OFR ME 1970-1

A Groundwater Report on the
Nova Scotia Department of Lands and Forests
Complex at Shubenacadie

By

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Groundwater Section
N. S. Dept. of Mines

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ABSTRACT

Field exploration was mainly confined to the surficial deposits overlying the Windsor Group of sediments. It was found that the glaciofluvial and/or lacustrine deposits of sands in the area transmit an excellent quality of water to well points developed in these materials. Unfortunately a portion of these sand deposits has been used as a burial ground for animals by the wild life park which has resulted in a dense bacterialogical contamination of these areas. Therefore unless the area that has already been contaminated can be located and outlined and the remaining deposits protected from further pollution itwillbe unsafe to construct new wells and develop this area as a water supply.

An examination of the water bearing characteristics of the surficial sand deposits, and the chemical analyses of water derived from these materials indicate that development of these shallow sands is the most practical course to follow in obtaining a water supply for the area.

Data collected during the survey also indicate the existance of a considerable depth of water bearing gravel near the west side of the complex. Although the water obtained from depths greater than 110 feet is reported to be unsuitable for use because of large amounts of dissolved mineral, it is highly possible that water bearing zones at depths to about 75 feet may contain a relatively minor amount of dissolved mineral matter.

INTRODUCTION

A brief groundwater survey was carried out in the Department of Lands and Forests complex at Shubenacadie to assess the possibility of obtaining a water supply for the three department sections in that area: 1. The Parks Division, 2. Wild Life Park, and 3. Fire Control Headquarters.

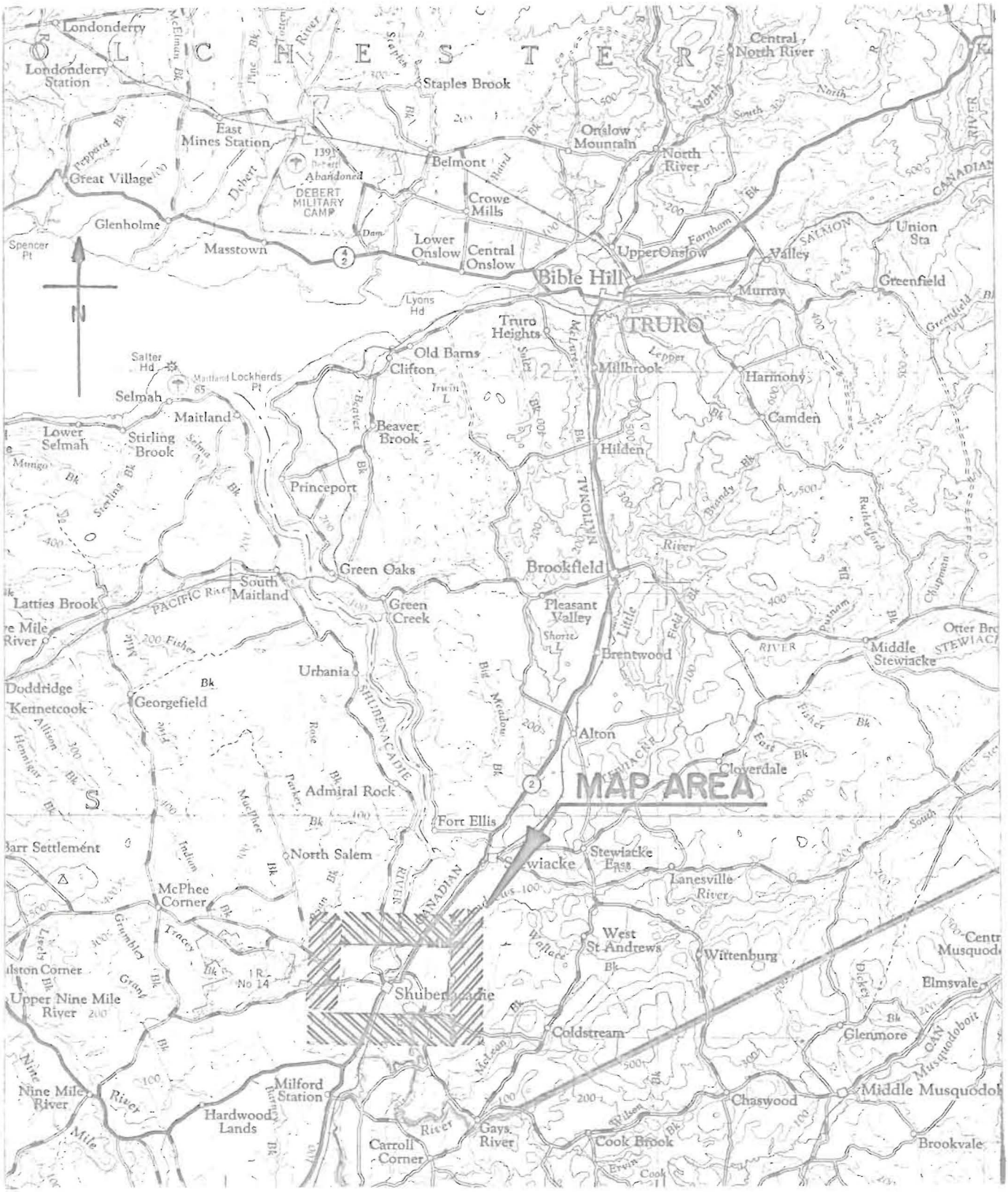
The survey attempted mainly to appraise the quality and quantity of water available in the surficial sand deposits. Also samples were collected from the three drilled wells in the Wild Life Park to determine the chemical quality and the possibility of using this generally considered "highly mineralized water" as an alternate source.

