality;
- Ground water quantity and quality;
- Surface water quality;
- Hydrology,
- Fish and Fish habitat;
- Vegetation, including wildlife habitat and biodiversity;
- Wetlands, if applicable, and their functions;
- Species at risk;
- Migratory birds, particularly with respect to the potential for disturbance or destruction of migratory birds or their nests;
- Wildlife;
- Noise and Lighting; and
- Air quality.

3.1.3 Socio-Economic and Cultural Environments

- Adjacent land uses;
- Local neighbourhood and residents;
- Current use of lands and resources for traditional purposes by Aboriginal persons;
- Worker health and safety;
- Public health and safety;
- Aesthetics;
- Structures/sites of archaeological, paleontological or architectural significance; and
- Heritage and historical cultural resources.

3.1.4 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, including:

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

3.1.5 Any change to the project that may be caused by the environment

The environmental hazards that may affect the project and the predicted effects of these environmental hazards. The following issues shall be addressed in this environmental assessment and the design of the project:

- Climate change,
- Seismic activities.

3.1.6 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. The cumulative effects assessment shall focus on, but not necessarily be limited to:

- Cumulative effects of the project with other developments that are planned within Lennox Island such as road and/or residential construction, or additional groundwater takings.
- Cumulative effects of the various components of the project within the community.

3.1.7 Capacity of Renewable Resources

This environmental assessment will 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 groundwater system.

3.1.8 Project Boundaries - Spatial and Temporal

The proposed project is located entirely on Lennox Island. Spatial project boundaries are defined as the specific site area that includes the areas of construction and the zones of influence around the construction site (biological and physical), specifically the construction area footprint and adjacent lands. The following are proposed spatial boundaries for the project:

- The project footprint includes any land area that is directly disturbed by the construction activities of the project. This includes: any associated construction equipment access routes and lay down areas. The projected footprint of the well field and access road will be the previously disturbed area to the north of the current well field, which is estimated to be approximately 150 meters long by 15 meters wide. The proposed pump house, which is estimated to be the same size as the existing facility approximately 50 m^2, will be constructed in the same area as the existing pump house, which is located west of Indian Feather path along Sweetgrass Trail. The second pump house, with an approximate footprint of 50 m^2 is located at the intersection of Sweetgrass Trail and Eagle Feather Trail. The reservoir footprint will be west of Indian Feather path along Sweetgrass Trail and will encompass an area of approximately 150 m^2, but will be surrounded by a chain-link fence creating an enclosed area of approximately 300 m^2. The same lay down area that was used for the Wastewater Treatment Plant will be used for this project, which is located along Sweetgrass Trail.
- The corridor includes any area beyond the construction footprint, 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 all of Lennox Island above the Ordinary High Water mark or the extent of the area affected by the project. This could include the effects of construction activities (noise, dust, vehicle emissions, etc), and the operational activities (possible negative effects of draw down because of the system's groundwater withdrawal), and effects that the increased system capacity could have on other infrastructures located on Lennox Island, such as the new wastewater treatment system (possible negative effects from increased treatment volumes and decreased surface water quality).

The following are proposed temporal boundaries for the project:

• The short term temporal boundary of the project would last approximately eighteen months and includes the construction and commissioning phases of the project. It includes activities such as: the construction and commissioning of the new well(s); the construction and commissioning of the new pump house; and, the construction and commissioning of the water reservoir. It also includes activities related to construction equipment access; lay down areas as well as any accidents and malfunctions that may be associated with the construction phase of the project.

• The medium term temporal boundary of the project is 18-36 month range and includes activities such as: the effectiveness of site restoration; possible accidents and malfunctions (for example, failure of the new on-site water mains, 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 on-site water mains, 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.

3.1.9 Ecological Boundaries

Ecological boundaries refer to the temporal and spatial scales over which environmental components or populations' function. Temporal ecological boundaries take into consideration the variety of relevant characteristics of environmental components or populations including: 1) Magnitude, frequency and trends in the natural variation of a population or ecological component. 2) Time required for a biological, physical and/or chemical response to an effect to become evident. 3) Time required for a population or ecological system to recover from an effect and return to its pre-impact state.

Temporal ecological boundaries for impact assessment need to consider biologically meaningful intervals with respect to the life cycle of the species being examined. The degree of a potential impact on a particular species or environmental component is also influenced by other temporal characteristics including: 1) the portion of the year that the species or component remains in the proposed project area. 2) The timing of sensitive life history periods (such as larval life phase or bird nesting periods) in relation to the schedule of proposed activities. 3) Whether the project activity cycle includes a period of dormancy.

The distribution, patterns of movement, and potential zones of interaction between a Valued Ecosystem Component and the project determine spatial ecological boundaries. The spatial extent of this assessment will be for the whole of Lennox Island above the Ordinary High Water mark. This is the same theoretical boundary for the aquifer under Lennox Island. Direct project-environment interactions are unlikely to occur beyond the spatial extent of the project boundary; however, migratory species/stock ranges are considered in the assessment.

3.1.10 Socioeconomic Boundaries

Socioeconomic boundaries refer to the temporal and spatial scales for economic systems and socioeconomic aspects of the environment, which include: 1) the time required for a response to a change in the socioeconomic environment to become evident. 2) The time necessary for a response to a project-related effect to become evident. 3) The time required for the socioeconomic environment to recover from an effect and return to its original state.

Only socioeconomic effects resulting from the direct effects of a project on the environment are considered. Spatial boundaries are established on the basis of the spatial characteristics of the socio-cultural and economic environment. The spatial limits of the socioeconomic boundaries will include all of Prince Edward Island. This environmental assessment considers the full range of project/environmental interactions, the environmental factors that could be affected by the project and the significance of related impacts with mitigation. Included in the considerations are land, air and water resources, the socioeconomic environment, and the cumulative effects of the project in relation to existing or anticipated projects.

4.0 DESCRIPTION OF THE ENVIRONMENT

4.1 Physical Setting

The site of the proposed water supply upgrade is located in the Lennox Island First Nations Community on Lennox Island, PEI. The approximate NAD83 coordinates of the proposed project area are Latitude 46° 36' 7" and Longitude 63° 51' 13". Lennox Island is located approximately 50 (kilometers) km north west of Summerside in the Malpeque Bay and it is connected to mainland PEI by means of a bridge and can be accessed via Highway 163. Ground elevation in the vicinity of the well field is in the order of 6.5 m above sea level.

Lennox Island is home to a population of roughly 260 permanent residents, with the majority of them residing on the south side of the island bordering the Lennox Channel. The community consists primarily of single-family residential accommodations in addition to a school, church, Band Office, medical facility and various other small non-residential properties. Presently all the properties located in Lennox Island (approximately 100 in total) are serviced by private septic systems however a central wastewater and sewage treatment system is currently being constructed. Upon completion of the wastewater and sewage system all existing private septic systems will be decommissioned. Delcom Engineering, the same company that designed the Water Supply Upgrade, designed the wastewater and sewage system.

The predominant soil type on Lennox Island is Kildare series orthic podzol, with fair to good drainage and a tendency to erode. There are salt marshes along parts of the northeast and southwest shores. In the entire Island area, the organic, salt marsh and beach deposits include (1) peat and muck; (2) sand, silt and clay; and (3) beach, bar, dune and tidal flats, respectively (Soils of Prince Edward Island, 1988). With a total area of 1,320 acres (534 hectares), the island contains several freshwater wetlands, rivers and salt marshes.

The Canadian Climate Normals (1971 to 2000) recorded from the climate station in Alberton ($46^0$51'-N $64^0$01'-W), Prince Edward Island indicate an annual daily mean temperature of 5.4°C, with extremes ranging from –33.0 °C to 33.3 °C. Measurable precipitation averages 1071.0 mm annually. Extreme daily precipitation has been recorded at 102.0 mm. Current trends show the water level on the north shore of Prince Edward Island, based on studies conducted at Rustico Harbour, to be rising at 29 centimetres per century (McCulloch et al. 2002).

The Malpeque Bay area is a RAMSAR[1] site, recognized as an area of unique ecological characteristics. Malpeque Bay is a coastal lagoon system protected from the open sea (Gulf of St. Lawrence) by a 25 km-long coastal sandspit and dune formation. A 1 km-wide channel at the eastern tip of the sandspit provides for the main exchange of tidal waters between the bay and the open sea. Some 23 small rivers and creeks contribute fresh water to this wetland, thus producing principally an estuarine regime, see Figure No. 3. Numerous small salt marshes (average size 5 ha) are scattered along the coastline, which is characterized, by a band of intertidal sand-mud that varies in width from 0.5 to 1,000 m (Canada 30, 2001).

The distance from the project site to the nearest freshwater wetland is approximately 100 m, 215 m to the nearest salt marsh, 100 m to the nearest water course and 140 m to the nearest marine environment. There are no identified sand dunes on Lennox Island.

In January 2004, Jacques Whitford Environment Limited (JWEL) conducted a Preliminary Hydrogeological Assessment at Lennox Island. From the investigation it was determined that an outline of the stratigraphy was as follows:

0 to 4.6 m	Overburden consisting of compact reddish brown silty sand with trace gravel, to clayey silt, with some sand and trace gravel.
4.6 to 12.2 m	Weak to moderately cemented reddish brown sandstone with water encountered at 8.5 m.
12.2 to 15.2 m	Moderately cemented reddish brown medium grained micaceous sandstone with minor seams of mudstone.
15.2 to 15.8 m	Reddish orange mudstone.
15.8 to 19.8 m	Moderate to highly cemented (calcite) reddish brown medium to coarse grained micaceous sandstone.
19.8 to 21.3 m	Weakly cemented reddish brown and grey fine grained sandstone highly interbedded with mudstone.
21.3 to 22.9 m	Moderate to highly cemented (calcite) reddish brown medium to coarse grained micaceous sandstone.
22.9 to 24.4 m	Weakly cemented reddish brown and grey fine grained sandstone highly interbedded with mudstone.

[1] The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 152 Contracting Parties to the Convention, with 1611 wetland sites, totaling 145.2 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance.

24.4 to 26.8 m	Moderate to highly cemented (calcite) reddish brown medium to coarse grained micaceous sandstone.
26.8 to 27.4 m	Weakly cemented reddish brown and grey fine grained sandstone highly interbedded with mudstone.
27.4 to 33.5	Moderately cemented reddish brown medium grained micaceous sandstone with minor seams of mudstone.

