Assessment Studies of Water and Wastewater Systems and Associated Water Management Practices at Lennox Island First Nation Lennox Island, PEI (Site #06003) Atlantic Region

For
Indian and Northern Affairs Canada
Atlantic Region

By
MGI Limited
Fredericton, NB

March 2002

1.0 Overview

MGI Limited was retained by Public Works & Government Services Canada on behalf of Indian and Northern Affairs Canada to conduct an inspection of the water and wastewater system of the Lennox Island First Nation community located in Lennox Island, PEI. As homes in the community obtain their potable water supply by either private wells and/or a community water supply and individual septic systems for sewage services the following methodology was used:

1) Review of available data from Indian and Northern Affairs Canada and Health Canada;
2) Liaison with Lennox Island First Nation community representative to schedule a site visit;
3) Site visit and interview with community representative (i.e. Chief, Community Health Representative, etc.);
4) Physical inspection of community infrastructure;
5) Discussion with local well driller and septic system installers on general bedrock conditions, water levels, when necessary for supplemental information; and
6) Draft and final report preparation discussing risks and possible mitigation if necessary.

Provided below is background information on the Lennox Island First Nation community.

Date of Visit:	January 10/11, 2002
Inspector(s)/Interviewer(s):	Troy Small
Site Address:	P.O. Box 134, Lennox Island, PEI, C0B 1P0
Phone #:	902-831-2779
Fax#:	902-831-3153
Tribal Council Affiliation:	St. John River Valley Tribal Council
Chief:	Darlene Bernard
Location:	Lennox Island, PEI
Population:	325 (on-reserve)
# Housing Units:	87

2.0 Water System Findings

2.1 Water Source and Design

The community receives its potable water from three community wells via distribution mains that are maintained by the community. The community is separated into two sections for potable water distribution by a shut-off valve located along Sweetgrass Trail directly north of the Band Office. A total of approximately 5,143 metres of distribution piping consisting of 150 mm diameter PVC water mains, 50 mm diameter PVC lateral water lines and 19 mm diameter PVC residential off-takes service the community. The portion of the community east of the Band Office (Eagle Feather Trail area) is serviced by the "old" pumphouse and two potable water wells located in a residential/commercial area of the community on Eagle Feather Trail. The portion of the community west of the Band Office (Sweetgrass Trail area) is serviced by the "new" pumphouse and one well located in a residential area on Sweetgrass Trail (Figure 2).

The two wells associated with the "old" pumphouse (Well #1 and Well #2) were constructed in 1950 and 1973 respectively. Well #1 is located inside the "old" pumphouse with the top of the well casing being flush with the pumphouse concrete floor. Well #2 is located in the excavated pumphouse building extension area approximately 1.5 metres below grade (refer to pictures in Appendix B). The pumphouse extension area has a dirt floor and the operator noted that this area would freeze prior to the installation of a new furnace in approximately 1999. Well #1 is 150 cm in diameter, reportedly drilled to a depth of 30 metres, and contains a one HP submersible pump. Well #2 is also 150 mm in diameter, was reportedly drilled to a depth of 23 metres and contains a two HP submersible pump. Water from the these two wells is pumped to six pressure tanks (395 litre capacity) located in the "old" pumphouse and then distributed to the eastern portion of the community. The well associated with the new pumphouse (Well #3) was constructed in 1994 by Moore Well Drilling Inc. and is located approximately 20 metres northeast of the pumphouse. Well #3 is 150 cm in diameter, reportedly drilled to a depth of 26 metres and contains a 2.5 HP submersible pump. Although a detailed pump test was not completed on the well, the drillers reported a water yield of approximately 114 litres per minute. Water from Well #3 is pumped to the "new" pumphouse equipped with four pressure tanks (544 litre capacity) that distribute the water throughout the western portion of the community

The pumphouses are not equipped with flow meters or disinfection units although Health Canada has recommended to the band that emergency chlorination units be installed at each pumphouse. The pumphouses are kept locked and the wellheads are secured with screw tightened caps but the areas surrounding the pumphouses/wells are not fenced. There is no groundwater protection area identified or enforced and there are several homes/buildings with private septic systems located within 10 to 50 metres of the community wells. It was noted during the site visit that the most of the homes/buildings in the community also have furnace oil tanks. The "old" pumphouse building is heated using furnace oil and the 909 litre storage tank is located at the northwest corner of the building and does not have any spill containment provisions. There have not been any spills or leaks reported with the furnace oil tank but the tank bottom and sides are severely rusted. An aboveground petroleum storage tank (approximately 13,600 litre capacity) associated with the community school is located approximately 25 metres downgradient of the "old" pumphouse. The tank appears to be in good condition and the area surrounding the tank is fenced. In addition, a ground transformer is located approximately 10 metres to the west of the "old" pumphouse. It is not known if the transformer contains PCBs. It was also noted during the site visit that an engineered surface water drainage ditch is located approximately five to ten metres from Well #3 (between Well #3 and the "new" pumphouse). The drainage ditch originates in a swampy area in the center of the community and flows southwest to Malpeque Bay.

Recent raw water quality data (2000) noted the absence of coliform bacteria in the potable water wells. The available Health Canada data identified two isolated occurrences of total coliform bacteria (below ten counts of total coliform bacteria) in the community distribution system in 1998 and 2000. Recent raw water chemical quality data (June 2000) noted that the community water supply meets the GCDWQ guidelines for maximum allowable and interim maximum allowable chemical concentrations (MAC / IMAC). However, it was noted that the potable water continually exceeds aesthetic objectives for hardness and periodically for manganese. The high risk rating is due to the lack of an emergency chlorination/disinfection system on either of the two systems.

The community does not have any fire hydrants for fire protection or for flushing potentially stagnant water from the distribution mains. The operator noted that when the community Fire Hall (located on Eagle Feather Trail) opens its water valve to fill the community tanker truck that the "old" pumphouse/wells can not meet the increased demands of the community and water pressure decreases in the eastern portion of the community. There is no backup power supply for the community well pump/pressure tanks should there be power outages and there is no alarm system to indicate well pump shut-off or malfunction. There are no emergency back-up well pumps stored on-site and pump replacement requires three days. However, the main shut-off valve located in the Band Office parking lot can be opened in the event of a system malfunction so that one pumphouse/well(s) can service the entire community. It was noted during the site visit that the community is currently accepting design plans for upgrades to the existing water system and for development of a new central wastewater collection and treatment facility.

2.2 Operation and Sample Collection

The band is responsible for the maintenance and operation of the existing distribution system including the installation of new infrastructure. The pumphouses in the community are not equipped with disinfection units and the community does not have hydrants for flushing of the distribution mains. The community does not have operation and maintenance manuals for the system and there are limited spare parts kept on-site. The community does not have an emergency response plan in the event of potable water contamination. The operator noted that new pressure tanks were installed in the "new" pumphouse in 2001. He also noted that a water main break on Indian Feather Path occurs yearly (cause of the break is not known) and is repaired by the operator.

Health Canada conducts monthly bacteriologic sampling at approximately six locations in the community. The presence of coliform bacteria exceeding GCDWQ guidelines (above ten counts) has not been identified in water samples collected from the distribution system. No boil orders have been issued in the community in the last two years. Health Canada also collects water samples twice yearly for chemical analyses. It was noted that the potable water continual exceeds aesthetic objectives for hardness and periodically for manganese.