The primary need for a central water system is to provide the three sections of the Department of Lands and Forests an adequate supply of good quality water preferably from a common source and through a common distribution system.

Location and Population

The Department of Lands and Forests complex is located in the southern part of Colchester County on the Halifax to Truro Highway about 20 miles south of Truro (see Location Map, scale 1 inch equals 4 miles, Figure 1). Another map (Fig. 2, page 7) scale 4 inches equals one mile, outlines the surficial geology of that area. This area is included in the west central portion of the Shubenacadie map sheet 11 E 3.

Because of the multiple and various activities, many of which are seasonal, within the complex it is difficult to accurately determine the population to be serviced with a domestic water system. However, an estimate of about 40 persons



e.b

SCALE: 1" = 4 MILES

FIGURE 1 LOCATION MAP OF AREA

during the winter months and a total of about 300 persons during the summer picnic and camping season may be an accurate enough estimate for our purposes. Over and above this figure there is an animal population of several hundreds which also depends on a constant supply of water.

Climate

The mean annual precipitation is 41.8 inches at Upper Stewiacke, based on 30 years of records, with 36.2 inches as rainfall. Of the total 16.8 inches or about 41% of this occurs during the months of May to September inclusive.

Physiography and Drainage

The Shubenacadie area is in the south portion of the Central Lowlands of Nova Scotia and is bounded on the south by the Atlantic uplands.

Land elevations in the map area vary from less than 50 feet along the Shubenacadie River to over 150 feet above sea level in the north part of the area.

The two principle water courses in the area, the Shubenacadie River and St. Andrews River, form the west and the east boundaries respectively. The former, which is tidal in this area, flows north while the latter flows southward draining the area north and east of the map area.

A third unnamed drainage system originates at a sinkhole (Karst hole) about .5 mile north of the center of the area. The stream flows south, parallel to the other two streams, and through the wild life park where it is utilized as a sanctuary for waterfowl.

Water Use

At present the water supply for the area is obtained from three different sources. The wild life park has three drilled bedrock wells which reportedly supply an inadequate volume of water containing a large amount of total dissolved solids. The Fire Control Headquarters obtain its domestic supply from a large well-cistern type of a structure which requires additions of water by a water truck on a weekly basis during most summer periods. The Parks Division, as yet, do not have a water supply for the picnic-camping complex which is currently nearing completion.

An estimate of total water consumption within the complex is at best a very crude estimate because of the diversified uses and the effect seasonal activity has on daily consumption. However, assuming a maximum number of 300 consumers and allowing a consumption of 50 gallons per day (igpd) per consumer, it is estimated that about 15,000 imperial gallons per day (about 10 imperial gallons per minute, igpm), would be required during peak summer activity. It must be born in mind that the majority of these consumers at peak demand will be in the picnic and camping area where a limited number of cold water taps will be available to supply water for washing, cooking and drinking. On the basis of these considerations it is felt that a supply of 10 igpm on a continuous basis will be more than adequate.

Previous Work

The bedrock geology of the Shubenacadie area has been mapped by I. M. Stevenson in 1959 on a scale of one inch equals one mile. This map shows and contains notes on general geological structure, the lithology and economic geology of the area. Owen L. Hughes mapped the surficial geology of the area in 1957.

A complete soil survey was carried out in the area in 1948 by the Dominion Department of Agriculture.

