

On-site Water & Wastewater System Research

Summary Of Volume I “Long-Term Water And Wastewater Servicing Study, September 2009” [1]

Supervisor: Mrs. Tracey Allen  
 Written by: Maher Ellaz  
 North Shore Municipality, PEI, Canada

VOLUME I: COMMUNITY PROFILE

1. General

1.1. Introduction

Information utilized in the study was collected from different sources including North Shore Council, the Administrator or residents. Also through a resident survey, which was only completed by 29% of all property owners. Other information and data was gathered from a range of PEI government entities and websites

2. Natural features

2.1. Location

The Community of North Shore is located in Queens County northwest of Charlottetown on the northern shore of PEI. It encompasses 92 sq. km of land.

2.2. Climate

PEI climate can be described as to be controlled continental air masses that are affected by the surrounding waters of the Gulf of St. Lawrence. Winter temperatures range from -3° to -11° degrees C. While summer temperatures range from 20° to 32° C. Precipitation is distributed over the year, with an average rainfall of 868 mm and snowfall of 340 mm.

2.3. Population & Cultural Characteristics

2.3.1. Population

The Community falls inside the Statistics Canada Census Agglomeration of Lot 34.

Table 2: Population by Age (2006 census)

Age Group	Total	% Total
0-14	440	18.70%
15-24	315	13.40%
25-44	665	28.20%
45-54	370	15.70%
55-64	280	11.90%
65+	285	12.10%

2.3.2. Cultural Characteristics

97% of the population is Canadian born with 1% aboriginal.

2.4. Economic Characteristic

2.4.1. Employment

Rate of employment 70.6% and unemployment rate of 10.0%. With a median income of \$61,978, above the PEI median of \$54,800.

2.4.2. Industries and occupations

Largest industries were other services, business services and retail trade. With primary population employment fields in business finance and administration.

2.4.3. Community Finances

Municipal tax rate is \$0.16/\$100 of assessed value for residential properties and \$1.5/\$100 for commercial properties.

2.5. Land use

2.5.1. General

60% of properties are residential, 40% for seasonal use only, 2% commercial, 1% institutional/government and 37% vacant (undeveloped land).

Table 1: Building Permits Analysis

Permit Description	2006	2007	2008	Average/Yr	Range
Single Family Dwelling	13	9	21	14	9 to 21
Seasonal Dwelling	3	4	7	5	3 to 7
Other (outbuilding, garage, addition, deck, etc.)	10	14	16	13	10 to 16
Subdivision Approval Greater than four Lots	0	2	0	1	0 to 2
Total:	26	29	44	33	

2.6. Hydrological and Physical Features

2.6.1. Topography & Drainage

Rural, agriculture setting with economic activity primarily revolving around farming, fishing and tourism. Topography comprises of rolling hills with slopes between 3 to 7 %. There are five sub-watershed areas identified being Parsons Creek, Auld Creek, Black River and McCallum Creek.

2.6.2. Surface Water

Routine water sampling in the Brackley and Covehead Bays has been conducted annually since 200 as part of the PEIDEEF annual estuaries water quality survey. The water has

been routinely recorded as “anoxic” (oxygen depleted).

Nitrate levels in Covehead Bay have been higher than those in Brackley, due to more agricultural land-use activity.

In 2002 the PEI Agricultural Crop Rotation Act was introduced. Stating that land parcels larger than 1 hectare (2.5 acres) with slopes of 9% or more should either not be planted with regular crop, or if planted requiring approved management plan.

2.6.3. Groundwater

All domestic wells in the community tap the same fractured sandstone bedrock aquifer. Known as PEI Redbeds. Some investigation reported saltwater intrusion, elevated nitrates, presence of e-coli and fecal coliform attributed to failing septic systems. *Water quality is of a particular concern in the densely populated Stanhope Peninsula*, attributed to dense development on small lots, and the presence of old and *poorly maintained* septic systems.

3. Existing Wastewater Infrastructure

3.1. Existing On-site Infrastructure

On-site Sewage Disposal System (OSSDS) services the properties in the North Shore. With reports of well contamination resulting from failing septic systems.

3.1.1. Service Area, Number of Systems

The majority of existing OSSDS in the area utilize gravity multiple trench disposal field. The next most common system is the gravity HDPE leaching chamber disposal field, approved for use on PEI since 1991. Contour (C1 & C2) disposal fields are the third most common type.

Table 3: Minimum Required Septic Tank Capacity

# of Bedrooms	Minimum Capacity (Litres)	Minimum Capacity (Igals)
2 or less	2040	450
3	2725	600
4	3400	720
5	4090	900
6	4540	1000
7	5000	1100

3.1.2. Minimum Lot Size

The Community has enacted a by-law, which requires any new building lots to be **4047m<sup>2</sup>** (1 acre) **minimum** lot size (2004 Official Plan). Exceeding the minimum required lot size under the Planning Act Regulations for Category I and II lots.