The Lennox Island First Nation community is equipped with a Coli-Lert unit. The Community Public Works Supervisor/Operator (Angus Sark) collects water samples from four locations (two locations on east side of community and two locations on the west side of the community) in the community. Coliform bacteria were not identified in the community distribution system in December 2001 or January 2002 based on the available community Coli-Lert data. It was noted during the site visit that starting February 2002 the Community Public Works Supervisor/Operator will be collecting water samples from distribution system on a weekly basis for on-site analyses using the Coli-Lert unit. Health Canada will continue to collect water samples from the community on a monthly basis for analyses at an off-site certified laboratory as quality control.

The Lennox Island First Nation community has a designated person responsible for the maintenance/operation of the water system. The operator (Angus Sark) has been operating and maintaining the system for approximately ten years. He is not certified by the ACWWA and has not had any formal training. There is no back-up operator to accept responsibility for the system during vacations and illness. The operator appears to have good knowledge of the overall system operation and the system appears to be well maintained. The fact that the operator has no formal training for water distribution or treatment and there is no back-up personnel represents a high risk situation.

It is noted that the "old" pumphouse building is over 50 years old and should be remodeled/upgraded as the building has exposed electrical wiring, missing interior paneling and the concrete slab foundation is deteriorated.

3.0 Wastewater System Findings

3.1 Wastewater Collection and Treatment

All of the 87 homes in the community have private septic systems. The water system operator is also responsible for the installation and maintenance of the private septic systems in the community. He is not a licensed septic system installer but Health Canada inspects any new installations or upgrades. The operator reported that individual septic systems in the community range from one to 25 years in age and new installations consist of a cement septic tank with approximately 45 to 85 metres of infiltrators. He also noted that soil conditions in the community are predominately sandy excluding the Indian Feather Path and Oapos Trail area (swampy and clay soil conditions). The Indian Feather Path area has raised septic beds due to clay soil conditions in the area. The water table in the community is normally at greater than three metres below surface and bedrock in the area is reportedly greater than 7.5 metres depth.

3.2 Operation

As noted in Section 3.1, the water system operator is responsible for maintaining all the septic systems in the community and responds to any complaints of sewage back-ups. Each septic tank is cleaned approximately every two years or as required using a vacuum truck. The operator reported several systems in the community have recently been upgraded/replaced as the old systems had become degraded and were not draining properly. In approximately 1998, one residence in the Indian Feather Path area had a system with poor septic bed drainage that backed-up into the basement and sewage seeped beneath the finished flooring. The basement flooring was removed based on the recommendations of Health Canada and a new raised septic bed was installed.

4.0 Discussion and Recommendations

As noted in Section 2.1, the community is currently accepting design plans for upgrading the existing water system and for implementation of a new central wastewater collection and treatment facility that should address the issues and recommendations discussed below.

Issue #1 The site visit noted that the community water supply wells are located in a residential/commercial areas of the community with nearby residences/buildings reportedly having private septic systems and furnace oil tanks. In addition, the "old" pumphouse has a furnace oil tank without any spill containment.

Recommendation: Develop a wellhead protection plan to mitigate future water quality impacts.

Issue #2 The two community water systems are currently not being disinfected and on-site disinfection units are not available despite Health Canada recommendations to the band that an emergency disinfection unit (chlorination unit) should be installed at each of the two

pumphouses. Chlorination is effective against bacteria and provides a residual protection within the distribution system with proper dosing. However, chlorination is not effective against cryptosporidium and giardia protozoa that may be present if the surface water infiltrates the potable water wells.

Recommendation: Continuous chlorination via equipment fitted with in-line chlorine residual analysers which control the sodium hypochlorite feed pumps should be provided for the community water system. A ultraviolet disinfection system should also be installed prior to chlorination equipment for cryptosporidium and giardia protection.

Issue #3 The community is currently responsible for the operation and maintenance of the community water distribution system but the water distribution system can not be flushed to remove potentially stagnant water as the system is not equipped with fire hydrants. The operator noted that the eastern portion of the community loses water pressure when the Fire Hall opens their water valve to fill the community tanker truck. There is no backup power supply for the well pumps/pressure tanks should there be power outages and there is no alarm system to indicate well pump shut-off or malfunction. Emergency repair parts are limited and there is no back-up well pumps although the main valve (at the Band Office) can be opened so that one pumphouse/well(s) can service the entire community if required. The community does not have operation and maintenance manuals available for the water distribution system and they do not have an established emergency response plan in the event the community water supply becomes contaminated.

Recommendation: Complete an engineering study to determine accurate fire flow demands and assess water storage capacity required to meet fire flow provision requirements. Complete a well yield study to determine if the existing potable water wells can meet the future water demands of the community. An alarm or detection system should be installed on each well pump to detect shut-offs or malfunctions. Back up power should be available for the well pumps in the case of a power outage and a back-up pump/emergency spare parts should be available for the community well/distribution system. An emergency protocol should be developed to cover At Risk situations for the water system that clearly identify the responsibilities and actions of the operators, Health Canada and Band Council/support persons. Operation and maintenance manuals should be readily available and kept on-site.

Issue #4 The operator has approximately ten years on the job experience and appears to have a good knowledge of the overall system operation but he does not have any formal water distribution or water treatment training. There is no back-up operator to accept responsibility for the system during vacations and illness.

Recommendation: The Band should ensure that there is a secondary operator available during vacations and times of illness. The operator should complete ACWWA Level I Water Distribution and Water Treatment training.

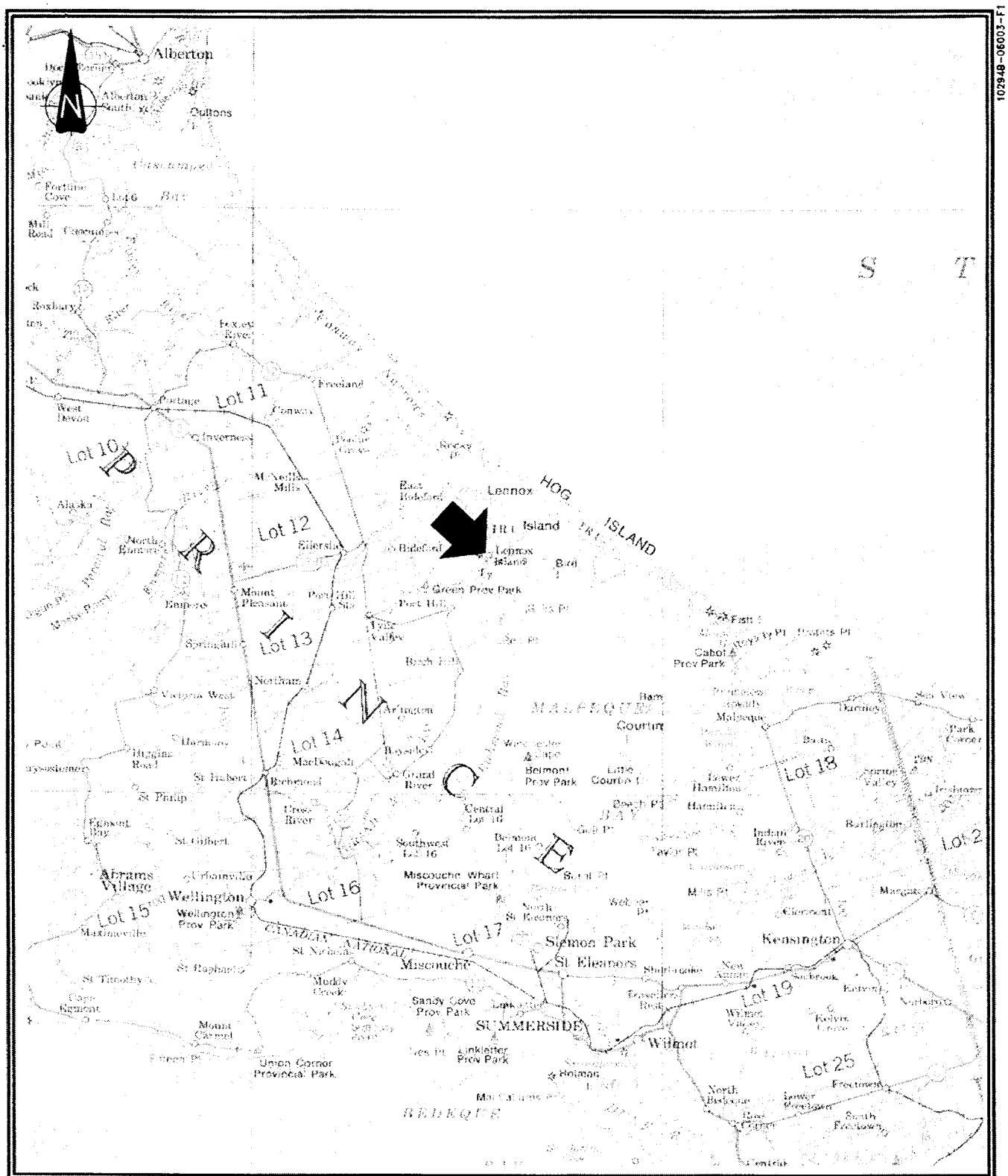
Issue #5: All of the 52 homes in the community have private septic systems. The operator reported historical problems with several systems causing back-ups and one residence required the basement interior finish to be removed (based on the recommendations of Health Canada). There are several homes/buildings in the area of the water supply wells, however recent raw water data did not identify any bacterial contamination at the community wells.