Acknowledgments

The Groundwater Section, Geological Division, Nova Scotia Department of Mines, would like to acknowledge the co-operation of employees of the Dept. of Lands and Forests in the area and residents of that area for supplying information and assisting in collecting data required for compiling this report.

GEOLOGY

Introduction

The rocks underlying the Shubenacadie area belong exclusively to the Windsor Group of marine sediments of Mississippian age, and consist of limestone, gypsum, shale and some minor amounts of sandstone.

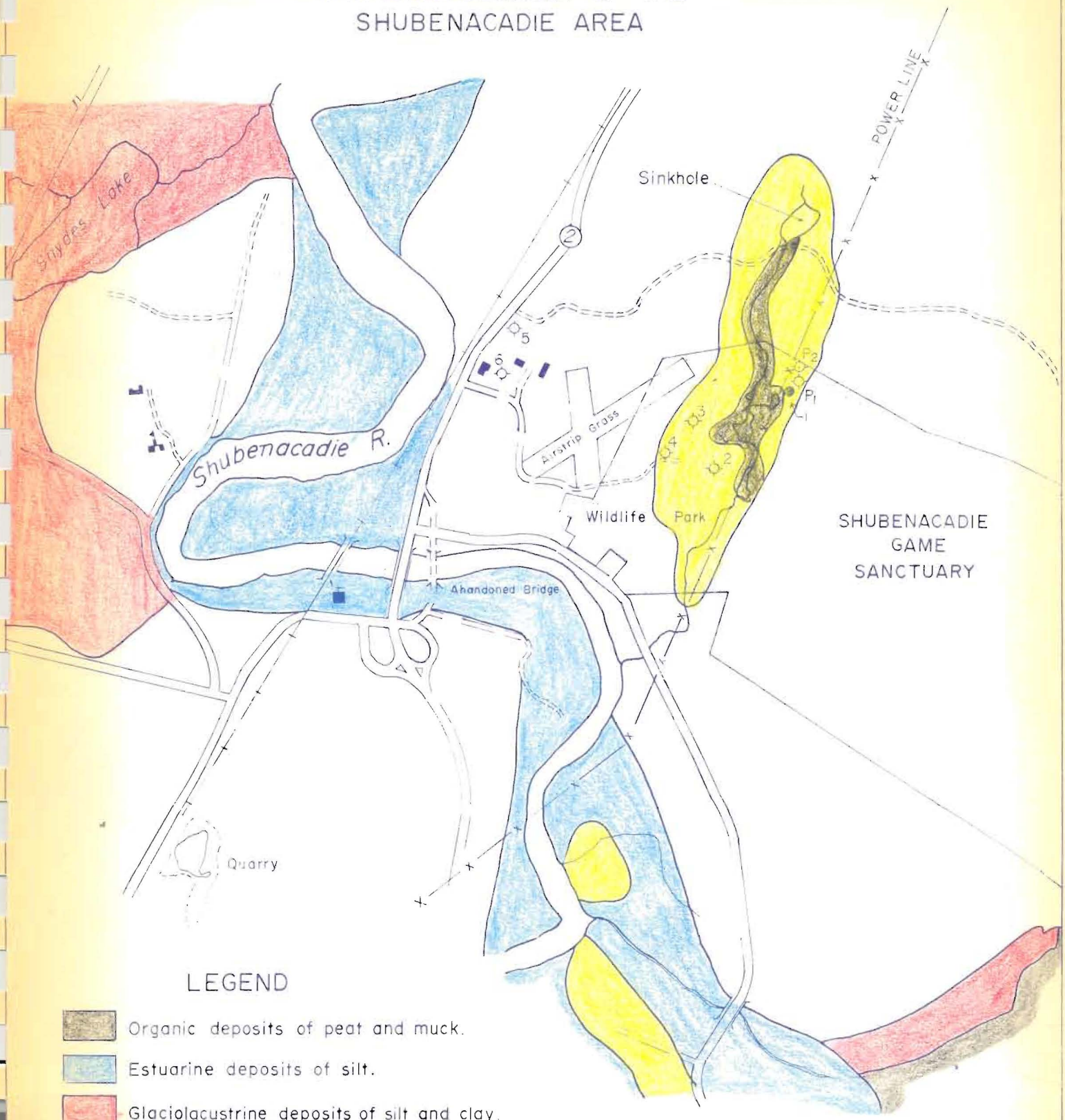
Surficial deposits of till, sand, silt and clay of varying thickness are found in the area overlying the bedrock. These deposits being generally thinner on the uplands and thickest in the lowlands.