4.2 Biological Setting

In the waters adjacent to Lennox Island within Malpeque Bay there are the following species: lobster (*Homarus americanus*) stocks within 4 km, rock crab (*Cancer irroratus*) within 4 km, mackerel (*Scomber scombrus*) fishing grounds within 10 km, herring (*Clupea harengus*) within 4 km, and Atlantic cod (*Gadus ogac*) at a distance of 8 km from the wharf (TFK, 2006). In addition, it is understood from Traditional Ecological Knowledge (TEK) that lobster fishing is conducted in all parts of the Malpeque Bay including the water surrounding Lennox Island. Shellfish leases are also common in Malpeque Bay with the closest leases (oysters) located 250 m to the southeast and northwest of the existing wharf.

Malpeque Bay has been designated as a RAMSAR wetland site and an Important Bird Area candidate. According to the Atlas of Breeding Birds of the Maritime Provinces (1992) there are no rare or endangered species at the project site and there are between 60 and 89 different bird species in the area. There are no recorded areas of Piping Plover nesting/breeding areas in the vicinity of the proposed work.

The village area is a mixture of native and introduced grasses and forbs with isolated pockets of black spruce, willow and alder. Outside the village is predominately covered in black spruce, balsam, cedar, willow, alder, poplar and white birch with occasional red maple. At the project site, the flora consists mainly of sweet grass and black spruce.

A query of the Atlantic Canada Conservation Data Centre (ACCDC) was conducted and extended to a distance of 5 kilometres (km) around the project area. The ACCDC assembles and provides information and expertise on species at risk and natural communities in Atlantic Canada. The results indicate that the study area contains 17 records of 15 rare vascular, 0 records of rare nonvascular flora, 5 records of 4 rare vertebrate, and 0 records of rare invertebrate. Of the aforementioned rare flora and fauna 4 species with a rank of S1 or S2 have been identified on Lennox Island, these are the Gronovius Dodder, American Groundnut, American Germander and Seabeach Dock (ACCDC, 2006).

The Gronovius Dodder is usually parasitic on many hosts in wet places and was located in a salt marsh on Lennox Island. The American Groundnut has been identified in tidal woodlands and on the high edge of salt marshes. The American Germander is usually found in the upper salt marsh range and along shores and moist thickets, it was identified

in a salt marsh on Lennox Island. Seabeach Dock is usually found in saline or brackish marshes and along beaches.

The following are definitions of the provincial (subnational) ranks for the S-ranks.

S1 Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.

S2 Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.

S3 Uncommon throughout its range in the province, or found only in a restricted range, even if abundant in at some locations. (21 to 100 occurrences).

S4 Usually widespread, fairly common throughout its range in the province, and apparently secure with many occurrences, but the Element is of long-term concern (e.g. watch list). (100+ occurrences).

S5 Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions.

On October 1, 2004, JWEL conducted a Flora and Fauna Survey in the footprint of the sewage treatment plant and associated corridors in Lennox Island. While this study did not include the footprint of this Project, it does provide insight as to what types of species are typically found on Lennox Island. All species of vascular plants encountered during the field survey were both identified and recorded in the field, or samples were collected to verify identification.

A total of 219 species of vascular plants were recorded during the survey within the study area, none of which are listed in the Species at Risk Act (SARA) or considered endangered, threatened or of special concern by the Committee on the Status of Wildlife in Canada (COSEWIC). Ten of these species are considered rare (i.e., S1, S1S2, S2 or S2S3) by the ACCDC (2004). Eight of the plants identified were not able to be identified to species and therefore are not ranked by the ACCDC. *Dryopteris x boottii* (hybrid Wood-Fern) is also not ranked by the ACCDC. *Brachyelytrum septentrionale* (Bearded Short-Husk), *Mitchella repens* (Partridge-Berry), *Cornus rugosa* (Roundleaf Dogwood), *Agrimonia gryposepala* (Tall Hairy Groovebur) and *Lycopodiella inundata* (Bog Clubmoss) were observed in patches where they were recorded. *Rhus typhina* (Staghorn Sumac) was recorded scattered along the southern edge of the corridor off Oyster Trail, as well as near the wellfield off Sweetgrass Trail. *Viburnum alnifolium* (Hobblebush) and *Petasites frigidus* (Arctic Butter-bur) were scattered in the areas where they were recorded. Only two specimens of *Sanicula marilandica* (Black Snake-Root) and one specimen of *Hypericum majus* (Larger Canadian St. John's Wort) were recorded during the survey.

Fauna observed in the project area during the survey included several bird species, two mammal species and one amphibian. None of the fauna species are listed in the Species at Risk Act (SARA) or considered endangered, threatened or of special concern by the Committee on the Status of Wildlife in Canada (COSEWIC).

Bird species recorded within the project footprint included Blue Jay (*Cyanocitta cristata*), Northern Raven (*Corvus corax*), American Crow (*Corvus brachyrhynchos*), American Robin (*Turdus migratorius*), Black-capped Chickadee (*Parus atricapillus*), Red-breasted Nuthatch (*Sitta canadensis*), Yellow-rumped Warbler (*Dendroica coronata*), Magnolia Warbler (*Dendroica magnolia*) and White-throated Sparrow (*Zonotrichia albicollis*). Gulls (*Larus spp*.), Doublecrested Cormorants (Phalacrocorax auritus) and Canada Geese (*Branta canadensis*) were observed flying overhead during the survey.

Mammals recorded during the survey included Red Squirrel (*Tamiasciurus hudsonicus*) and Raccoon (*Procyon lotor*). Herpetofauna observed during the survey included Northern Leopard Frog (*Rana pipiens*).

Species Abundance of the 2004 survey

- *Brachyelytrum septentrionale (S1) Large* diffuse patches of approximately 5-metre radius; 100s of stems
- *Mitchella repens(S1)* Four diffuse patches, approximately 1 - 2 square metres each
- *Hypericum majus (S1?)* One specimen
- *Cornus rugosa (S1S2)* 27+ recorded; typically in patches of 3 - 10 within 5-metre radius
- *Agrimonia gryposepala (S2)* 10+ within a 3-metre radius
- *Petasites frigidus (S2)* Two to three specimens
- *Sanicula marilandica (S2)* Two specimens
- *Rhus typhina (S2?)* 10+ specimens
- *Lycopodiella inundata (S2S3)* Two dense patches, approximately 1 - 2 square metres each
- *Viburnum alnifolium (S2S3)* 5+ specimens

4.3 Hydrogeological Setting

The aquifer system extending across Lennox Island consists of an unconfined, moderately permeable silty sand surficial aquifer that overlies a semi-confined to confined sandstone bedrock aquifer. Groundwater recharge to the bedrock is from a combination of vertical leakage through the overlying overburden deposits, and from the higher topography to the east.

The surficial aquifer is generally described as reddish-brown silty sand glacial till with an averaging 4.5 m thick in the study area. Surficial soil mapping indicates that the glacial till overlies much of the area.

The Lennox Island area is underlain by a series of upwards fining sequences of late Carboniferous to early Permian aged redbeds, of the Kildare Capes Formation often referred to as Megacycle II. This bedding has a low dip of a few degrees to the northeast to east, and bedrock strike is northeast.

As an island environment, groundwater would be expected to recharge in the central portion of the island, thence flow radially outwards towards the coastal zones. Jacques Whitford conducted a Groundwater Supply Study on Lennox Island in October of 2005 and concluded that the water table appears to reside about 1 m above mean sea level in the well field area, and is 5 to 6 m below grade, mean 5.2 m. The sandstone bedrock aquifer has an average transmissivity of 51 m^2/day and a coefficient of storage of 2.2 x 10^{-4}. These values are within the range of values typical of Prince Edward Island aquifers. These values are also considered to be conservatively low, as the early observation well data occurred while the tide was going out, which results in a slightly steeper drawdown plot. The distance drawdown assessments indicated radii of influence of 600 (high tide) to 1200 m (low tide) and 125 to 530 m on the two test wells.

For Prince Edward Island, where significant annual recharge to the bedrock aquifer is known to occur, a 100-day safe yield is generally calculated for production wells. This assumes continuous recharge with no recovery or rainfall recharge for a period exceeding three months.

The water quality is described as moderately hard (mean hardness 156 mg/L) and alkaline (mean alkalinity 143.4 mg/L, mean pH 8.0), calcium-bicarbonate water of moderate dissolved solids (mean TDS 198 mg/L), with all parameters analyzed being within respective guidelines for Canadian Drinking Water Quality with the exception of bacteria count (total coliform DC) of 14 in PW1-05. It has been hypothesized that the bacterial count may have originated from the pumping equipment used during the test.

Water table monitoring at the Prince Edward Island Department of Environment, Energy and Forestry (PEIDEEF) Baltic site indicates an average 2 m annual water table fluctuation and typical bimodal hydrograph with highest levels occurring in April and November, and lowest levels occurring in September and during the frozen winter months.

5.0 REGULATORY ENVIRONMENT

The design and construction of the system will conform to applicable acts, codes, regulations, guidelines and standards, including:

- National Building Code
- National Electrical Code
- American Water Works Association Standards
- Canadian Standards Association
- Uniform Traffic Control devices for Canada and the Temporary Workplace Traffic Control Manual
- Atlantic Canada Guidelines for the Supply, Treatment, Storage, Distribution and Operation of Drinking Water Supply Systems
- Procedure Manual for Safe Drinking Water in First Nations Communities South of 60^{o}
- Migratory Bird Convention Act
- Federal Fisheries Act
- Federal Wetland Policy
- Species at Risk Act
- Federal Transportation of Dangerous Goods Act
- Prince Edward Island Environmental Protection Act
- PEI Occupational Health and Safety Act and regulations put forth by the Workplace Health, Safety and Compensation Commission of PEI.
- Prince Edward Island Archaeological Sites Protection Act.

The Protocol for Safe Drinking Water in First Nation Communities as prepared by INAC and Health Canada in partnership with First Nation representatives culminated in the First Nations Water Management Strategy. This strategy is composed of the following seven elements:

1. A plan to upgrade and build water and wastewater facilities to meet established design, construction and water quality standards;
2. An effective water quality monitoring program combined with a comprehensive and coordinated compliance and reporting regime that will improve the detection of drinking water problems in a timely manner thereby reducing the possibility of risk to health;
3. An effective an sustainable operation and maintenance program designed to ensure the safety of the residents and the protection of assets;
4. A plan for continued expansion and enhancement of training programs, to ensure that all operators have the skills, knowledge and experience required to fulfill their responsibilities, supported by the introduction of mandatory certification requirements for all operators;
5. A set of integrated water management protocols with clearly defined roles and responsibilities consistent with nation performance standards along with improvement in emergency response procedures;
6. A public awareness campaign aimed at informing both First Nation decision-makers of their roles and responsibilities in ensuring the safety of water supplies

with in communities and First Nation households of measures they can take to protect the quality of water within their home and community; and

7. A comprehensive set of clearly defined standards, protocols and policies using a multi-barrier approach, which include:
    a. Protection of raw water sources;
    b. Effective treatment of drinking water;
    c. Maintenance of a clean distribution system; and,
    d. Comprehensive testing to confirm water quality.