Recommendation: A study should be completed to determine if a community wastewater collection and treatment system is necessary. The study should determine if the soil, groundwater and bedrock conditions in the area are suitable for individual septic systems especially in the vicinity of the potable water wells.

5.0 Conclusions

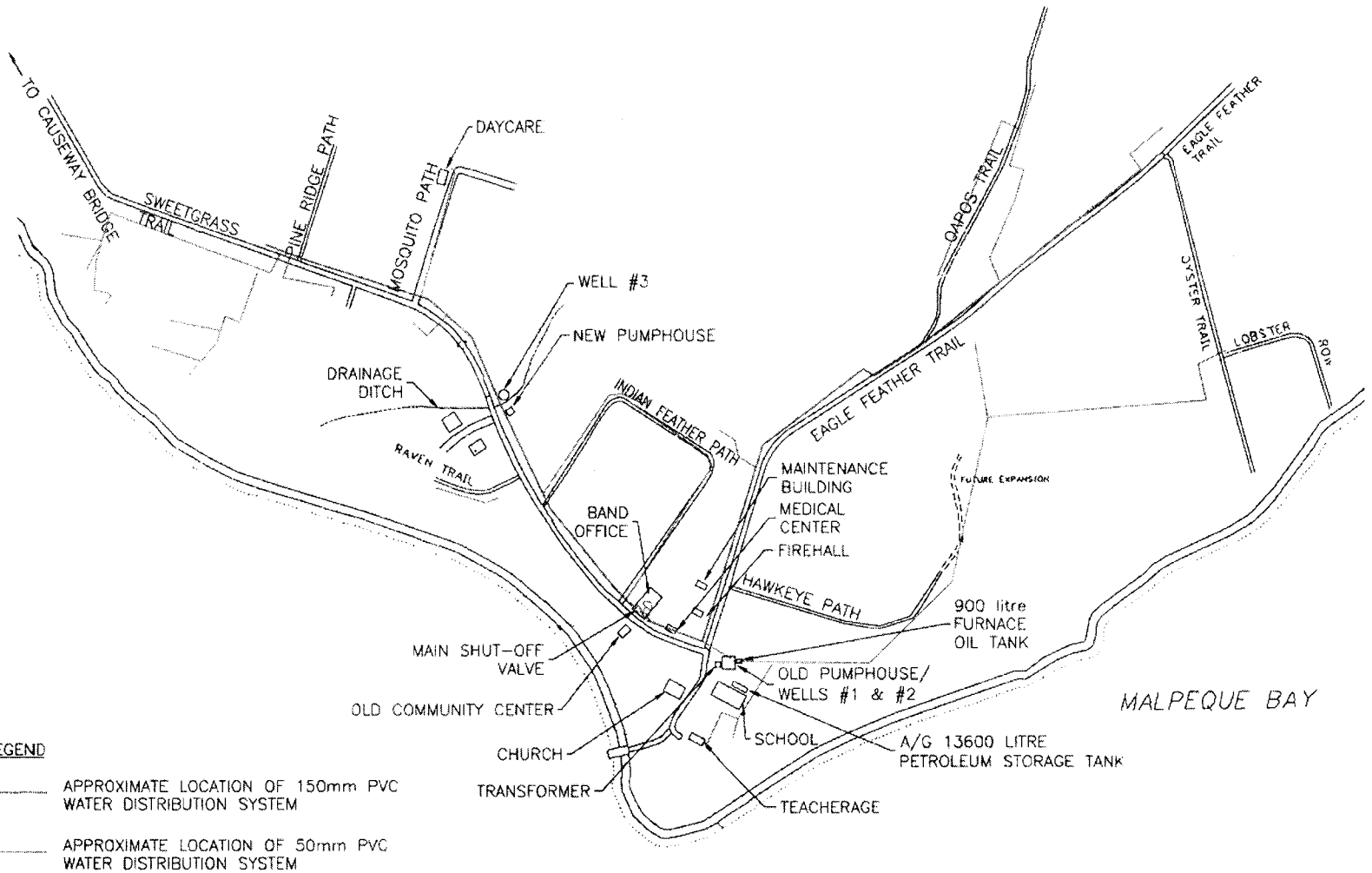
Overall Community Risk Assessment

Water		Wastewater	
A. Water Source	Medium	A. Effluent Receiving	N/A
B. Design	High	B. Design	Medium
C. Operations	Medium	C. Operations	Low
D. Reporting	Low	D. Reporting	N/A
E. Operators	High	E. Operators	Medium
F. Statistical Data	N/A	F. Statistical Data	Medium



MGI A member of the Family of Companies	TITLE: SITE LOCATION (SITE #06003)	DATE: Feb. 2002	PROJECT NO.: 10294B
	PROJECT: ASSESSMENT STUDIES OF WATER & WASTEWATER SYSTEMS ATLANTIC CANADA FIRST NATION COMMUNITIES LENNOX ISLAND FIRST NATION, LENNOX ISLAND, PEI	SCALE: Unknown	FIGURE NO.: 1
		DRAWN: GBS	