Bedrock Deposits

Lack of outcrop in the map area makes it difficult to learn the structure of the Windsor marine sediments. However all drill holes, wells, etc. that have penetrated the surficial materials indicated the bedrock as limestones, gypsum, calcareous shales, and minor amounts of sandstones. Three drilled wells in the wild life park bottomed in these types of rocks have variable yields (see Fig. 2 for Location and Appendix A for logs).

Map No.2

SURFICIAL GEOLOGY OF THE SHUBENACADIE AREA



LEGEND

- Organic deposits of peat and muck.
- Estuarine deposits of silt.
- Glaciolacustrine deposits of silt and clay.
- Glaciofluvial deposits of sand
- Basal till.

Scale : 1" = 1320'

D.H.B.

Surficial Deposits

Mantling the bedrock are deposits of glacial drift. Glacial drift includes unsorted till (unstratified drift) deposited during the Pleistocene Epoch (ice age), and washed materials consisting of glaciofluvial and/or lacustrine materials deposited by glacial melt water. Till is composed of a mixture of clay, silt and gravel or a combination of any of these found generally anywhere but along river flood plains. Lacustrine deposits of fine sand and silt usually occur in lowland areas and may be incised by recent stream action and replaced by coarser alluvial materials consisting of sands and gravels.

The surficial materials found in this area were probably deposited while the remains of the glacier still occupied the uplands lying to the east, referred to as Wittenburg Mountain. The most common material in the area is a basal clay till. However the river flood plains and the adjacent lowland areas are covered with stratified deposits of glaciofluvial and/or lacustrine silts and sands. Within the park these silts and sands are confined to the borders of the small drainage system flowing through the sanctuary. Test holes drilled into these materials indicate that the depth varies from about 10-15 feet. A gray plastic clay underlying the sand extends to a depth of over 100 feet.

Although these sands generally possess very good sorting they are interbedded with deposits of peat in most areas. The occurrence of peat was consistent at all locations where it was found in that it occurs at a depth of from 2 to 3 feet and also immediately overlying the clay. At some locations it also occurred at a depth of about 6-7 feet.

The only location where no peat was found interbedded with or immediately underlying the sand was at well point No. 2 (see P2 on Fig. 2).

HYDROLOGY

Introduction

The shales and till seldom yield more than a domestic water supply in one well. Limestone and gypsum deposits are sometimes capable of yielding large amounts of groundwater but only with usually undesirable chemical characteristics. The waters are very hard and contain high amounts of total dissolved solids. However because of the intended use in this area and the other supply factors, a very hard water may be perfectly acceptable if the supply is more than adequate.

The only geological deposits in the area that may present favorable conditions for obtaining large quantities of relatively good quality water are the surficial materials of glaciofluvial and/or lacustrine sands (see Fig. 2). These are possible aquifers or water bearing zones. In the past, wells have not been drilled into the sand deposits because methods of screening wells in unconsolidated deposits were not known by local drillers until recently.

Windsor Aquifers

The yields of wells drilled into the Windsor sediments are highly variable. Solution channels penetrated by wells in limestone and/or gypsum beds may yield substantial quantities of water whereas wells penetrating the shale units and massive limestone and/or gypsum beds may not yield enough water to meet individual domestic needs. Three deep bedrock wells drilled in the area (Nos. 2, 3, and 4 Table 1) yielded between 4 and 5 igpm when tested by the well drillers.

Surficial Aquifers

In some places Pleistocene sands and gravels are very good aquifers. For

example a screened well completed in a sand and gravel aquifer near Brookfield indicated a yield of over 200 igpm (over 285,000 igpd).

Table 1. Data on Selected Wells Drilled in Shubenacadie

Well No.	Depth (ft.)	Diam. (in.)	Length of Casing	Driller's Estimate of yiels (igpm)
2	255	6	121	4
3	350	6	80(?)	5
4	116	6	102	5
5	112	6	112	12
6	142	6	142	40 +

To date there is limited information available on the surficial deposits of sand and gravel in the Shubenacadie area that indicate whether they are good water bearing materials or not, well No. 5 and 6 (Table 1) are bottomed in sand and gravel and are reported capable of yielding up to 12 igpm and 40 + igpm respectively.

Dug well No. 1 (Fig. 2) constructed with a graded sand pack yielded about 5 igpm during 8 hours of continuous pumping during which time the water table appeared to stablize at a drawdown of about 4 feet.