6.0 PROJECT/ENVIRONMENT INTERACTION

The following section describes the interactions of the project on the environmental factors identified in section 3. The significance of the interactions, mitigation measures as well as the predicted residual impacts, both positive and negative, will be discussed. The Valued Ecosystem Components (VECs) were selected based on ecological importance to the existing environment (as described in section 4.0), the relative sensitivity of environmental components to project influences and their relative social, cultural or economic importance.

The significance of adverse/positive effects is based on the magnitude, reversibility, nature, extent, duration and confidence in a given criteria. Criteria for determining the significance of potential impacts are provided in Section 5.1.

6.1 Assessment Criteria for Determination of Significance

Magnitude	Magnitude, in general terms, may vary among Issues, but is a factor that accounts for size, intensity, concentration, importance, volume and social or monetary value. It is rated as compared with background conditions, protective standards or normal variability.	
	Small	Relative to natural or background levels
	Moderate	Relative to natural or background levels
	Large	Relative to natural or background levels
Reversibility	Reversible	Effect can be reversed
	Irreversible	Effects are permanent
Nature	Positive	Net benefit
	Negative	Net loss or adverse effect
Extent	Immediate	Confined to project site
	Local	Effects beyond immediate project site but not regional in scale
	Regional	Effects on a wide scale
Duration	Short Term	Between 0 and 18 months in duration
	Medium Term	Between 19 months and 3 years in duration
	Long Term	Beyond 3 years in duration

6.2 Environmental Effects Analysis

6.2.1 Soil

Description of the Effects

The primary soil concern associated with the construction work is the effects of erosion and hydrocarbon spills on the environment. The largest continuous area of soil disturbance will be the access road to the well field and during the concrete pad installation for the water reservoir. The soil disturbance is considered to be reversible, however the installation of the concrete pad will remain in place for the lifespan of the reservoir and as such that patch could be construed as having irreversible effects. The effects resulting from this project will be negative but limited to an immediate extent with a short-term duration, with the exception of the concrete pad operation.

Following construction activities all exposed areas, including the access road, will have been stabilized. Seeding of all exposed areas will also take place, with the exception of the stabilized access road. There will be no un-stabilized exposed soil required for the operational stages of the system and as such no impact on soil.

Summary of the Effects

- Short-term disturbance from construction activities carried out at the project site could leave exposed soil in the immediate area.
- Immediate negative local impacts could result from hydrocarbon products (i.e., chemicals, fuel, hydraulic fluid and lubricants) being released via accidental events/spills.

Required Mitigation

- Measures shall be implemented, in advance of soil disturbance activities that will allow surface drainage to be diverted around the work area to minimize soil erosion. This shall be undertaken during dry weather and coordinated with the timely placement of fill materials.
- Stockpiles of soil shall be sloped and compacted to prevent ingress of moisture; protected from erosion with mulch, plastic or geotextile; surrounded by straw, earthen berms or silt fences; and, located no closer than 50 m from any watercourse.
- Exposed soil areas shall be minimized by limiting the area that is exposed at one time and by limiting the time that any one area is exposed. Areas prone to erosion will be controlled by water control methods such as silt fences to control run-off from the site and potential siltation of the adjacent properties and municipal facilities (i.e., storm drains) (if applicable).
- The contractor shall monitor the site prior to, during and after construction activity to ensure that the sedimentation and erosion control measures are functioning effectively.
- After construction is complete all exposed soil shall be replanted or sodded to ensure soil stabilization. Erosion control structures will be removed and

decommissioned after sufficient amounts of vegetation have grown and secured the area.

- Vegetated buffer zones shall be maintained as appropriate to protect resources at risk.
- Machinery shall be stored on an impermeable surface or over drip trays.
- Transfer, fuelling and lubrication of equipment on the site will occur in such a manner as to minimize the possibility of contamination to the surface/subsurface soil and/or surface (both marine and fresh) and/or groundwater. Fuelling or servicing of mobile equipment on land shall not be allowed within 30 m of a water course except within a specifically designated refuelling area where conditions will allow for containment of an accidental spill of fuels and/or lubricants.
- Contractors shall have an emergency response plan for fuel leaks and petroleum contamination and shall maintain appropriate spill response equipment in a readily accessible location, with the knowledge and ability to respond to spills. It is recommended that the Canadian Standards Association publication Emergency Planning for Industry CAN/CSA-Z731-95 (reaffirmed 2002), be consulted as a useful reference.
- All spills or leaks, such as those from machinery or fuel storage tanks, shall be promptly contained and cleaned up and reported to the 24-hour environmental emergencies reporting system (1-800-565-1633).

INAC's Conclusion and Significance of Predicted Residual Environmental Effects

Taking into account the above mentioned mitigation measures, and the fact that the surrounding locale is considered to be flat land with small undulations thereby reducing the potential for run-off and soil erosion, INAC has concluded that the project is not likely to cause significant adverse environmental effects on soil.

6.2.2 Hydrology/Groundwater Quality and Quantity

Description of the Effects

The primary concerns of the project on the quantity and quality of groundwater are centered on the capacity of the aquifer to sustain the increased water extraction, the possibility of salt-water intrusion into the aquifer and by creating new pathways for contaminants to enter the aquifer. Currently there is no immediate requirement for increased water extraction with the exception of using the resource to fight fires. In the future the population of the island is expected to grow and therefore an increase in water is expected, however the design takes this into account. The magnitude of water extraction is considered to be a small increase in the short to medium term, increasing to moderate magnitude over the long term as the island's population increases.

Osmosis is continuously occurring between the fresh and saltwater interface, since the aquifer is a dynamic system a state of equilibrium is not achieved. Increased water extraction has the potential to produce a larger cone of influence surrounding the well field and thus increase the likelihood of salt-water intrusion. While there have been no historical indications that salt-water intrusion has occurred on Lennox Island it remains a possible adverse environmental effect. A preliminary pump test (JWEL, 2005) on two installed wells indicates that saltwater intrusion is a low risk and with proper planning and monitoring the magnitude of this risk is further reduced.

As indicated the contamination of the aquifer is a potential effect associated with the project. The establishment of a new well field and the decommissioning of the old well field both represent a direct pathway for contaminants to enter the aquifer. However recently residential septic systems were decommissioned and replaced with a new central sewer service, thereby reducing the possibility of bacterial contamination.

Summary of the Effects

- There is the potential that the aquifer may lack the capacity to support the required yield on a long-term basis.
- There is potential for salt-water intrusion of the aquifer resulting in diminished water quality.
- Draw down within a pumping well to below major water bearing fractures can lead to cascading water streams within the well bore that can cause turbidity, and significant declines in specific capacity and pumping levels. If the uppermost major fracture zone is completely dewatered it may result in a rapid draw down and possible cavitations of the well(s).
- Potential direct pathway via the well(s) for contaminants entering the aquifer; and,
- There is the potential for immediate negative local impacts resulting from hydrocarbon products (i.e., chemicals, fuel, hydraulic fluid and lubricants) being released via accidental events/spills.

Required Mitigation

- The proposed water production wells shall be located further away from the fresh-salt water interface (inland from the current existing wells). The operators shall limit or eliminate the pumping in Lennox Island's three current production wells that are located closer to the shoreline.
- Upon commissioning of the well field a pump test will shall be conducted on the entire system simulating a fire event. Should any concerns arise from the pump test a water extraction management plan shall be established.
- Install either a shut-off valve or an alarm that would not allow the aquifer to be pumped below a pre-determined level. The well pump will be automatically shut off in the unlikely event excessive draw down is measured in one of the production wells.
- If saltwater intrusion occurs pumping will be reduced to allow the aquifer to recharge and therefore reduce the inflow of saltwater. If saltwater has entered the residential distribution lines the area of concern will be isolated via valve control. The impacted water will be returned to the aquifer and new water will be redistributed.
- A preliminary Well Field Protection Plan will identify potential hazards and capture zones so that future best management practices can be incorporated. Additionally, this Plan shall identify a protection zone around the well field and make recommendations on the establishment of a no activity zone to prevent bacterial sources and petroleum products from reaching the wellhead.
- All drilling and well construction procedures shall be carried out in a manner pursuant to the PEI Environment Protection Act - Water Well Regulations, and following the American Water Works Association Standards for Water Wells (AWWA Standard A100-97).
- Testing shall be conducted throughout the drilling to identify characteristics of water bearing fractures.
- Grouting shall be used as a shield to prevent the bacterial contamination of groundwater and shall extend from the base of the casing to a point below the pit-less adapter level (approximately 12 m). A sample of the grout mixture (each batch) will be collected for inspection by the hydrogeologist to document consistency. The grouting used for the casing shall be a minimum 25% to 30% by weight solids bentonite grout, or other mixture approved for municipal wells.
- Each new well shall be disinfected after completion of drilling operations and after removal of the pumping test equipment.
- The contactor shall maintain a clean working environment during the work, and shall clean up the site upon completion of the work (e.g., remove all surplus materials, and hand or machine-grade the drill site to eliminate wheel ruts, drilling cuttings and promote runoff away from well head).
- Pumping shall be alternated based on the draws (production capacity) of the proposed wells to minimize localized effects on the aquifer.
- Potable water shall be disinfected with chlorine to avoid bacterial levels of concern.
- Careful maintenance and monitoring of all equipment shall be carried out to minimize the risk of spills or leaks of petroleum based products.

- See Mitigation Measures for Soil.

Required Monitoring

A monitoring program will be developed to assess the groundwater draw down and in the well field. Monthly static water level monitoring will be conducted for a period of two years to characterize seasonal trends. Monthly water chemistry monitoring will be conducted for the first two years after commissioning the system to identify any concerns related to salt water intrusion. Parameters to be analyzed monthly include sodium and chloride. The operators of the water system are responsible for the above identified monitoring.

In addition to the requirements above regular monitoring of the water quality will be continued. Presently Health Canada has an Environmental Health Officer collect and test samples as per the Procedure Manual for Safe Drinking Water in First Nations Communities South of 60^{o}. The basics of the policies regarding monitoring are:

Microbiology

- 4 distribution samples weekly by Community Based Water Monitor (CBWM)
- Distribution samples monthly by HC Environmental Health Officer (EHO)

Chemical

- For baseline purposes from a new water system, detailed chemistry 2x/ year for 2 years to establish the baseline (from source and treated, could be modified by EHO).
- General chemistry sample once/ year (from source and treated, could be modified by EHO).

HC sampling protocols are more detailed and require more samples than the provincial protocol. In discussion with HC it was determined that the above sampling regimes would not require modification from the EHO.