10294B-06003-F1



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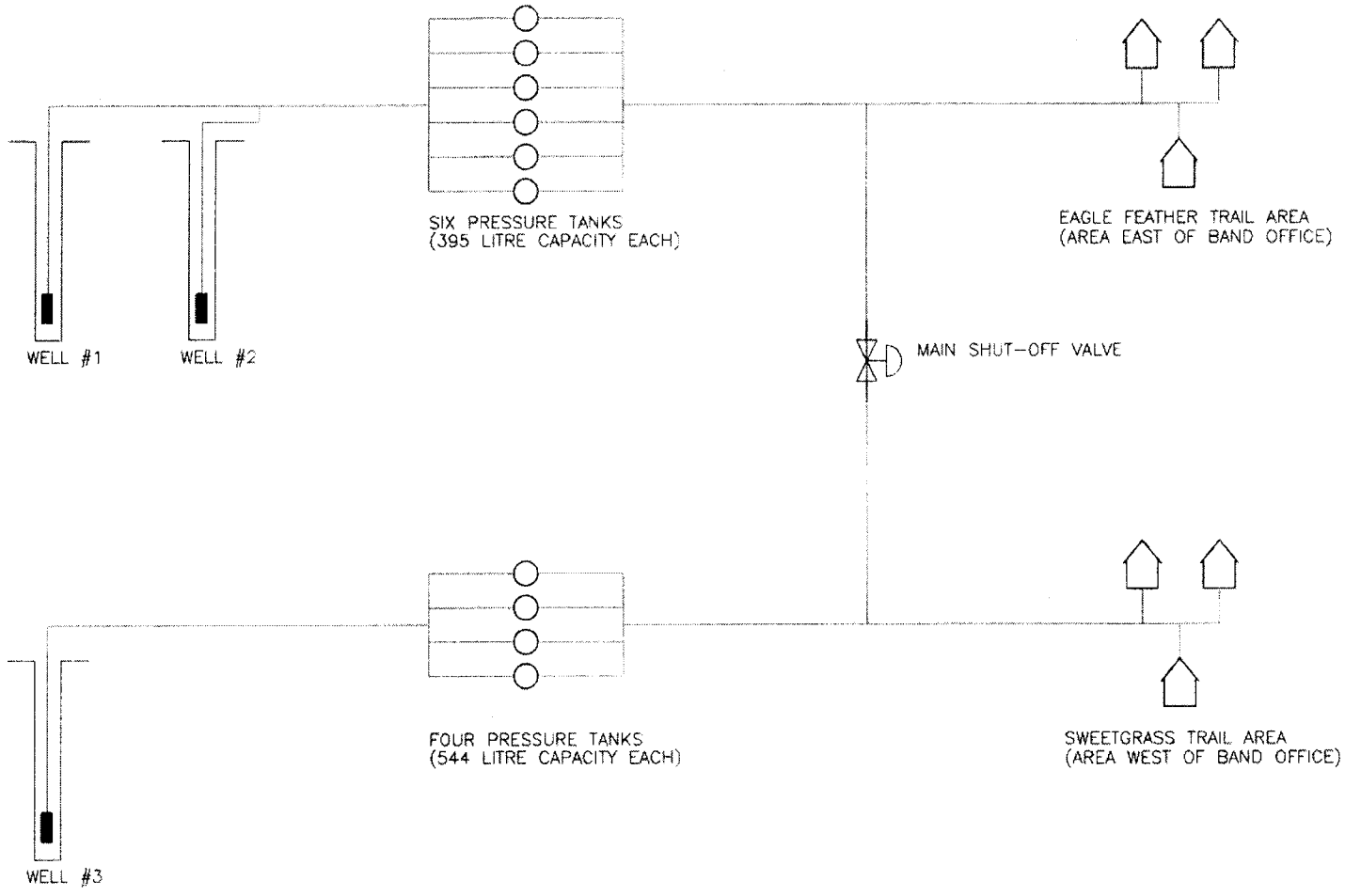
TITLE: SITE PLAN (SITE #06003)		DATE: Feb. 2002	PROJECT NO.: 10294B
PROJECT: ASSESSMENT STUDIES OF WATER & WASTE WATER SYSTEMS ATLANTIC CANADA FIRST NATION COMMUNITIES LENNOX ISLAND FIRST NATION, LENNOX ISLAND, PEI		SCALE: As Noted	FIGURE NO.: 2
		DRAWN: GBS	



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TITLE: PROCESS FLOW-WATER (SITE #06003)		DATE: Feb. 2002	PROJECT NO.: 10294B
PROJECT: ASSESSMENT STUDIES OF WATER & WASTEWATER SYSTEMS ATLANTIC CANADA FIRST NATION COMMUNITIES LENNOX ISLAND FIRST NATION, LENNOX ISLAND, PEI		SCALE: NTS	FIGURE NO.: 3
		DRAWN: GBS	

Appendix A

Water Testing Results

HEALTH CANADA DATABASE

Water Quality Data - Bacteriological Sampling

LENNOX ISLAND MICMAC FIRST NATION RESERVE

		PARAMETERS TESTED:	
SAMPLE LOCATION	DATE	TOTAL COLIFORM /100ml	FECAL COLIFORM (ecoli) /100 ml
Apt. # 3	03/05/97	absent	absent
Band Council	03/05/97	absent	absent
Band Office	10/05/95	absent	absent
Band Office	07/17/96	absent	absent
Band Office	07/09/97	absent	absent
Band Office	03/02/98	absent	absent
Band Office	12/09/98	absent	absent
Band Office	03/10/99	absent	absent
Band Office	06/16/99	absent	absent
Band Office	09/08/99	absent	absent
Band Office	12/14/99	absent	absent
Band Office	03/10/00	absent	absent
Band Office	06/27/00	absent	absent
Band Office	07/07/00	absent	absent
Band Office	09/05/00	absent	absent
Band Office	09/28/00	absent	absent
Band Office	10/16/00	absent	absent
Band Office	11/22/00	absent	absent
Band Office	01/17/01	absent	absent
Band Office	03/06/01	0	0
Band Office	04/10/01	0	0
Band Office	05/08/01	0	0
Beach at Wharf	07/06/00	na	50
s.19(1)	06/16/99	absent	absent
	07/18/99	absent	absent
	09/08/99	absent	absent
	12/14/99	absent	absent
	01/11/00	absent	absent
	03/10/00	absent	absent
	06/27/00	absent	absent
	07/07/00	absent	absent
	09/05/00	absent	absent
	10/16/00	absent	absent
	12/13/00	absent	absent
	01/17/01	absent	absent
	03/06/01	0	0
	11/22/99	absent	absent
	07/17/96	absent	absent
	05/05/98	absent	absent
	03/10/99	absent	absent
	03/30/99	absent	absent
	10/05/98	absent	absent
Day Care Centre	12/09/98	absent	absent
Day Care Centre	01/13/99	absent	absent
Day Care Centre	06/16/99	absent	absent
Day Care Centre	03/10/00	absent	absent
Day Care Centre	05/15/00	absent	absent