Two, 1 1/2 inch diameter, No. 20 slot well screens (P1 and P2, Fig. 2) were jetted to a depth of about 11 feet where they encountered a heavy grey clay. P1 penetrated two peat horizons, one at a depth of about 4 feet and the other at the bottom of the sand at a depth of about 10 feet. P2 penetrated about 11 feet of clean, fine sand overlying the clay. This latter well point was subsequently

pumped at about 7 igpm for 2 hours resulting in about 3 feet of drawdown at the point.

WATER QUALITY

Windsor Aquifers

Generally waters from the Windsor rocks are extremely high in hardness, sodium, chloride, sulphates, and iron. Consequently these waters are commonly objectionable as a water supply mainly because of the problems that this type of water created in hot water heating systems and laundry operations. Normally these waters are quite acceptable for other domestic purposes such as drinking and cooking.

The chemical analyses of samples collected from wells No. 2, 3 and 4 are listed in Appendix B. Total dissolved solids of these waters varies from about 876 ppm to about 2,769 ppm. In all cases sulphate is the most common constituent. In the samples from well Nos. 2 and 3 sodium and chloride are also present in above normal amounts.

Surficial Aquifers

Water samples collected from the surficial sand deposits may be divided into two groups: firstly, the samples from wells (i.e. well No. 1) penetrating peat horizons interbedded in the sand; secondly, the sample from well Point No. 2 which penetrated clean sand for a depth of 11 feet when clay was encountered.

The quality of water from the peat-sand formation is undesirable because of two main factors; namely color and high coliform bacteria population (see Appendix A for reports on bacterialogical examination of water samples). It was learned after

after constructing well No. 1 that the sand deposit in that area has been used as a burial grounds by the park employees. However no records were kept of the burials and because the sites have not been posted it is impossible to determine a safe location for development of such a well.

The sample of water from well point No. 2 indicated a very good quality, in which all chemical constituents analysed for were present in amounts less than those limits outlined in "Canadian Drinking Water Standards and Objectives 1968".

RECOMMENDATIONS AND CONCLUSIONS

From the existing data on the groundwater geology of the Shubenacadie area it appears that four possible alternatives exist for development of a water supply. These alternatives listed in order of decreasing priorities are as follows:

1. Development of the glaciofluvial and/or lacustrine sand deposits;
2. Development of the upper gravel formation reported in the log of well No. 6;
3. Utilization of the water obtained from drilled well No. 4;
4. Utilizing the water, with treatment, from the sinkhole about 0.5 mile north of the wild life park.

Before development of the glaciofluvial and/or lacustrine sand deposits they must be fully explored and evaluated with respect to development of a water supply. This procedure must entail: firstly, locating and outlining the area that has been contaminated; secondly, installing a series of small diameter well screens a safe distance from and up gradient of the outlined contaminated area; and thirdly, protecting the area in which the well system is developed from further indiscriminate disposal of potentially dangerous pollutants.

Development of the upper gravel deposits recorded in the log of well No. 6 would entail logging these materials with the purpose of developing a screened well at a depth of about 50 to 60 feet.

Utilization of the water from well No. 4 would involve conducting a pump test on the well and supplying a pump capable of producing the safe yield determined from the pump test data. If the quality is highly objectionable then the only other course of action open is either treatment of this well water or utilization of the sinkhole which would undoubtedly require chlorination.