In the unlikely event that coastal flooding occurs as a result of a storm surge additional water quality monitoring, as described above, shall be employed. The monitoring program is designed to reduce the risk of localized, elevated drawdowns and associated salt-water intrusion. Furthermore it will enable the users to optimize the operation of the well field in a safe and sustainable manner. It is recommended that the results from monitoring be used to produce a Groundwater Extraction Plan aimed principally, but not limited to the risk of salt-water intrusion.

Additional Recommendations
Upon receipt of the preliminary Well Field Protection Plan it is recommended that the Lennox Island First Nations incorporate a public awareness campaign, formal designation of groundwater protection areas, development of groundwater protection measures, and contingency and emergency response planning. Groundwater protection measures may include non-regulatory measures, such as public education, best management practices and/or regulatory measures such as land use planning. The plan and awareness program should also include attention to proper disposal of household chemical and automotive fluids. Additionally, consideration should be given to restricting the types and quantities of chemicals or other compounds of concern used within the groundwater protection areas.

INAC's Conclusion and Significance of Predicted Residual Environmental Effects
Taking into account the above mentioned mitigation measures, that the current annual average water demand represents a small portion (~ 10%) of the estimated annual recharge and that the fact that salt water intrusion has never occurred on Lennox Island, INAC has concluded that the project is not likely to cause significant adverse environmental effects on hydrology/ground water quality and quantity.

6.2.3 Surface Water Quality

Description of the Effects
The primary surface water quality concerns associated with the construction phase of the project are the impacts resulting from sediment erosion and transport. Additional surface water quality concerns are related to the construction of the wells and subsequent pump test. Water discharged as a result of pump testing is expected to free of suspended solids and will be discharged into the adjacent ditch system.

Residual environmental effects are related to the amount and duration of exposed soil in the project area. The effects are predicted to be small in magnitude, reversible with an immediate extent over the short term. All established environmental methods for contending with surface water run-off, associated erosion and sediment transport will be implemented for the life of the project.

Summary of the Effects
- There is the potential for immediate negative local impacts resulting from sediment erosion related to construction activities and therefore suspended sediments transported via surface water.
- There is the potential for immediate negative local impacts resulting from discharge water associated with drilling of wells and the subsequent hydrogeological studies.

Required Mitigation

- Silt fencing shall be installed as per manufactures specifications and maintained such that it performs its intended function until the site is deemed stable.
- Water resulting from drilling operations containing cutting, fines and suspended sediment shall be subject to established best management practices to contend with suspended sediments (i.e. filter fabric, settling ponds) prior to being released into the ditch system.
- The ditch system that will receive water from drilling operations and pump tests shall be prepared in such a way as to reduce the flow velocity (i.e. check dams, straw bales) and therefore reduce possible erosion of the ditch.
- As feasible, drilling/construction work shall take place when the ground is frozen or during dry summer months. In combination with other precautions, scheduling activities to avoid periods of rain can reduce the risk of adversely affecting surface waters.
- Turbid water retained by sediment control structures shall be routed through settling ponds, sediment filter bags or existing vegetation sufficient distance from any watercourse to ensure the level of suspended solids in the watercourse does not increase more than 25 milligrams per litre above background levels.
- See Mitigation Measures for Soil

INAC's Conclusion and Significance of Predicted Residual Environmental Effects

Taking into account the limited spatial area of the construction site, short term temporal scope of drilling activities and the mitigation measures outlined above, INAC has concluded that the project is not likely to cause significant adverse environmental effects on surface water quality.

6.2.4 Fish and Fish Habitat

Description of the Effects

The project is located approximately 100 m away from the nearest watercourse and approximately 140 m from the marine environment. The project is located in areas considered to be non-influential to fish habitat, therefore it is not anticipated that the project will result in the harmful alteration, disruption or destruction (HADD) of aquatic habitat. Nonetheless care must be taken to reduce potential impacts to fish and fish habitat resulting from soil run-off, well construction and subsequent pump testing. The magnitude of all potential adverse effects to this VEC is predicted to be small relative to background levels. Potential effects associated with suspended sediments entering an aquatic environment have a geographic extent in the local area.

Summary of the Effects

- There is the potential for immediate negative local impacts resulting from sediment erosion related to construction activities and therefore suspended sediments negatively affecting fish and their habitat.
- There is the potential for immediate negative local impacts resulting from Project related debris/material entering the marine environment and/or fish habitat via accidental or storm events.

- There is the potential for immediate negative local impacts resulting from hydrocarbon products (i.e., chemicals, fuel, hydraulic fluid and lubricants) being released via accidental events/spills.

Required Mitigation

- Sediment control works be installed at the onset of the project, added wherever necessary to control sedimentation and maintained until the vegetation has re-established.
- Stockpiles of soil shall be sloped and compacted to prevent ingress of moisture and protected from erosion using common best management practices such as mulch or plastic and surrounded by straw, earthen berms or silt fences. Stockpiles shall be located a sufficient distance from any watercourses to ensure no deleterious substances enter an aquatic environment.
- If any construction debris or material (e.g., plastic, food scraps, etc.) enters the marine environments it shall be removed immediately and disposed of in an appropriate manner.
- That all necessary precautions be taken to prevent discharge or loss of any harmful material or substance into the watercourse; including but not limited to hydrocarbons, fresh cement, paint or concrete.
- Machinery and pollutants shall be located or stored in areas not in danger of floodwaters.
- Equipment refuelling operations shall take place at least 30 metres from any watercourse on a prepared impermeable surface with a collection system.
- All equipment shall be free from leaks or coatings of hydrocarbon-based fluids and/or lubricants harmful to the environment. Hoses and tanks are to be inspected on a regular basis to prevent fractures and breaks.
- See Mitigation Measures for Soil.
- See Mitigation Measures for Surface Water Quality.

INAC's Conclusion and Significance of Predicted Residual Environmental Effects
Taking into account the location of the of the project site, limited spatial area of the exposed soil in the construction site, short term temporal scope of drilling activities and pump testing and the mitigation measures outlined above, INAC has concluded that the project is not likely to cause significant adverse environmental effects on fish and fish habitat.

6.2.5 Freshwater Wetlands

Description of the Effects

At no time in the project will freshwater wetlands be directly impacted from construction activities. The closest wetland is located approximately 100 m from the project site. The primary environmental wetland concern associated with the project is that increased water extraction and a larger cone of influence resulting from an expanded well field may result in indirect adverse effects to surrounding freshwater wetlands.

In discussion with Environment Canada and the Prince Edward Island Department of Environment, Energy, and Forestry it is unclear if the adjacent wetlands have a direct connection with the water table. Typically there are two types of freshwater wetlands; one is characterized by flat land with low permeable materials (such as clay) at the bottom. Usually the water in this wetland comes from precipitation (runoff) and has very limited connection to ground water. The second type of wetland is hydraulically linked to groundwater, where the water table is at the same level as the wetland. In this case, when the wetland is fed by runoff or precipitation it will recharge groundwater. Conversely, during periods of drought it will discharge groundwater and thus act as a dynamic process.

On Lennox Island it is believed that the wetlands are considered to be a combination of the two types and that the wetlands would be able to sustain themselves via precipitation and surface water flow. Furthermore, the proposed water supply wells will be located at an approximate depth of 40 m below the surface and therefore the influence of pumping is not expected to have adverse effects at or near the surface. Nonetheless, this project and its operation have the potential to alter the water table dynamics and thus indirectly result in adverse environmental effects to freshwater wetlands.

Environmental effects for this project are predicted to be small in magnitude with a local extent and duration in the short to medium term.

Summary of the Effects

- There is the potential for immediate and long-term negative localized impacts resulting from excess groundwater extraction resulting in loss of sustaining waters to adjacent wetlands.
- There is the potential for immediate negative local impacts resulting from hydrocarbon products (i.e., chemicals, fuel, hydraulic fluid and lubricants) being released via accidental events/spills.

Required Mitigation

- This project will comply with The Federal Policy on Wetland Conservation with its objective to “promote the conservation of Canada’s wetlands to sustain their ecological and socio-economic functions, now and in the future.” In the unlikely event that a wetland loss occurs the Canadian Wildlife Service will be contact as an expert authority to aid in identifying appropriate compensation measures.

- A pump test shall be performed on the entire system prior to commission. It is expected that such a test will establish the cone of influence relating to water withdrawal. This cone of influence should determine accurately whether or not certain pumping conditions will have an effect on adjacent wetlands via the lowering of the water table.
- Fuelling or servicing of equipment shall not take place within 30 m of wetlands or other sensitive habitats;
- All equipment to be used around wetlands is to be free from leaks or coatings of hydrocarbon-based fluids and/or lubricants harmful to the environment. Hoses and tanks are to be inspected on a regular basis to prevent fractures and breaks.
- See Mitigation Measures for Soil.

Required Monitoring

- Adjacent freshwater wetlands will be monitored for a 5-year period. Photographs will be collected from the same location at the same time of year as a means of monitoring and a copy will be provided to the Canadian Wildlife Service. Of particular interest will be any changes in the amount of open water space and floral distribution and abundance. The Canadian Wildlife Service will review the results of the monitoring program with INAC and other stakeholders to ensure the mitigation is effective and any necessary corrective actions are taken in a timely manner. If noticeable changes occur and it is determined that ground water extraction have resulted in negative effects on the adjacent wetlands than the Canadian Wildlife Service will be contacted as the expert authority on wetland compensation as per the Federal Policy on Wetland Conservation. The guiding principle of the Federal Policy on Wetland Conservation is to ensure there is no net loss of wetlands.

INAC's Conclusion and Significance of Predicted Residual Environmental Effects

Taking into account the above mentioned mitigation measures, the fact that the nearest freshwater wetland is located approximately 100 m from the project site and that monitoring of wetlands will take place to ensure mitigation is effective and any necessary corrective actions are taken in a timely manner surrounding, INAC has concluded that the project is not likely to cause significant adverse environmental effects on freshwater wetlands.

6.2.6 Estuaries/Salt Marshes

Description of the Effects

The primary salt marsh environmental concern related to the project is the potential for suspended sediments to have adverse effects. The closest salt marsh is located 215 m away from the project site, which reduces the potential for significant adverse effects. There are no identified estuaries in the area and therefore no adverse effects are predicted.

Summary of the Effects

- There is the potential for short-term localized negative effects from suspended solids related to construction activities, pump testing and associated water discharge.

Required Mitigation

- See Mitigation Measures for Soil.
- See Mitigation Measures for Surface Water Quality.
- See Mitigation Measure for Fish and Fish Habitat.

INAC's Conclusion and Significance of Predicted Residual Environmental Effects

Taking into account the above mentioned mitigation measures, and the fact that the nearest salt marsh is located approximately 215 m from the project site and that the surrounding locale is considered to be flat land with small undulations thereby reducing the potential for run-off and sedimentation, INAC has concluded that the project is not likely to cause significant adverse environmental effects on salt marshes or estuaries.