Day Care Centre	09/28/00	absent	absent
Day Care Centre	11/22/00	absent	absent
Day Care Centre	04/10/01	0	0
Day Care Centre	05/08/01	0	0
Day Care Centre	05/15/01	0	0
Fire Hall	05/14/97	absent	absent
Fire Hall	04/01/98	absent	absent
Fire Hall	12/14/99	absent	absent
Fire Hall	05/15/00	absent	absent
Fire Hall	07/07/00	absent	absent
s.19(1)	05/15/00	absent	absent
	07/09/97	absent	absent
	04/01/98	absent	absent
	11/22/00	absent	absent
	05/08/01	0	0
	05/15/01	0	0
Health Centre	04/01/98	absent	absent
Health Centre	05/05/98	absent	absent
Health Centre	06/02/98	absent	absent
Health Centre	09/10/98	absent	absent
Health Centre	12/09/98	absent	absent
Health Centre	01/13/99	absent	absent
Health Centre	07/18/99	absent	absent
Health Centre	11/22/99	absent	absent
Health Centre	01/11/00	absent	absent
Health Centre	12/13/00	absent	absent
Jake's Kwik Way	10/05/95	absent	absent
Jake's Kwik Way	05/08/96	absent	absent
Jake's Kwik Way	07/17/96	absent	absent
Jake's Kwik Way	03/05/97	absent	absent
Jake's Kwik Way	05/14/97	absent	absent
Jake's Kwik Way	07/09/97	absent	absent
Jake's Kwik Way	04/01/98	absent	absent
Jake's Kwik Way	05/05/98	absent	absent
Jake's Kwik Way	06/02/98	absent	absent
Jake's Kwik Way	09/10/98	absent	absent
Jake's Kwik Way	10/05/98	absent	absent
Jake's Kwik Way	12/09/98	absent	absent
Jake's Kwik Way	01/13/99	absent	absent
Jake's Kwik Way	03/10/99	absent	absent
Jake's Kwik Way	03/30/99	absent	absent
Jake's Kwik Way	06/16/99	absent	absent
Jake's Kwik Way	07/18/99	absent	absent
Jake's Kwik Way	09/08/99	absent	absent
Jake's Kwik Way	11/22/99	absent	absent
Jake's Kwik Way	12/14/99	absent	absent
Jake's Kwik Way	01/11/00	absent	absent
Jake's Kwik Way	03/10/00	absent	absent
Jake's Kwik Way	05/15/00	absent	absent
Jake's Kwik Way	06/27/00	absent	absent
Jake's Kwik Way	07/07/00	absent	absent
Jake's Kwik Way	09/05/00	absent	absent
Jake's Kwik Way	09/28/00	absent	absent
Jake's Kwik Way	10/16/00	absent	absent
Jake's Kwik Way	11/22/00	absent	absent

Jake's Kwik Way	12/13/00	absent	absent
Jake's Kwik Way	01/17/01	absent	absent
Jake's Kwik Way	03/06/01	0	0
Jake's Kwik Way	04/10/01	0	0
Jake's Kwik Way	05/08/01	0	0
Jake's Kwik Way	05/15/01	0	0
	07/09/97	absent	absent
	04/01/98	absent	absent
	05/05/98	absent	absent
	06/02/98	absent	absent
	09/10/98	absent	absent
	10/05/98	absent	absent
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	11/22/00	absent	absent
	03/02/98	absent	absent
	09/10/98	1	absent
	12/09/98	absent	absent
	03/10/99	absent	absent
	03/30/99	absent	absent
	10/05/98	absent	absent
Mahewmegew Compost Plant	09/29/00	3	absent
Mahewmegew Peat Moss Plant	06/02/98	absent	absent
Mahewmegew Peat Moss Plant	06/02/98	6	absent
Mahewmegew Peat Moss Plant	06/16/99	absent	absent
Mahewmegew Peat Moss Plant	06/27/00	absent	absent
Mahewmegew Peat Moss Plant	09/05/00	absent	absent
Mahewmegew Peat Moss Plant	09/29/00	absent	absent
Mahewmegew Peat Moss Plant	05/15/01	0	0
s.19(1)	03/02/98	absent	absent
New Well	06/27/00	absent	absent
Old Well	03/30/99	absent	absent
Old Well	06/27/00	absent	absent
Old Well	01/17/01	absent	absent
s.19(1)	03/05/97	absent	absent
Pump House New Well	07/17/96	absent	absent
Pump House New Well	07/09/97	absent	absent

Pump House New Well	04/01/98	absent	absent
Pump House New Well	06/02/98	absent	absent
Pump House New Well	12/09/98	absent	absent
Pump House New Well	11/22/00	absent	absent
Pump House Old Well	03/05/97	absent	absent
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Pump House Old Well	09/10/98	absent	absent
Pump House Old Well	12/09/98	absent	absent
Pump House Old Well	10/05/98	absent	absent
Pump House Old Well	01/13/99	absent	absent
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School	03/02/98	absent	absent
School	09/28/00	absent	absent
School	10/16/00	absent	absent
School	11/22/00	absent	absent
School	03/06/01	0	0
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School	05/08/01	0	0
School	05/15/01	0	0
	05/14/97	absent	absent
s.19(1)	10/05/95	absent	absent
	03/05/97	absent	absent
Well	03/10/99	absent	absent
Well New	05/08/96	absent	absent
Well No. 2	10/05/95	absent	absent
Wharf (beach)	05/15/01	na	7
	10/14/97	absent	absent
s.19(1)	10/14/97	absent	absent
	10/14/97	absent	absent
	10/14/97	absent	absent
		Roger	lennoxb

HEALTH CANADA DATABASE

DRINKING WATER QUALITY (CHEMICAL) DATA

LENNOX ISLAND MICMAC FIRST NATION RESERVE

s.19(1)

Parameters Sampled		aluminum	arsenic	barium	boron	chloride	chromium	colour	copper	fluoride	hardness	iron	L. I.	lead	manganese	nitrate	pH	selenium	sodium	sulphate	turbidity	uranium	zinc
Health or Aesthetic Limit	mg/l -->		0.025	1.00	5.00	<250	0.05	< 15 TCU	< 1.0	1.5	80 - 100	< 0.3		0.01	< 0.05	45.00	6.5 to 8.5	0.01	< 200	< 500	1 NTU <5 NTU	0.1	< 5.0
LOCATION	Date:		IMAC	MAC	IMAC	AO	MAC	AO	AO	MAC	MAC	AO		MAC	AO	MAC	AO	MAC	AO	AO	MAC & AO	MAC	AO
Band Office	05/09/96					122													36.8				
Band Office	03/03/96					119	<0.05		0.06		274.1	<0.1		<0.002	<0.02	2.8	7.6		39.32	14.12			<0.02
Band Office	03/19/93	0.006	<0.002	0.11	0.025	86.4	0.003	4	0.06	<0.1	233.0	<0.02		0.0014	<0.01	2.7	7.7	<0.002	23.7	12	0.26	0.0002	<0.01
	02/14/96						<0.05		<0.02	0.25		<0.1		<0.002	<0.02		7.7		37.63	15.68			0.04
	06/03/96					125	<0.05		0.05			<0.1		<0.002	<0.02	2.8	8		152.9	14.59			<0.02
	06/06/96					114	<0.05		0.02			<0.1		<0.002	<0.02	2.9	8		36.06	14.73			<0.02
	06/13/96					112	<0.05		0.05		8.7	<0.1		<0.002	<0.02	2.8	7.9		152.4	14.48			<0.02
	06/20/96					109	<0.05		0.07		267.5	<0.1		<0.002	<0.02	2.8	7.8		35.07	14.46			<0.02
	06/27/96					115	<0.05		0.04		40.8	<0.1		<0.0005	<0.02	2.7	7.8		135.3	14.48			<0.02
	06/10/96					111	<0.05		0.05		261.6	<0.1		< 2	<0.02	3.2	7.7		34.96	14.43			<0.02
Fire Hall	05/09/96					122													37.3				
	05/09/96					31.5													88				
Jake's KwikWay	05/09/96	<0.025	<0.001	<0.05	<0.200	21.7	<0.02		0.017	<0.1	66.4	0.022		<0.001	0.011	0.39	7.97	<0.001	62.1	6.73	0.1		0.016
Jake's KwikWay	06/03/96					23	<0.05		0.07			0.53		0.002	<0.02	0.4	8		93.88	6.27			<0.02
Jake's KwikWay - 2nd sample	06/03/96					23	<0.05		0.07		8.7	<0.1		<0.002	<0.02	0.3	7.9		50.13	6.2			<0.02
Jake's KwikWay	06/10/96					22	<0.05		0.06		15.7	<0.1		<0.002	<0.02	0.6	8		89.63	6.15			<0.02
Jake's KwikWay	06/20/96					22	<0.05		0.05		14.0	<0.1		<0.002	<0.02	0.4	7.9		93.64	6.27			<0.02
Jake's KwikWay	06/27/96					22	<0.05		0.36		42.0	<0.1		<0.002	<0.02	0.4	7.9		80.26	6.59			0.04
Jake's KwikWay	09/03/96					29	<0.05		0.27		44.6	<0.1		<0.002	<0.02	0.5	8.2		81.74	6.25			0.03
Jake's KwikWay	01/20/97					26	<0.05		0.04		133.5	<0.01		<0.002	<0.02	0.5	7.6		34.41	6.45			<0.02
Jake's KwikWay	07/09/97																		17				