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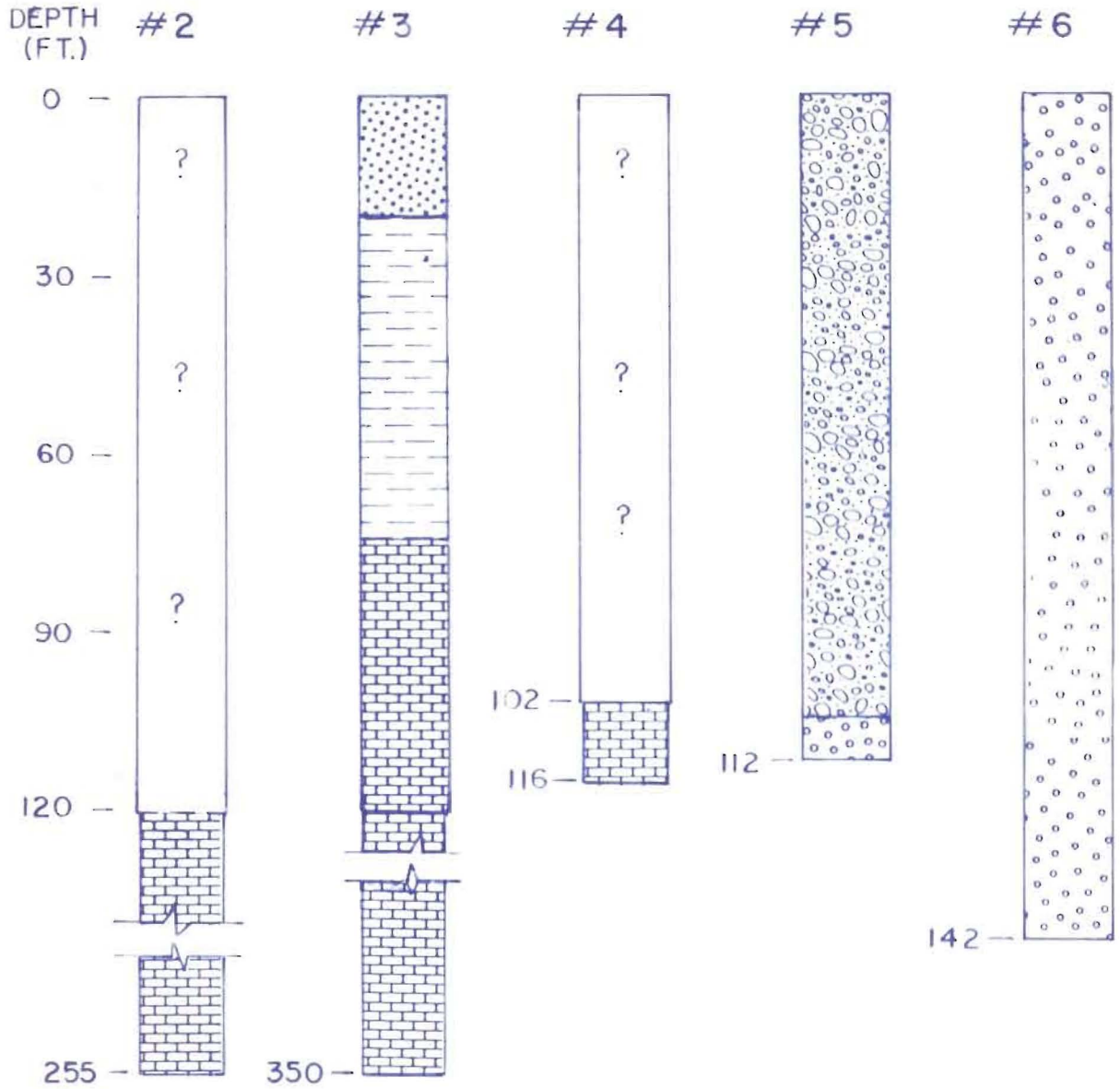
APPENDIX A

Graphic logs of selected wells drilled in the Shubenacadie area.

GRAPHIC LOGS OF SELECTED WELLS DRILLED IN THE SHUBENACADIE AREA



LEGEND

- Clay
- Clay & Boulders
- Gravel
- Sand
- Gypsum & Limestone

Vertical Scale 1" = 30'

T.W. HENNIGAR

e.a.b.

APPENDIX B

Chemical analyses of samples from selected wells in the Shubenacadie area.

NOVA SCOTIA DEPARTMENT OF MINES
GROUNDWATER SECTION
CHEMICAL ANALYSIS OF WATER

Sample No.: WELL No. 2
Area: Shubenacadie
Grid Location: 11E3
Source: Well (Wildlife Park) Depth 225
Field Measurements: Temp: 49°F
Remarks: Length csq 121 (diam. 6')

Date Sampled: October 2, 1970
Date of Analysis: October 25, 1970
Sampled By: T. W. Hennigar
Aquifer: Windsor Group
pH: _____ ; Fe: _____

	ppm	epm
Calcium	67.5	
Magnesium	21.6	
Sodium	450.0	
Potassium	4.0	
Iron Total	0.29	
Manganese Total	0.008	
Sulphate	781.5	
Chloride	342.0	
Fluoride	0.12	
Nitrate	3.74	
Silica	11.0	
Boron	0.25	
	ppb	
Copper	550	
Lead	10	
Zinc	50	
Other (specify)		

Alkalinities:	
-Phenolphthalein as $CaCO_3$	NIL
-Methyl Orange as $CaCO_3$	136.0 ppm
Hardness (Total as $CaCO_3$)	150.0 ppm
Loss of Ignition (1 hr. @ 500°C)	19.2 ppm
Total Dissolved Solids	1,924.3 ppm
Suspended Matter	0.6 ppm
Specific Conductance (mhos. x 10^{-5} @ 25°C)	~~0.0200~~ 2000
pH value	7.3
Color	5
Turbidity	2.7
SSP	
SAR	