6.2.7 Lighting, Air Quality & Noise

Description of the Effects

The primary air quality concern associated with construction work is the effect of dust, emissions, and noise from the project vehicles and equipment on the surrounding environment. The potential effects for this project and its activities are influenced by the timing of project activities, the relatively small footprint of the project site and the inclusion of preventative measures to minimize emissions and noise levels.

Construction related activities could result in an increase in noise and dust on the project site and surrounding area. Dusting conditions related to machinery use and excavation will be of short duration and confined to the project site. While negative in nature, such effects are generally avoidable with appropriate mitigation measures. Similarly, any increase in noise levels related to the operation of construction equipment will be of short duration and confined to the project area. The magnitude of such noise effects will be small relative background levels given volume of traffic in the area, taking appropriate mitigative measures into account.

Equipment operation produces emissions typical of gas and diesel-fuelled vehicles. Generally, emissions may cause occasional nuisance problems on construction sites; however, they typically do not present problems outside of the immediate project area and for projects of this nature, emissions would be short-term and localized. While a certain level of gaseous emissions from equipment will be unavoidable during the project phases, certain operational practices can be employed to reduce or mitigate emissions to acceptable levels, including limiting engine idling, ensuring that equipment is kept in good repair and operating efficiently. These measures will prevent carry-through of elevated levels of hydrocarbons from engine operation and loss of lubricants through leakage.

Following construction activities there will be no need for machinery to be present and the operational stages of the system will not impact air quality and noise.

Summary of Effects

- There is the possibility of a moderate increase in the level of dust and noise, associated with the construction phase, which may have a short-term negative impact in the immediate area.
- Air and noise emissions from trucks, vehicles, and equipment may have a short-term negative impact in the immediate area.

Required Mitigation

- Construction will be conducted in accordance with Municipal and/or Provincial regulations to mitigate disturbances.
- Work is to be carried out during daylight hours (unless special arrangements are made to facilitate work at night) to mitigate any disturbance to residents.
- All construction equipment shall be fitted with standard and well-maintained noise suppression devices.
- Work shall be conducted so that lighting and noise levels remain comparable to those currently produced in the project area. Where additional lighting is required to conduct work, lights shall be positioned such that the direction of the lighting is opposite that of nearby residential and business areas.
- Project vehicles will keep to designated project transportation routes.
- Appropriate dust suppression methods are to be employed when required, such as during summer dry conditions. The construction manager shall determine locations where water is to be applied, the amount of water to be applied, and the times at which it shall be applied.
- Waste oil and calcium chloride are not to be used for dust control under any circumstances.
- The contractor and site manager shall ensure that idling equipment is limited to what is necessary, so as to reduce impacts on local air quality and minimize Green House Gas (GHG) emissions.
- All equipment shall be kept in good working order and inlet caps should be maintained to reduce vaporization of fuel.
- Construction activities must respect appropriate time restriction and use smaller, less disturbing equipment where possible.

INAC's Conclusion and Significance of Predicted Residual Environmental Effects
Taking into account the above mentioned mitigation measures, and the fact that the construction period will be of short duration and confined to the project area. INAC has concluded that the project is not likely to cause significant adverse environmental effects on lighting, air quality and noise.

6.2.8 Health & Safety

Description of the Effects
The primary health and safety concerns are related to construction activities and accidental events/spills of hydrocarbon products (i.e., chemicals, fuel, hydraulic fluid and lubricants) for the duration of the project. In the construction phase, there may be exposure to a small magnitude of potential hazardous materials in the immediate working area.

Summary of the Effects
- In the construction phase, there may be exposure to a small magnitude of potential hazardous materials in the immediate working area.
- Workers could be injured or killed if accidents occur during the project.

Required Mitigation
- Safe working procedures shall be followed for the duration of the project as per the Health and Safety Regulations and applicable municipal, provincial and federal regulations.
- Employees shall be trained in health and safety protocols (e.g. safe work practices, emergency response).
- Workers in contact with hazardous materials shall be provided with and use appropriate personal protective equipment.
- Hazardous materials will be used only by personnel who are trained and qualified in the handling of these materials and only in accordance with the manufacturer's instruction and government regulations. The WHMIS program will be implemented throughout the job site in accordance with the PEI Occupational Health and Safety Act and regulations put forth by the Workplace Health, Safety and Compensation Commission of PEI. All employees involved with hazardous materials must be appropriately trained.
- A complete inventory of the hazardous materials is to be maintained according to the WHMIS. This inventory is to be available to regulatory agencies upon request.
- Material Safety Data Sheets (MSDS) will be available for all hazardous materials in use or stored on-site.
- The transportation of hazardous materials will be conducted in compliance with the Federal Transportation of Dangerous Goods Act.
- If excavations are to remain open when workers are not present on-site, there shall be warning signs placed near the open excavation or they shall be fenced off to ensure that humans and wildlife are not injured by falling onto these excavations.

- Caution is to be taken in not overloading trucks and in ensuring that all contents are properly secured.
- Trucks are to operate within posted speed limits.
- Trucks are to reduce speed and proceed with caution when traffic (i.e., vehicle and pedestrian) is present and during periods of low lights (i.e., dusk and dawn).

INAC's Conclusion and Significance of Predicted Residual Environmental Effects
Taking into account the above mentioned mitigation measures, and the fact that there will be no anthropogenic activities associated with the construction or operational phases that would result in an impact to human health, INAC has concluded that the project is not likely to cause significant adverse environmental effects on health and safety.

6.2.9 Current Use of Lands and Resources for Traditional Purposes by Aboriginal Persons and Adjacent Land Use

Description of the Effects
This project proponent is the Lennox Island First Nations and the project and all adjacent land areas are located on a recognized First Nations Reserve. Tiffany Sark-Carr Director of the Lennox Island Mi'kmaq Cultural Center, Matthew McGuire Director/EDO of Development and Growth, and Chief Darlene Bernard were contacted by Peter Curley of PWGSC to discuss this project and no items of concern were presented.

A Cultural Resource survey identified that cultural traditions, namely the harvest of cedar and cranberries takes place on Lennox Island. Community members pointed out that cedar and cranberry picking can be conducted in other areas of Lennox Island, however the project is not predicted to have any impacts on these areas. There have not been any identified land uses in adjacent areas that would be affected by this project.

Summary of the Effects
- The project is located on a recognized First Nations Reserve and is not expected have any adverse effects.

Required Mitigation
- None

INAC's Conclusion and Significance of Predicted Residual Environmental Effects
Taking into account that the project proponent is the Lennox Island Band Council, that the project is taking place on a recognized First Nations Reserve and community elders have not identified any cultural resources or adjacent land uses that may be affected by the project, INAC has concluded that the project is not likely to cause significant adverse environmental effects to Current Use of Lands and Resources for Traditional Purposes by Aboriginal Persons and Adjacent Land Use.

6.2.10 Wildlife/Birds

Summary of the Effects

The proposed project will have minimal effects on terrestrial wildlife and birds due to the physical boundaries of the project area (i.e., limited spatial area). However, the primary environmental concerns associated with this VEC are the disturbance of birds and wildlife during the construction period and the loss of habitat throughout the operational phase. The breeding season for most birds within the project area occurs between May 1 and August 31, however, some MBCA-protected species nest outside of this time frame. While most bird species construct nests in trees and shrubs, several nest at ground level, and some may nest in burrows in stockpiles of soil.

All migratory birds are protected under the Migratory Birds Convention Act (MBCA). This legislation provides migratory birds protection from hunting and capture during sensitive periods, and prohibits the deposit of oil, oil wastes, or other substances harmful to migratory birds or in any area frequented by birds. The interpretation of "other substances" includes food scraps, sediment plumes, dust, noise and activities that could disturb nesting or feeding migratory birds.

NavCanada has been consulted on the design of the project and has indicated that lights are not required for the water reservoir. Therefore there are no predicted project interactions with birds such as, nocturnal migrants or night flying seabirds. Through a combination of avoidance, mitigation and scheduling of construction activities, the impacts to wildlife and birds from the proposed project are expected to be not significant. The magnitude of any impacts will be small with a local extent over the short term and minimized through avoidance, scheduling and mitigation.

Description of the Effects

- There will be an increase in noise levels and construction traffic that could cause disruptions to nesting birds, migration of birds or bird habitat for the duration of the construction project.
- Increased impacts on wildlife immediately adjacent to the project area resulting from the disturbance of terrestrial habitats for the duration of the construction project.

Required Mitigation

- Avoid disturbances to all birds and wildlife in and near the project area.
- The Contractor is to use public roads to access the project.
- Avoid clearing and grubbing during the breeding season for most birds (i.e. May 1 to August 31), if it is deemed necessary to clear and grub during this time frame the area should be inspected by a qualified person to ensure no nests are present.
- Avoid impacting active nests for all migratory bird species regardless of the time of year or disturbance of birds caring for per-fledged chicks should they be discovered during project activities. Avoidance shall take the form of establishing appropriate vegetated buffer zones around nests and minimizing activities in the

immediate area until nesting is complete and chicks have naturally migrated from the area.

- Care shall be taken to avoid impacts to nesting forest birds such as Osprey, Bald Eagles, Owls, woodland hawks and colonial birds. Measures shall include excluding construction within 100-250 m from a nest prior to the end of June to the end of July. If a nest is encountered during construction, the appropriate regulatory authority shall be contacted.
- The Contractor shall be aware that migratory birds, their eggs, nests and young are protected under the *Migratory Birds Convention Act* (MBCA) and shall work in compliance with all aspects of the Migratory Bird Act.
- See Mitigation Measures for Air Quality and Noise

Required Monitoring

- Prior to disturbance of natural areas a qualified biologist will survey the project site to ensure there are no wildlife or birds species that may be disrupted or negatively affected by construction activities. Should any species of concern be identified monitoring will take place for the duration of potentially disturbing activities to ensure there are no significant adverse effects and to ensure compliance with the Migratory Bird Act.

INAC's Conclusion and Significance of Predicted Residual Environmental Effects

Taking into account the above mentioned mitigation measures, the limited temporal scope of construction activities and the as-required monitoring program, INAC has concluded that the project is not likely to cause significant adverse environmental effects on birds or wildlife.

6.2.11 Rare/Endangered Species

Description of the Effects

The primary environmental concern associated with VEC is the potential loss or disturbance of rare or endangered species. In this context, a significant adverse effect on a species at risk is defined as any effect resulting in a sustained suppression of fitness to maintain the population, or a decrease in density of the population below naturally occurring levels. For species designated as endangered (or significant for other reasons), the loss of these species at an individual level may be considered a significant adverse effect.