HEALTH CANADA DATABASE

DRINKING WATER QUALITY (CHEMICAL) DATA

LENNOX ISLAND MICMAC FIRST NATION RESERVE

Parameters Sampled		aluminum	arsenic	barium	boron	chloride	chromium	colour	copper	fluoride	hardness	iron	L.I.	lead	manganese	nitrate	pH	selenium	sodium	sulphate	turbidity	uranium	zinc
Health or Aesthetic Limit	mg/l -->		0.025	1.00	5.00	<250	0.05	< 15 TCU	< 1.0	1.5	80 - 100	< 0.3		0.01	< 0.05	45.00	6.5 to 8.5	0.01	< 200	< 500	1 NTU <5 NTU	0.1	< 5.0
LOCATION	Date:		IMAC	MAC	IMAC	AO	MAC	AO	AO	MAC	MAC	AO		MAC	AO	MAC	AO	MAC	AO	AO	MAC & AO	MAC	AO
	01/20/97					153	<0.05		0.02		36.9	<0.1		<0.002	<0.02	2.6	7.6		158	13.62			<0.02
	07/09/97																		139				
	06/06/96					127	<0.05		0.04			<0.1		<0.002	<0.02	2.8	7.9		37.62	14.5			0.03
	06/06/96					114	<0.05		0.03			0.11		<0.002	<0.02	2.7	8.3		38.34	14.61			0.03
	06/10/96					107	<0.05		0.02		257.2	<0.1		<0.002	<0.02	3.1	7.7		33.96	14.43			0.03
	06/13/96					116	<0.05		0.05		233.2	<0.1		<0.002	<0.02	2.6	7.7		51.51	14.6			0.03
	06/20/96					107	<0.05		0.03		265.6	<0.1		<0.002	<0.02	2.7	7.9		35.13	14.37			0.04
	06/27/96					119	<0.05		0.11		79.0	<0.1		<0.002	<0.02	2.8	7.8		119.3	14.51			0.03
	09/03/96					125	<0.05		0.04		201.6	0.16		<0.002	<0.02	2.8	7.6		71.21	14.23			0.05
	09/03/96					24	<0.05		0.05		1.3	<0.1		<0.002	<0.02	0.5	7.9		96.08	6.16			<0.02
New Well	02/14/96					20	<0.05		<0.02	0.23	194.9	0.14		<0.002	0.13	0.3	7.8		11.26	6.1			<0.02
New Well	05/09/98	0.035	0.0019	0.169	<0.200	21.4	<0.02		<0.01	<0.01	205.1	0.132		<0.001	0.056	0.36	7.93	<0.001	11.1	6.7	0.4		<0.01
New Well	06/06/96					107	<0.05		0.02			<0.1		<0.002	<0.02	3.1	7.7		33.96	14.43			0.03
New Well	03/03/98	<0.025	0.0018	0.206	<0.200	92.6	0.023		0.026	<0.1	195.2	<0.01		<0.001	<0.01	0.87	7.93	<0.001	14.4	8.1	0		0.018
New Well	06/27/00	<0.025	<0.0015	0.262	0.013	31.1	<0.01		0.037	<0.1	199.1	0.014	0.6	<0.001	<0.005	1.05	8.12	<0.0015	11.8	4.77	0	0.005	0.018
Old Well	05/09/96	<0.025	0.0015	0.148	<0.200	99.7	<0.02		<0.01	<0.1	244.3	0.138		<0.001	< 0.01	2.8	7.91	0.0011	32.3	15	0.4		0.022
Old Well	06/13/96					116	<0.05		0.05			<0.1		<0.002	<0.02	2.6	7.7		51.51	14.6			0.03
Old Well	06/20/96					107	<0.05		0.03			<0.1		<0.002	<0.02	2.7	7.9		35.13	14.37			0.04
Old Well	06/27/96					119	<0.05		0.11			<0.1		<0.0005	<0.02	2.8	7.8		119.3	14.51			0.03
Old Well	03/03/98	<0.025	0.0013	0.043	<0.200	194	0.028		0.115	<0.1	109.6	<0.01		<0.001	0.065	3.3	7.63	<0.001	189	15	0		<0.01
Old Well	06/27/00	<0.025	<0.0015	0.112	0.024	80.2	0.012		0.074	<0.1	238.9	<0.01	0.7	<0.001	0.012	<0.05	7.93	<0.0015	42.1	13.9	0	<0.0005	0.02
Peat Moss Plant	06/01/98	<0.025	<0.001	0.068	<0.200	16.2	<0.01		<0.01	<0.1	59.3	0.08		<0.001	<0.01	0.14	7.45	<0.001	7.9	3.51	0		<0.01
	01/20/97					27	<0.05		<0.02		186.1	<0.1		<0.002	0.03	0.5	7.8		11.71	6.33			<0.02
	07/31/00	<0.025	<0.0015	0.262	0.021	37.1	0.012		<0.01	<0.1	210.7	0.021	0.7	<0.001	<0.005	1.12	8.15	<0.0015	12.8	7.38	0	<0.0005	0.015
	05/09/96					31.5													55.4				
	05/09/96	<0.025	<0.001	<0.05	<0.200	98.6	<0.02		<0.01	<0.1	4.2	<0.1		<0.001	<0.01	2.9	7.91	<0.001	150	15.1	0		<0.01
	06/03/96					22	<0.05		0.04			<0.1		<0.002	<0.02	0.4	8		97.98	6.15			<0.02
	06/06/96					22	<0.05		0.06			<0.1		<0.002	<0.02	0.4	8		57.68	6.05			<0.02
	06/10/96					23	<0.05		0.05		139.6	<0.1		<0.002	0.03	0.9	7.9		36.5	6.34			<0.02
	06/13/96					22	<0.05		<0.01		1.7	<0.1		<0.002	<0.02	0.7	7.8		102.5	6.43			<0.02
	06/20/96					21	<0.05		0.07		121.2	<0.1		<0.002	<0.02	0.4	7.9		43.79	6.4			0.03
	06/27/96					22	<0.05		0.16		4.0	<0.1		<0.002	<0.02	0.4	8.2		92.22	6.23			<0.02
ool	01/20/97					153	<0.05		0.08		298.8	<0.1		<0.002	<0.02	2.7	7.6		39.86	13.59			<0.02
well #1	10/23/95					110		<3	0.01	<0.1	267.0	<0.02			<0.01	3.7	7.7		38.8	16	0.12		0.07
Well #2	10/23/95					18.5		<3	<0.01	<0.1	171.0	<0.02			<0.01	0.12	7.8		10.2	6	0.1		<0.01
																						Roger	lennoxc

s.19(1)

s.19(1)