NOTE:
T denotes trace amount (Less than 0.01 ppm)

Analysed by: M. Gates

NOVA SCOTIA DEPARTMENT OF MINES
GROUNDWATER SECTION
CHEMICAL ANALYSIS OF WATER

Sample No.: WELL No. 3
Area: Shubenacadie
Grid Location: 11E3
Source: Well (350') Diam. 6" (Wildlife Park)
Field Measurements: Temp: 57°F
Remarks: High Solids

Date Sampled: October, 1970 (2)
Date of Analysis: October 25, 1970
Sampled By: T. W. Hennigar
Aquifer: Windsor Group
pH: _____; Fe: _____

	ppm	epm
Calcium	182.2	
Magnesium	26.9	
Sodium	490.0	
Potassium	5.9	
Iron Total	0.30	
Manganese Total	0.008	
Sulphate	1,440.4	
Chloride	108.1	
Fluoride	0.10	
Nitrate	3.22	
Silica	11.7	
Boron	0.28	
	ppb	
Copper	400	
Lead	20	
Zinc	120	
Other (specify)		

Alkalinities:	
-Phenolphthalein as $CaCO_3$	NIL
-Methyl Orange as $CaCO_3$	110.0 ppm
Hardness (Total as $CaCO_3$)	326.0 ppm
Loss of Ignition (1 hr. @ 500°C)	632.5 ppm
Total Dissolved Solids	2,769.2 ppm
Suspended Matter	0.5 ppm
Specific Conductance (mhos. x 10^{-5} @ 25°C)	~~0.0225~~ 2250
pH value	7.2
Color	10
Turbidity	2.7
SSP	
SAR	

NOTE:
T denotes trace amount (Less than 0.01 ppm)

Analysed by: Yn- Gates

NOVA SCOTIA DEPARTMENT OF MINES
GROUNDWATER SECTION
CHEMICAL ANALYSIS OF WATER

Sample No.: WELL No. 4
Area: Shubenacadie
Grid Location: 11E3 Windsor Gr.
Source:
Field Measurements: Temp: 55°F

Date Sampled: October 2, 1970
Date of Analysis: October 25, 1970
Sampled By: T. W. Henniger
Aquifer:
pH: ; Fe:

Remarks: Surface Water 600 Wildlife Park, Well 116' csq Length 102 Dia. 6

	ppm	epm
Calcium	64.1	
Magnesium	34.0	
Sodium	76.0	
Potassium	1.2	
Iron Total	0.31	
Manganese Total	0.040	
Sulphate	249.8	
Chloride	26.8	
Fluoride	0.08	
Nitrate	3.12	
Silica	7.72	
Boron	0.10	
	ppb	
Copper	100	
Lead	10	
Zinc	40	
Other (specify)		

Alkalinities:	
-Phenolphthalein as $CaCO_3$	NIL
-Methyl Orange as $CaCO_3$	104.9 ppm
Hardness (Total as $CaCO_3$)	138.1 ppm
Loss of Ignition (1 hr. @ 500°C)	374.0 ppm
Total Dissolved Solids	876.6 ppm
Suspended Matter	0.060 ppm
Specific Conductance (mhos. x 10^{-5} @ 25°C)	~~0.006~~ 600
pH value	7.7
Color	5
Turbidity	3.7
SSP	
SAR	

NOTE:
T denotes trace amount (Less than 0.01 ppm)

Analysed by: W. Gates

1330

NOVA SCOTIA WATER AUTHORITY

CHEMICAL ANALYSIS OF WATER

NOV 12 [illegible]
NOVA [illegible] 22

LOCATION: Shubenacadie
11 E/3 B 790

DATE SAMPLED: 15/8/70

DATE RECEIVED: 5/10/70

IDENTIFICATION MARK: WELL NO. 1

SAMPLED BY: T.W. Hennigar

SUBMITTED BY: T.W. Hennigar

N.S.D.M., Box 1087, Halifax, N.S.