44% of the developed properties do not meet the minimum requirement (2322.5 m<sup>2</sup>) by PEI Sewage Regulation. And 57% of the undeveloped lots don't meet the minimum lot size of 4047m<sup>2</sup> required in the North Shore Community By-laws.

3.1.3. Septic System Ownership/Management

Most septic systems in the Community are owned, operated and maintained by homeowners. Residents Survey showed that 80% when asked, would like to participate in a community-based inspection and pumping programme for septic systems.

Table 4: Minimum Lot Sizes for On-site water and wastewater systems

Minimum Standard	Category I	Category II	Category III	Category IV	Category V
Minimum Lot Area	35,000 sq.ft. (2322 sq.m)	35,000 sq.ft. (3252 sq.m)	51,000 sq.ft. (4738 sq.m)	75,000 sq.ft. (6975sq.m)	Not Developable
Minimum Circle Diameter	150 ft (45.7 m)	175 ft (53.3 m)	225 ft (68.6 m)	300 ft (91.5 m)	N/A
Minimum Lot Frontage	100 ft (30.5)	100 ft (30.5)	100 ft (30.5)	100 ft (30.5)	N/A

4. Existing Water Supply Infrastructure

4.1. Central or Cluster Systems

Three largest central service wells are the Stanhope Campground, the Stanhope Peninsula Port Authority and Covehead Development Incorporated (CDI). CDI central water supply has three wells, and is planned for a build-out of 150 homes in MacMillan Point area.

A study carried by CBCL in 2000 (updated in 2007) proposes a new central water supply to be located at the southern end of Stanhope Lane near the Bayshore Road intersection. Providing potable water to residents of the Stanhope Peninsula, while all other water supplies to be decommissioned upon completion of the proposed system.

Where the system's design was based on seasonal peak daily yield estimates, requiring a capacity of 600 usgpm.

4.2. Individual wells

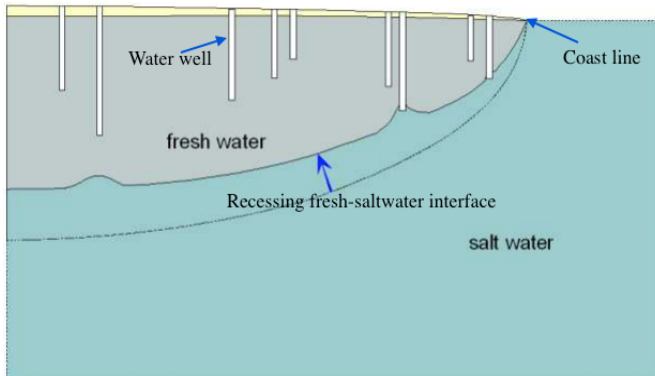
Individual wells reportedly yield between 1,600 to 16,000 Lpd. With a well depth range from 25 to 37 meters (80 to 120 feet) and an average static water level depth of 8 meters below grade.

A peak summertime population of 1,352 with an increase of year-round population increase in the peninsular area was estimated.

However, the development is less than half of the estimated long-term sustainable yield of the aquifer for the peninsula, during peak times of the year. If the withdrawal were to exceed the amount of annual recharge, causing saltwater intrusion to intensifies adding on the natural environmental factors.

Some wells in that region maybe located too close to the shoreline where freshwater lens is too thin to be extracted effectively without pumping some of the saltwater.

*these current minimum construction standards, but are still used as potable supplies.*



**Figure 1: Fresh-saltwater intrusion lens**

### 6.3. Wellfield protection

The province develops groundwater flow models and delineates time-dependent capture zones for each municipal wellfield. Any central water supply developed for the community will require the delineation of protection zones and the preparation of an associated Wellfield Protection Plan.

### REFERENCES

[1]: *Long-Term Water & Wastewater Servicing Study, Volume: 1. By Engineering Technologies Canada Ltd. September 2009*

## 5. Existing Wastewater Management

### 5.1. Centralized Sewers and Cluster Systems

The central sewer system at the PEI National Park falls under the jurisdiction of Public Works Canada. Where any new central wastewater system must comply with the Atlantic Canada Standards and Guidelines Manual for the Collection, Treatment and Disposal of Sanitary Sewage and with the Environmental Act, 2009 Sewage Disposal Regulations.

### 5.2. On-site Sewage Systems

The minimum standards for the construction of OSSDS are regulated under the PEI Environmental Act, Sewage Disposal Regulations and the PEI Planning Act, Subdivision and Development Regulations.

## 6. Existing Regulatory Environment

### 6.1. Centralized Water and Cluster Systems

New construction of centralized or cluster systems would require approval under the PEIDEEF under the Water Well Regulations Act.

### 6.2. On-site Wells

Government regulations include minimum setbacks of 50 feet from any domestic well to any septic system, as well as construction standards, which require 40 feet of protective steel casing. *Many of the domestic wells in the community don't meet*