Environment and Local Government — New Nouveau Brunswick — Environnement et gouvernements locaux

Analytical Services Laboratory/Laboratoire des services analytiques
12, rue McGloin Street, Fredericton, NB E3A 5T8

Inorganic Report / Rapport inorganique

Client information du Client:

Organization/Organisation: Health Canada
Attention: Roger Mazerolle

Prop. No./No. de Projet: 0997

Lab No./No. de Lab. : **19919 - 200111917**

Authorization/Authorité: Leslie Carr
Matrix/Matrice: Groundwater / Eau Souterraine
Matrix/Matrice: Drinking Water/Eau Potable

Report Date
Date du rapport: 2001/11/20

Client Sample Identifier/ No. d'Echantillon du client: LENNOX ISLAND OLD WELL

Date Collected/Date de prelevement: 2001/11/05

Parameter/ Paramètre	Flag	Result/ Résultats	Units/ Unités	L.O.Q./ L.D.Q.	H.A.L./ L.A.S.
Alkalinity / Alcalinité		176	mg/l		
Aluminum / Aluminium	Less than L.O.Q. / Moins de L.D.Q.		mg/l	0.025	
Antimony / Antimoine	Less than L.O.Q. / Moins de L.D.Q.		µg/l	1.0	6.0
Arsenic	Less than L.O.Q. / Moins de L.D.Q.		µg/l	1.5	25.0
Barium / Baryum		0.238	mg/l	0.010	1.0
Boron / Bore		0.017	mg/l	0.010	5.0
Bromide / Bromure		0.134	mg/l	0.100	
Cadmium	Less than L.O.Q. / Moins de L.D.Q.		µg/l	0.5	5.0
Calcium		99.9	mg/l	0.10	200
Chloride / Chlorure		116	mg/l	0.050	250
Chromium / Chrome	Less than L.O.Q. / Moins de L.D.Q.		mg/l	0.010	0.050
Conductivity / Conductivité		783	µS/cm		
Copper / Cuivre	Less than L.O.Q. / Moins de L.D.Q.		mg/l	0.010	1.0
Fluoride / Fluorure	Less than L.O.Q. / Moins de L.D.Q.		mg/l	0.100	1.5
Iron / Fer	Less than L.O.Q. / Moins de L.D.Q.		mg/l	0.010	0.300
Lead / Plomb	Less than L.O.Q. / Moins de L.D.Q.		µg/l	1.0	10
Magnesium / Magnésium		10.9	mg/l	0.10	150
Manganese / Manganèse	Less than L.O.Q. / Moins de L.D.Q.		mg/l	0.005	
Nitrate		3.05	mg/l	0.05	10.0
Nitrate / Nitrite		3.10	mg/l	0.05	10.0
Nitrite	Less than L.O.Q. / Moins de L.D.Q.		mg/l	0.05	1.0
pH		7.87			
Potassium		0.938	mg/l	0.10	
Selenium / Sélénium	Less than L.O.Q. / Moins de L.D.Q.		µg/l	1.5	10

Calculated Parameters\Paramètres calculés

Sum of Cations	7.432	Sum of Anions	7.315	% Difference	-0.80
Saturation Index @ 8°C	0.749	CO3(as CaCO3)	0	HCO3(as CaCO3)	178.0000

[LOQ/LDQ] Limit of quantitation/Limite de quantification
[HAL/LAS] Health Advisory Level (Drinking water only)/Limites acceptables pour la santé (Eau potable seulement)

Environment and Local Government — New Nouveau Brunswick — Environnement et gouvernements locaux

Analytical Services Laboratory/Laboratoire des services analytiques
12, rue McGloin Street, Fredericton, NB E3A 5T8

Inorganic Report / Rapport Inorganique

Client Information du Client:

Organization/Organisation: Health Canada
Attention: Roger Mazerolle

Prop. No./No. de Projet: 0997

Lab No./No. de Lab. : **19919 - 200111917**

Authorization/Authorité: Leslie Carr
Matrix/Matrice: Groundwater / Eau Souterraine
Matrix/Matrice: Drinking Water/Eau Potable

Report Date
Date du rapport: 2001/11/20

Client Sample Identifier/ No. d'Echantillon du client:	LENNOX ISLAND OLD WELL
Date Collected/Date de prelevement:	2001/11/05

Parameter/ Paramètre	Flag	Result/ Résultats	Units/ Unités	L.O.Q./ L.D.Q.	H.A.L./ L.A.S.
Sodium		36.0	mg/l	0.10	270
Sulfate		14.4	mg/l	0.050	
Thallium	Less than L.O.Q. / Moins de L.D.Q.		µg/l	1.0	
Total Hardness / Dureté totale	*** Exceeds H.A.L. / Plus que L.A.S. ***	294.3	mg/l	0.65	200
Turbidity / Turbidité		0.0	NTU	0.	1.0
Uranium	Less than L.O.Q. / Moins de L.D.Q.		µg/l	0.5	20
Zinc		0.018	mg/l	0.005	5.0

Calculated Parameters\Paramètres calculés

Sum of Cations	7.432	Sum of Anions	7.315	% Difference	-0.80
Saturation Index @ 5°C	0.748	CO3(as CaCO3)	0	HCO3(as CaCO3)	176.0000

[LOQ/LDQ] Limit of quantitation/Limite de quantification
[HAL/LAS] Health Advisory Level (Drinking water only)/Limites acceptables pour la santé (Eau potable seulement)

BACTERIOLOGICAL WATER QUALITY MONITORING
COLILERT - MPN (MOST PROBABLE NUMBER)

COMMUNITY : LENNOX ISLAND

QUALITY CONTROL

DATE	AGENT	COLOUR
	E.COLI	_____/_____
	K.Pneumoniae	_____/_____
	P.Aeruginosa	_____/_____

LOCATION SAMPLING

DATE	LOCATION	RESULTS		SAMPLED BY
		Total Coliform	E.Coli	
New Well				
Dec19/01	Day Care	N/D	N/D	Angus Sark
Dec19/01	Kwik Way	N/D	N/D	Angus Sark
Old Well				
Dec19/01	School / Fountain	N/D	N/D	Angus Sark
Dec19/01	Band Office	N/D	N/D	Angus Sark

BACTERIOLOGICAL WATER QUALITY MONITORING
COLILERT - MPN (MOST PROBABLE NUMBER)

COMMUNITY : *LENNOX ISLAND*

QUALITY CONTROL

DATE	AGENT	COLOUR
	E. Coli	____ / ____
	K. Pneumoniae	____ / ____
	P. Aeruginosa	____ / ____

LOCATION SAMPLING:

DATE	LOCATION	RESULT		SAMPLED BY:
		Total Coliform	E. Coli	
Dec 12/01	School gr 1; 2	N/D	N/D	Angus Sark
Dec 12/01	[redacted]	N/D	N/D	Angus Sark
	s.19(1)			
Dec 12/01	Kwikway	N/D	N/D	Angus Sark
Dec 12/01	Day Care	N/D	N/D	Angus Sark

Coliform.cdr

BACTERIOLOGICAL WATER QUALITY MONITORING
COLILERT - MPN (MOST PROBABLE NUMBER)

COMMUNITY : *LENNOX ISLAND*

QUALITY CONTROL

DATE	AGENT	COLOUR
	E. Coli	_____ / _____
	K. Pneumoniae	_____ / _____
	P. Aeruginosa	_____ / _____

LOCATION SAMPLING:

DATE	LOCATION	RESULT		SAMPLED BY:
		Total Coliform	E. Coli	
Dec 6/01	s.19(1)	N/D	N/D	Angus Sark
Notice.....this sample is a retest of Dec/5/01 ordered from Roger Mazzeralle..				