An ACCDC scan and a previously conducted rare plant and animal survey performed by JWEL (2005) did not identified any species at risk or endangered species on Lennox Island that would likely be found in the project area. However, several S1 and S2 ranks were identified in both the ACCDC Report and the JWEL survey. Considering that almost the entire project will take place on previously disturbed land it is not expected that any rare or endangered species are present, therefore no significant adverse effects will result from the project. However, care and caution must be exercised throughout the

project to minimize disturbance and destruction in the unlikely event that rare or endangered species are present.

Summary of the Effects

- There is a small possibility that rare plant species may incur irreversible negative effects in the immediate project area.
- There is a small possibility that rare and endangered flora and fauna may incur negative disturbance effects in the immediate project area during the construction phase(s).
- The magnitude of all potential adverse effects to this VEC is predicted to be small relative to background levels.
- Potential effects associated with disturbance to rare or endangered species have a geographic extent in the immediate to local area.

Required Mitigation

- If rare or endangered species are identified in the project area, project activities shall avoid these areas where possible; otherwise the species will be relocated to a suitable location to eliminate future project interactions.
- See Mitigation Measures for Fish and Fish Habitat.
- See Mitigation Measures for Freshwater Wetlands.
- See Mitigation Measures for Estuaries/Salt Marshes.
- See Mitigation measures for Air Quality and Noise.
- See Mitigation measures for Wildlife/Birds.

Required Monitoring

- Prior to disturbance of natural areas a qualified biologist will survey the project site to ensure there are no rare or endangered species that may be disrupted or negatively affected by construction activities. Should any species of concern be identified monitoring will take place for the duration of potentially disturbing activities to ensure there are no significant adverse effects.

INAC's Conclusion and Significance of Predicted Residual Environmental Effects

Taking into account that the majority of the project is taking place on previously disturbed land (cut-over), the above mentioned mitigation measures and the limited spatial scope of the project, INAC has concluded that the project is not likely to result in significant adverse environmental effects to Rare or Endangered Species.

6.2.12 Archaeology/ Paleontology/Heritage

Description of the Effects
PWGSC commissioned the Lennox Island Aboriginal Ecotourism Centre to conduct a Cultural Resource Survey regarding the proposed project plans. In total, ten people were chosen to participate in the survey that represented a broad range of life experiences but shared a common-extensive knowledge of Lennox Island. According to those interviewed they were aware of no evidence relating to significant cultural resources within the area to be affected by the project. However, the potential remains that areas were not identified in the survey and as such the possible destruction of resources is the primary environmental concern associated with this VEC.

Following the construction phase of the project there will be no need for further excavation and as such there are no predicted residual adverse environmental effects associated with this VEC.

Summary of the Effects

- The project has the potential to cause irreversible damage to archaeology/heritage sites or cultural resources.

Required Mitigation

- The contractor shall be required to follow a Protocol for Discovery of Archaeological Resources and a Protocol to Follow in the Event of Discovery of Human Remains, or Evidence of Burials, which is included in **Appendix A** of this CSR.

INAC's Conclusion and Significance of Predicted Residual Environmental Effects
Taking into account the limited spatial extent of the project, the mitigation outlined above and that no physical disturbances will be required beyond the construction phase, INAC has concluded that the project is not likely to result in significant adverse environmental effects to Archaeology/ Paleontology/Heritage.

6.2.13 Vegetation

Description of the Effects
The primary environmental concerns related to this VEC are the disturbance and loss of vegetation and the potential introduction of non-native and invasive plant species. The majority of the project will take place on previously disturbed land; however a limited amount of space will need to be cleared during well construction. There will be permanent loss of vegetation in the areas of the well access roadway, the wells and the water reservoir throughout the operational phase of the project. The area of disturbance is characterized mainly by Black spruce and grass, which also dominates the surrounding area. Lay-down areas for pipes and other materials will be in the same location as those used for the construction of the wastewater treatment project and therefore no additional

disturbances to vegetation in these areas are required. The two established marshalling yards are located on Eagle Feather Trail and Sweetgrass Trail.

Summary of the Effects

- Small to moderate irreversible negative effects to immediate plant populations associated with clearing activities and introduction of non-native or invasive plant species.
- Immediate negative local impacts could result from hydrocarbon products (i.e., chemicals, fuel, hydraulic fluid and lubricants) being released via accidental events/spills.

Required Mitigation

- The contractor shall limit the disturbance of terrestrial habitat to only those areas required for the project.
- Species of plants native to the area shall be used in revegetation efforts. If seeded mixes for such plants are unavailable, then only non-invasive plants species shall be used.
- To avoid spreading invasive plant species, such as Purple Loosestrife, machinery shall be cleaned of mud and vegetation prior to entering and leaving the project area.
- See Mitigation Measures for Soil.

INAC's Conclusion and Significance of Predicted Residual Environmental Effects

Taking into account the limited spatial extent of the project, the mitigation outlined above and that majority of the project footprint is taking place on previously disturbed land, INAC has concluded that the project is not likely to result in significant adverse environmental effects to Vegetation.

6.3 Effects of the Environment on the Project

6.3.1 Flooding and Erosion Hazard

Weather conditions should be assessed on a daily basis to determine the potential risk of adverse weather climate on the project.

- It is recommended that the contractor have a water management contingency plan in place prior to construction to contend with periods of heavy precipitation or flood events.
- The Contractor is encouraged to consult EC's local forecast at http://www.weatheroffice.ec.gc.ca/ so that the construction work can be scheduled at an appropriate time. Advisory and warning bulletins are issued by Environment Canada when there is a risk if coastal flooding events. Such bulletins typically include a meteorological description of the event, information on coastlines most likely to be affected, a description of complicating factors such as ocean waves and pack ice and an assessment of the severity of the storm.
- The Contractor is to ensure that proper material management and construction measures are employed. Mitigation will include:

- Monitoring extended weather forecasts to schedule activities to avoid significant storm events.
- Stopping activities during significant storm events.
- Increasing inspection of the construction zone immediately after a storm event.
- Any material lost as a result of storm events is to be immediately recovered by the operator when safe to do so.

6.3.2 Precipitation

Measurable precipitation averages 1071.0 mm annually. Extreme daily precipitation has been recorded at 102.0 mm. For Prince Edward Island, where significant annual recharge to the bedrock aquifer is known to occur, a 100-day safe yield is generally calculated for production wells. This assumes continuous recharge with no recovery or rainfall recharge for a period exceeding three months.

This assessment and the current design of the proposed system have taken into account the possibility of reduced precipitation from a groundwater recharge perspective. The operation and maintenance of the system will be dependant on monitoring of static water levels and physical parameters.

6.3.3 Wind Hazards

Lennox Island is not considered an area of high wind load. All structures and ancillary features constructed as part of this project will conform to applicable building codes with regard to wind load.

6.3.4 Seismic Hazard

According to the 2005 National Building Code Seismic Hazard Calculation there is the following 2% probability exceedances in 50 years (0.000404 per annum):

SA(0.2)	0.201
SA(0.5)	0.120
SA(1.0)	0.058
SA(2.0)	0.019

The probability of Sieismic Hazards having an effect on the project is considered to be small. All structures and ancillary features constructed as part of this project will conform to applicable building codes.

INAC's Conclusion and Significance of the Effects of the Environment on the Project

The project's design has taken into account the possibilities of extended periods of no precipitation, the possibilities of wind and seismic hazards as well as the possibility of flooding, soil erosion and rising sea levels. Therefore, INAC has concluded that the environment is not likely to result in significant adverse effects to the project.

6.4 Accidents, Malfunctions and Adverse Conditions

In this section, potential accidents, malfunctions and adverse conditions that might occur during the construction and operation phases of the Lennox Island Water Supply Upgrade Project are reviewed, and preventative measures that would need to be taken to minimize the risk of accidents and malfunctions occurring are identified.

6.4.1 Construction Phase

Potential accidents and malfunctions that could occur during the construction phase of the project include the following:

- Spills and releases of fuels, hydrocarbons (i.e. hydraulic oil, motor oil, etc.), or antifreeze from construction machinery;
- Damage to other utilities such as Maritime Electric power line poles on Lennox Island via accidental events;
- Accidents involving motorists, recreation enthusiasts, and the general public entering and leaving Lennox Island during construction activities. Accident prevention and protection of public safety will be of particular concern during construction phases; and,

To minimize the likelihood and severity of the occurrence of accidents and malfunctions occurring the following mitigative measures and environmental management components plans shall be developed and implemented.

- An Emergency Response and Spill Contingency Plan shall be implemented during all construction activities dealing with procedures related to re-fueling of construction machinery, storage and handling of hazardous materials. See Mitigation Measures for Soil located in Section 6.2.1.
- A traffic management plan shall be prepared for diverting traffic away from construction areas, for coordinating flow of construction traffic to and from Lennox Island, and for restricting public access from active construction sites.
- A Health and Safety Management Plan dealing with specific procedures and protocols for working around construction sites shall be prepared. It is recommended that location of other utilities rights-of-way and structures are clearly identified and barricaded (as is the case of Maritime Electric power transmission poles or underground services on Lennox Island) in the field prior to equipment mobilization. Development and implementation of this plan shall be the responsibility of Lennox Island's contractor.

6.4.2 Operations Phase

During the operations phase of the Lennox Island Water system the potential risk for accidents and malfunctions will be minimal. The potential exists for a spill or release of the disinfection compound (i.e. chlorine) during the storage and transportation of the product within the vicinity of the pump control building. However, the likelihood of an accidental release of disinfection compound is considered minimal, recognizing that the

province has safety requirements for the storage and handling of chlorine in accordance with the Workplace Hazardous material Information System (WHIMS) and Workers Compensation Board (WCB) Regulations. Furthermore since the site of chlorine storage and use is greater than 50 m from the Malpeque Bay and because the topography of the island at this point is relatively flat, a potential spill or release of chlorine to the ground would be unlikely to travel to the Malpeque Bay.

6.4.2 Decommissioning Phase

During the decommissioning phase the potential risk for accidents and malfunctions will be minimal. Potential accidents and malfunctions that could occur during the decommissioning phase of the project include the following:

- Insufficient infilling and capping of wells which may present a direct pathway for contaminants to enter the aquifer;
- Spills and releases of fuels, hydrocarbons (i.e. hydraulic oil, motor oil, etc.), or antifreeze from construction machinery;
- Accidents involving motorists, recreation enthusiasts, and the general public entering and leaving Lennox Island during decommissioning activities. Accident prevention and protection of public safety will be of particular concern during the decommissioning of the water reservoir; and,
- Accidental release of disinfection compounds during the removal of chlorination equipment and associated supplies.