Coliform.cdr

BACTERIOLOGICAL WATER QUALITY MONITORING
COLILERT - MPN (MOST PROBABLE NUMBER)

COMMUNITY : LENNOX ISLAND

QUALITY CONTROL

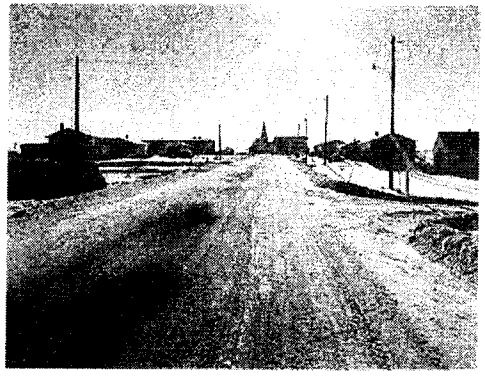
DATE	AGENT	COLOUR
	E.COLI	_____/_____
	K.Pneumoniae	_____/_____
	P.Aeruginosa	_____/_____

LOCATION SAMPLING

DATE	LOCATION	RESULTS		SAMPLED BY
		Total Coliform	E.Coli	
New Well				
Jan 8/02	Day Care	N/D	N/D	Angus Sark
Jan 8/02	Kwik Way	N/D	N/D	Angus Sark
Old Well	s.19(1)			
Jan 8/02	[redacted]	N/D	N/D	Angus Sark
Jan 8/02	Band Office	N/D	N/D	Angus Sark

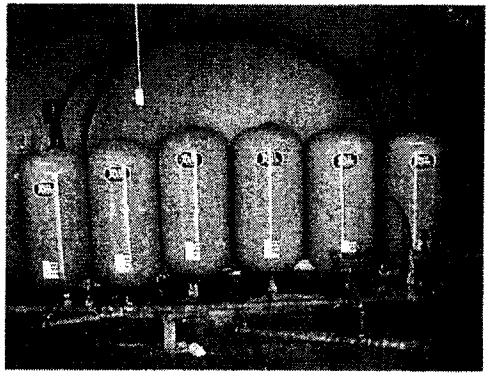
Appendix B

Photographs of Infrastructure

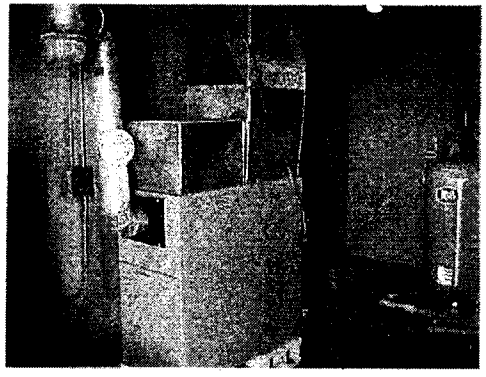


Looking east on Sweetgrass Trail.

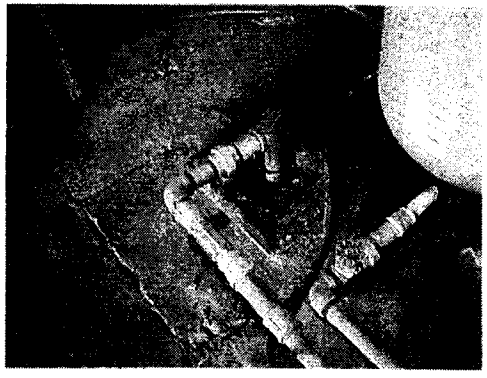
"Old" pumphouse.



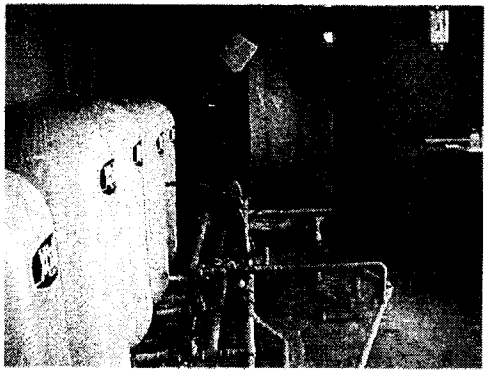
Pressure tanks in "old" pumphouse



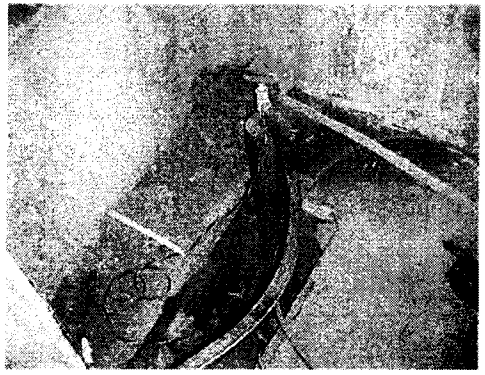
Furnace and well #1 (in corner of building) in "old" pumphouse.



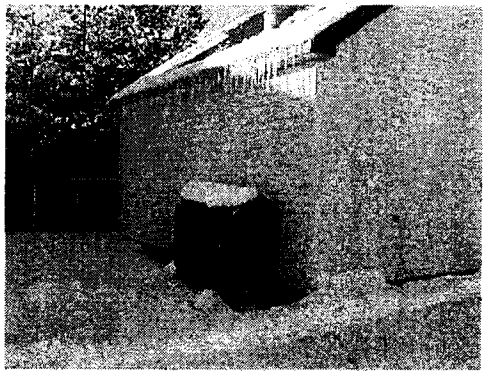
Well #1.



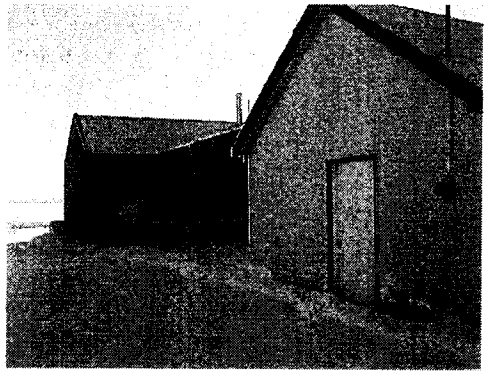
"Old" pumphouse extension entrance (Well #2 location).



Well #2



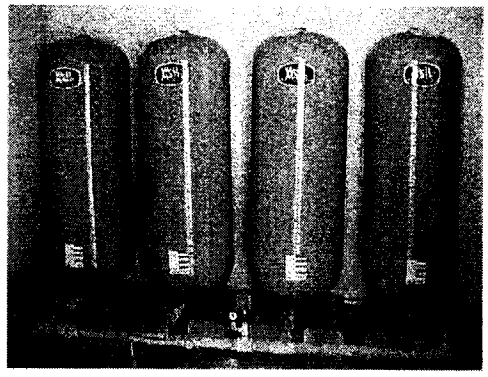
Lennox Island First Nation
Furnace oil tank at "old" pumphouse.



School and A/G storage tank adjacent to "old" pumphouse.

"New" pumphouse and well #3.

Well #3



Pressure tanks in "new" pumphouse.