To minimize the likelihood and severity of the occurrence of accidents and malfunctions occurring the following mitigative measures and environmental management components plans shall be developed and implemented.

- An Emergency Response and Spill Contingency Plan shall be implemented during all decommissioning activities dealing with procedures related to re-fueling of construction machinery, storage and handling of hazardous materials. See Mitigation Measures for Soil located in Section 6.2.1.
- A traffic management plan shall be prepared for diverting traffic away from work areas, for coordinating flow of construction traffic to and from Lennox Island, and for restricting public access from active work sites.
- A Health and Safety Management Plan dealing with specific procedures and protocols for working around construction sites shall be prepared.

INAC's Conclusion and Significance of Effects
Taking into account the limited scope of the project and the fact that the project will follow established construction, operational and decommissioning techniques, INAC has concluded there are no predicted significant effects associated with accidents, malfunctions and adverse conditions.

6.5 Cumulative Environmental Effects

6.5.1 Existing/Anticipated Projects and Activities

Lennox Island Wastewater Treatment Facility
The construction of the wastewater treatment facility is nearing the completion stage. In the summer of 2006 all existing residences were tied into the sewage distribution network and their individual septic systems were decommissioned. There remains some minor works to be completed such as decommissioning of sediment control structures.

Canada Games 2009
Lennox Island First Nation will be hosting Wrestling during the 2009 Canada Summer Games. An assessment of the needs of the Games and the cost of bringing the existing facility up to the Canada Games standard has resulted in the proposal to construct a new Band Office and Canada Games facility.

The Canada Games facility must be completed for a national wrestling event during the summer of 2008, which will require that construction begin in 2007 at the latest. The facility will be constructed to a C-2000 standard behind the current Band Office. After the 2009 Canada Games facility is completed, the current Band Office will be dismantled and - if possible - re-assembled as a storage facility at another location on Lennox Island.

Renewable Energy
A number of renewable energy and energy efficiency projects are currently underway. Wind Testing has been taking place on Lennox Island since June 28, 2004. Lennox Island is currently reviewing its options for proceeding with a Wind-related development.

A model renewable energy centre is being proposed in concert with the "Innovation and Technology Partnership." The model centre would demonstrate and apply on number of renewable energy technologies for public demonstration and monitoring.

6.5.2 Cumulative Effects on Groundwater
Land use activities within the watershed have been considered to interact cumulatively with the project. For example the use of fertilizer or pesticides on the nearby baseball field, home lawn care products, above ground fuel storage tanks, upset underground storage tanks, etc. may all have a negative impact on the groundwater. Conversely the recent decommissioning of private septic system and the use of a central wastewater treatment facility will have a positive effect on groundwater.

Grouting will be used as a shield for the wells in order to prevent the contamination of groundwater by surface water run off. The grouting shall extend from the base of the casing to a point below the pitless adapter level (approximately 13 m). Disinfections by chlorination will ensure the water is safe and potable.

The preliminary Well Field Protection Plan will identify potential hazards and capture zones so that best measure practices can be incorporated. This plan should be followed by a public awareness campaign, formal designation of groundwater protection areas, development of groundwater protection measures, and contingency and emergency response planning. Groundwater protection measures may include non-regulatory measures, such as public education, best management practices and/or regulatory measures such as land use planning. Additionally, consideration should be given to restricting the types and quantities of chemicals or other compounds of concern used within the groundwater protection areas.

At present there are no planned activities for Lennox Island that will result in additional water extraction from the aquifer.

Considering that the older distribution network and exposed wells will be decommissioned and newer more controllable system will take its place in addition to a modest growth rate of population it is not expected than any negative cumulative effects will occur as a result of the project.

6.5.3 Cumulative Effects to Surface Water

Land use activities within the watershed or within the drawdown core for the well field were considered to interact cumulatively with the project. For example, forestry or other vegetative clearing activities may accelerate surface water run-off. The area disturbed as a result of this project will be stabilized via best management measures such as silt fences until sufficient vegetation has grown to ensure natural stabilization. Therefore, no negative cumulative are predicted.

6.5.4 Cumulative Effects of Sediment Transport in Watercourses

The amount of exposed soil associated with the recent Wastewater Treatment project has been kept to a minimum and in most cases re-vegetation has already occurred. There may be other potential future construction projects and land use activities, which may result in sediment generation that may also occur during the life of the project. Since the spatial extent of the Water Supply Upgrade Project is relatively small and established neat management practices will be employed to protect watercourses from sediments during construction, and operation if required, no impacts to aquatic habitat will occur. The amount of sediment transport in any watercourse is expected to be minimal as a result of the project. Therefore, no cumulative effects are predicted.

6.5.5 Cumulative Effects on Forest Habitat

The amount of forest cover lost in the completion of the well field will be less than one-half km^2, as the well field development will take place in a previously disturbed area. A potential loss of forest habitat will result in the creation of additional edge habitat. Furthermore, this specific type of forest habitat is not unique and is widely available in the surrounding locale. When considering walking trail routes, the development of the wastewater treatment facility, as well as forestry land use the cumulative effect of the water supply project is only slightly additive and is socially acceptable, therefore no cumulative effects are predicted.

INAC's Conclusion and Significance of Cumulative Effects

Potential cumulative effects are assessed and summarized in section 6.5 of this report. No significant cumulative effects (i.e. past, present and likely future projects) are predicted to affect the groundwater, surface water, sediment transport in watercourses or forest habitat in the long-term as a result of the project. Furthermore, taking into account that there are no predicted effects that may result from the proposed construction activities, INAC has concluded that the project is not likely to result in significant cumulative effects.

6.6 Capacity of Renewable Resources

In the context of this CSR the only renewable resource that is identified as being in jeopardy of being unsustainable is groundwater. As indicated earlier in this document the proposed system has been designed to provide a continued supply of high quality water, in addition to the volume of water required for increased fire protection. In particular the project will increase the capacity of ground water extraction in excess of 300%, however, it is expected that the actual extraction will never reach the maximum capacity. Never the less care must be taken to ensure the sustainability of this renewable resource.

A professional opinion from the PEIDEEF Water Management Division (Somers, 2006) elucidated that when considering average water flows the land available for recharge would appear to represent a small (~ 10%) of estimated annual recharge. Furthermore even if it is assumed that only 20% of the Lennox Island area represents the effective recharge of the proposed system, anticipated water demand is still only in the range of 33% of estimated annual recharge.

JWEL (2006) also presented a professional opinion on the capacity of the groundwater resources available on Lennox Island. In their professional opinion it was determined that the long term planning considerations would require extraction of approximately 15% of the total available annual recharge for the entire island. Therefore there should be more than sufficient groundwater resources on the island for the desired demand if the wells are strategically spread out across the island.

The available data supported by the professional opinions presented above indicate that there is sufficient annual recharge of the groundwater to ensure the long-term capacity of this renewable resource. A second potential impact that may affect the capacity of the resource is the potential for saltwater intrusion. As per JWEL's recommendation for

wells to be strategically spread across the island the current proposed plan identifies a well array in keeping with this recommendation. Saline intrusion is highly dynamic and remediation in the event of unacceptable salinity levels would involve reducing the pumping rate of the identified well. This reduction would result in acceptable water quality. Further distributing continuous pumping over several wells would reduce the saline intrusion risk. To further support this conclusion close monitoring of the well field will be conducted for the first two years of operation to properly characterize seasonal trends and to establish a proper water extraction plan. There is no reason to believe that given proper care and control of the system and by extension the available water, that the sustainability of this resource is not achievable.

7.0 CONSULTATIONS

In order to fully investigate the nature and extent of the potential impacts of the project, a number of Federal and Provincial Agencies, along with the public were provided with the opportunity to comment on the proposal.

7.1 Public Consultation

A Cultural Resource Survey was conducted in October 2004 on Lennox Island. The survey was performed by Jesse Francis, Manager of the Lennox Island Aboriginal Ecotourism Centre, and involved interviewing 10 elders who were chosen by the Lennox Island First Nation Chief and Council. The principal aim of the survey was to collect traditional knowledge extant within the Lennox Island First Nation community that may indicate the presence of cultural resources within the areas affected by the Lennox Island Water Supply Upgrade project as well as the Wastewater Treatment System Project. All interviewees acknowledged that the projects should proceed and that there were no major issues with the scopes of the respective projects. The two recommendations made during the survey that relate to this project are:

- With regard to cultural resources, the project may go ahead in the areas planned, as planned.
- Contractors and their staff, particularly those who operate excavators, should be trained in the recognition of cultural resources, and have knowledge of what to do in the event that such resources are unearthed.

Pursuant to subsection 21(1) of CEAA, on February 2, 2006, INAC invited the public to comment on the Draft Scoping Document for the Water Supply Upgrade. The following actions were taken:

- A Public Notice was posted in the Voix Acadienne Newspaper on February 1st, 2006.
- A Public Notice was posted in the Guardian Newspaper on February 2nd, 2006.
- Flyers of the Public Notice were delivered to the 92 residences and 10 businesses on Lennox Island via Canada Post on February 15, 2006.

The Draft Scoping document included:

- A general project description
- A description of the CEAA process
- The scope of the environment assessment for the proposed project

The public comment period closed on February 21, 2006. There were no public comments received and as of August 1st, 2006, there have not been any public comments received pertaining to the project as a whole.

The Agency administers a Participant Funding Program that supports individuals and non-profit organizations interested in participating in EAs. The Agency was prepared to provide up to a total of $10,000 in participant funding, should this EA proceed as a CS. The Agency's notification period of the availability of participant funding was February 1st and 2nd to 21st, 2006; no applications were received.

7.2 Expert Advice

The following federal agencies were contacted pursuant to the *Regulations Respecting* the *Coordination by Federal Authorities of Environmental Assessment Procedures and Requirements* 5(1):

- Fisheries and Oceans Canada – Habitat Management Division
- Environment Canada
- Health Canada
- Natural Resources Canada (NRCan)

Federal Authorities were asked if they had a Section 5 trigger under CEAA that would make them a joint RA with INAC or if they had Section 12 expert advice to offer with regard to the project. Of the above-mentioned departments none have indicated that they would be an RA. Fisheries and Oceans Canada – Habitat Management Division, Environment Canada, NRCAN and Health Canada indicated that they had expert advice to offer.

Government Consultation:
Mr. Don Maynard, PWGSC, Senior Environmental Specialist
Mr. Ian McKay, PWGSC, Environmental Specialist
Mr. Peter Curley, PWGSC, Environmental Officer
Mr. Bob Robins, PWGSC, Project Engineer
Ms. Trish King, PWGSC/INAC, Civil Engineer
Mr. Jerry Wolchuck, INAC, Environmental Protection Officer
Ms. Vanessa Rodrigues, CEAA, Senior Program Officer
Ms. Cheryl Benjamin, CEAA, Senior Program Officer
Mr. Tony Henderson, Health Canada, A/Environmental Assessment Coordinator
Ms. Allison Denning, Health Canada, Regional Environmental Assessment Coordinator
Mr. Craig Wakelin, Env. Health Officer, First Nations & Inuit Health Branch, Health Canada
Ms. Sarah Olivier, NRCan, Environmental Assessment Officer
Mr. Wade Landsburg, DFO-HMD, Major Projects Manager
Ms. Carol Godin, DFO-HMD, Habitat Assessment Biologist
Ms. Jacqueline Ginnish, EC, Environmental Assessment Officer
Mr. Don Bourgeois, EC, Water Quality Specialist
Dr. Al Hanson, Canadian Wildlife Service, Wetland & Waterfowl Ecologist
Mr. Barry Jeffery, EC, Environmental Assessment Analyst
Mr. Marc Sheeran, EC, PEI Representative

Mr. Greg Wilson, PEIDEE, Environmental Assessment Coordinator
Mr. Delbert Reeves, PEIDEE (Water Management), Approvals/Reg. Compliance Eng.
Mr. Yefang Jiang, PEIDEE (Watershed Management), Watershed Hydrogeologist
Mr. Morley Foy, PEIDEE (Water Management), Approvals/Reg. Compliance Engineer
Mr. George Somers, PEIDEE, Drinking Water Management Section Manager
Mr. Harry Holman, PEIDCCA, Director of Culture and Heritage
Ms. Tiffany Sark-Carr, Director of the Lennox Island Mi'kmaq Cultural Center
Mr. Matthew McGuire, Director/EDO of Development and Growth
Chief Darlene Bernard, Lennox Island Band Council

Private Industry Consultation:
Mr Peter Joostema, Jacques Whitford Environmental Limited, Area Manager – PEI
Mr David MacFarlane, Jacques Whitford Environmental Limited, Hydrogeologist
Mr. John Redden, CGI, Fire Underwriters Survey Specialist
Mr Bill Hogan, Charlottetown Fire Department, Fire Services Manager
Mr Luc Van Hul, Delcom Engineering, P. Eng
Mr Clark Baglole, Delcom Engineering, P. Eng

CEAR Registry # 06-03-17002

8.0 FOLLOW-UP

The purpose of the follow-up program, as defined by CEAA, is to verify the accuracy of the environmental assessment and to determine the effectiveness of any mitigation measures that have been implemented. Furthermore the follow-up program is required under Section 38(2) of the Act, which states that the RA shall design a follow-up program for the project and ensure its implementation.

All construction activities associated with the project are standardized procedures with well-documented mitigation techniques. Since the project does not involve unproven mitigation techniques, follow-up will consist of implementing the following effects monitoring activities:

- Visual monitoring will be conducted in adjacent wetlands to assess impacts, if any, on the wetland from the operation of the well field.
- Groundwater draw down and water quality monitoring will be conducted to establish a correlation with pumping rates, precipitation and seasonal trends. This will involve regularly measuring the water levels in the monitoring well network installed around the well field in addition to collecting water chemistry samples.
- Prior to disturbance of natural areas a qualified biologist will survey the project site to ensure there are no wildlife or birds species that may be disrupted or negatively affected by construction activities. Should any species of concern be identified monitoring will take place for the duration of potentially disturbing

activities to ensure there are no significant adverse effects and to ensure compliance with the Migratory Bird Act.

- Prior to disturbance of natural areas a qualified biologist will survey the project site to ensure there are no rare or endangered species that may be disrupted or negatively affected by construction activities. Should any species of concern be identified monitoring will take place for the duration of potentially disturbing activities to ensure there are no significant adverse effects.

Information on the follow-up program will be posted on CEAR under project # *06-03-17002* when it is available. The proponent must provide site access to Responsible Authority officials and/or its agents upon request.

9.0 CONCLUSION

The primary concern with the Project remains the possibility for salt-water intrusion of the aquifer, which potentially may result in diminished water quality for the First Nations community of Lennox Island. To date there have been two separate water investigations preformed in the vicinity of the well field and neither have resulted in salt-water intrusion. However, it should be noted that neither of these investigation have simulated a worst-case scenario, which would likely be the recharging of the reservoir following a fire event.

Throughout the Comprehensive Study process experts in the fields of Aquifer Production and Drinking Water Quality have been consulted. It is the opinion of all experts consulted that the proposed project for Lennox Island is viable and that the sustainability of the resource if achievable given frequent monitoring and care. Upon commissioning of the proposed well field a pump test will be conducted to simulate the filling of the water reservoir. This test will provide integral information regarding the requirement for and possible establishment of a water extraction plan. Additionally, regular static water level readings and water chemistry data should be collected for a period of no less than two years upon commission of the water system. This information will provide insight into typical seasonal trends and supplement the information from the above noted pump-test.

Clearly, this project relates to the First Nations Water Management Strategy and as such INAC and the Lennox Island Band Council will be responsible for the care and control of the system. In adapting the pre-described protocol following the commissioning of the system the sustainability of the resource, the continued supply of high quality drinking water and the added volumes of water for increased fire protection are a sound and viable solution.

The follow-up program, which includes the monitoring of wetlands, birds and bird habitat, rare and endangered species and the water resources will provide increased site-specific information and identify any cause and effect relationships before they can develop to such appoint as to jeopardize natural areas, the quality of water or the resource. Therefore, INAC concludes that significant adverse environmental effects are unlikely taking into account mitigation measures described in this report. Furthermore, INAC concludes that there are no predicted residual significant adverse environmental effects associated with this project.

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APPENDIX A
Archeological Protocol

Protocol for discovery of archaeological resources

Discovery of Archaeological Resources OTHER than Human Remains:

Identification

All construction personnel are responsible for reporting any unusual materials unearthed during construction activities to the Construction Supervisor.

Stop Work

In those situations where the find is believed to be an archaeological resource, the Construction Supervisor will immediately stop work in the vicinity of the find and notify his immediate supervisor.

Investigation

A licensed or provincially approved archaeologist will immediately investigate the find and if it is determined to be an archaeological artifact or feature must consult with the Director of Culture and Heritage of the Department of Community and Cultural Affairs (902) 368-4784.

Mitigation

An appropriate mitigation strategy will be developed and implemented in consultation with the Department of Community and Cultural Affairs. If the archaeological resource is, or appears to be of aboriginal origin input may be sought from First Nation representatives, typically from the closest First Nation community.

No person, other than one authorized by the Minister responsible for the Department of Community and Culture Affairs may move, destroy, damage, deface, obliterate, alter, add to, mark or in any other way interfere with an archaeological resource.

Resuming Work

Work can only resume in the vicinity of the find when authorized by the Environmental Manager and/or the Construction Manager once clearance has been received from the Department of Community and Cultural Affairs.

Applicable Legislation

Prince Edward Island Archaeological Sites Protection Act, expected to be replaced by the Archaeology Act following the fall 2006 session of the P.E.I. legislature.

Agencies Involved

The Department of Community and Cultural Affairs.

Discovery of Human Remains, or Evidence of Burials:

Human remains will basically fall into the following three categories:

- **Legal evidence**

All human remains that are discovered should be initially treated as potential legal evidence associated with a criminal act and treated as such.

- **Historic Cemeteries and Family plots**

These include human remains buried in currently neglected and overgrown early twentieth century cemeteries and family plots. Living relatives or descendants may exist.

- **Archaeological remains**

Archaeological human remains include pre-contact human remains and historic period remains that were interred as a result of religious/social burial practices. Pre-contact human remains may occur as a single burial or as multiple burials such as unrecorded First Nations burial sites. Historic period archaeological human remains typically occur in historic cemeteries and long forgotten (pre-twentieth century) family plots.

Protocol to Follow in the Event of Discovery of Human Remains, or Evidence of Burials:

Halt all Activities

Halt all activities in the vicinity of the human remains at once. Until determined otherwise, the remains should be treated as evidence in a criminal investigation. If the remains are found in the bucket of heavy equipment, the bucket should not be emptied as physical evidence may be destroyed.

Secure the Area

The area should immediately be designated as Out of Bounds to all personnel and the public. Depending on the weather and other conditions, the human remains discovered should be provided with non-intrusive protection, such as covering with a cloth or canvas tarp (non-plastic preferred). All personnel and traffic should exit the site by one common non-intrusive path. Curiosity seekers should be kept off the site.

Inform the Lead Police Agency (RCMP or municipal police force)

The nearest detachment of the lead police agency must be informed immediately. For reasons of site security and sensitivity, it is recommended not to use a cell phone. Upon verbal description of the situation the lead police agency may dispense with a site visit to view the site/remains. Typically, the lead police agency is on the scene in less than 24 hours. The lead police agency will make a decision as to whether the Coroner and/or the Department of Community and Cultural Affairs should be involved.

The lead police agency specialists may be called to determine if the situation is associated with a crime or an archaeological feature. If it is determined that the site is related to a crime, the lead police agency specialist will inform the Coroner, collect data, and remove the remains.

If the lead police agency determines that the site is NOT related to a crime, then the Director of Culture and Heritage of the Department of Community and Cultural Affairs is to be consulted at (902) 368-4784 to determine the proper course of action in consultation with stakeholders.

If the Department of Community and Cultural Affairs determines that the human remains are not associated with an archaeological feature but still have to be removed, certificates of removal are required from the Coroner's Office and possibly the Chief Medical Officer of Prince Edward Island.

Resuming Work

Work can only resume in the vicinity of the discovery once clearance has been received from the authorities and agencies concerned.

Applicable Legislation

Prince Edward Island Archaeological Sites Protection Act, expected to be replaced by the Archaeology Act following the fall 2006 session of the P.E.I. legislature.

Criminal Code of Canada: Section 182(b) states: *"Every one who improperly or indecently interferes with or offers any indignity to a dead human body or human remains, whether buried or not, is guilty of an indictable offence and liable to imprisonment for a term not exceeding five years."*

Agencies Involved

Depending on the circumstances surrounding the discovery of human remains, several agencies may be involved and include:

- **Lead police agency (RCMP or municipal police force)**

  The lead police agency will decide what course of action to initiate.

- **Coroner's Office**

  The Coroner's Office may become involve in criminal investigations and in determining the cause of death.

- **Chief Medical Officer's Office**

  The interest of the Chief Medical Officer relates to health issues, specifically communicable diseases.

- **The Department of Community and Cultural Affairs, Government of Prince Edward Island**

If it is determined that the human remains are not associated with a criminal act or recent mishap, The Department of Community and Cultural Affairs will be consulted to determine the proper course of action. Pre-contact burials are an extremely sensitive issue and will require the involvement of First Nation representatives, typically from the closest First Nation community.