	ppm	epm		
Calcium	68.2	3.40	Alkalinities	
			–Phenolphthalein as $CaCO_3$	40
Magnesium	2.15	.181	–Methyl Orange as $CaCO_3$	.32
Sodium	2.0	.087	Hardness (Total as $CaCO_3$)	181.0
Iron Total	0.02	.001	Loss on Ignition (1 hr. @ 500°C)	
Manganese Total			Total Dissolved Solids	
Sulphate	11	.229	Suspended Matter	
Chloride	14.2	.400	Specific Conductance (mhos. x 10^{-5})	26
Nitrate	T		pH Value	6.4
			Color	10
			Turbidity	10

REMARKS: DEPTH = 11', DIAM = 3'

TOTAL HARDNESS - DETERMINED BY EDTA TITRATION.
In - T DENOTES TRACE AMOUNT (LESS THAN 0 01 p.p.m).
Fe - T DENOTES TRACE AMOUNT (LESS THAN 0.01 p.p.m).
Na - DETERMINED BY FLAME PHOTOMETER.

DATE: November 9, 1970

ANALYSED BY: [signature]

48378/1

NOVA SCOTIA DEPARTMENT OF MINES
GROUNDWATER SECTION
CHEMICAL ANALYSIS OF WATER

Sample No.: Well Point No. 2
Area: Shubenacadie (Lands and Forests)
Grid Location: 11 E 3 B 79 O
Source: Glaciofluvial sands, Depth = 11'
Field Measurements: Temp:
Remarks:

Date Sampled: November 3, 1970
Date of Analysis: November 27, 1970
Sampled By: Terry W. Hennigar
Aquifer: Surficial sands/Windsor Group
pH: ; Fe:

	ppm	epm
Calcium	2.9	
Magnesium	0.6	
Sodium	6.5	
Potassium	1.0	
Iron Total	0.11	
Manganese Total	0.05	
Sulphate	1.78	
Chloride	6.0	
Fluoride		
Nitrate	3.22	
Silica	17.35	
Boron	0.75	
	ppb	
Copper	450	
Lead	30	
Zinc	40	
Other (specify)		

Alkalinities:	
-Phenolphthalein as $CaCO_3$	0.0
-Methyl Orange as $CaCO_3$	33.8
Hardness (Total as $CaCO_3$)	29.5
Loss of Ignition (1 hr. @ 500°C)	20.5
Total Dissolved Solids	
Suspended Matter	0.11
Specific Conductance (mhos. x 10^{-5} @ 25°C)	90
pH value	6.8
Color	5
Turbidity	2.49
SSP	
SAR	

NOTE:
T denotes trace amount (Less than 0.01 ppm)

Analysed by:

APPENDIX C

Results of bacteriological examination of water samples from selected wells in the Shubenacadie area.

BACTERIOLOGICAL EXAM. OF WATER

SAMPLE TAKEN BY T W HENNIGAR

FOR _____ D.H.M.O.

DATE 15 Sept/70

SOURCE OR LOCATION Dept of Lands & Forests Park Shubenacadie WELL No. 1

☐ TREATED ☑ RAW

☐ MUNICIPAL ☐ LAKE
☐ SPRING ☐ SWIMMING AREA
☑ WELL ☐ SWIMMING POOL
☐ RIVER ☐ BEACH
OTHER _____

NAME T W HENNIGAR

ADDRESS GROUNDWATER GEOLOGIST
P.O. Box 1087 N.S.
HALIFAX, N.S.

SEP. 17. 1970
DATE REPORTED

PLEASE SEE REVERSE SIDE.

LAB. NO. SEP 1670 72208 — 4 UNITS

REPORT

NUMBER OF COLIFORM MICROORGANISMS PER 100 ML OF SAMPLE

2100

GRADE (FOR UNTREATED WATER ONLY) C

INTERPRETATION

GRADE A. SATISFACTORY, LESS THAN 2 PER 100 ML. OF SAMPLE)
GRADE B. DOUBTFUL, BETWEEN 2 AND 10 PER 100 ML. OF SAMPLE)
GRADE C. UNSATISFACTORY, GREATER THAN 10 PER 100 ML. OF SAMPLE)

R. S. Martin
DIRECTOR
DIVISION OF LABORATORIES

NOVA SCOTIA DEPT. OF PUBLIC HEALTH
5800 UNIVERSITY AVENUE HALIFAX, N.S.

BACTERIOLOGICAL EXAM. OF WATER

SAMPLE TAKEN BY T W HENNIGAR

FOR Lands & Forests D.H.M.O.

DATE 23 Sept/70

SOURCE OR LOCATION WELL No. 1 Shubenacadie

☐ TREATED ☑ RAW

☐ MUNICIPAL ☐ LAKE
☐ SPRING ☐ SWIMMING AREA
☑ WELL ☐ SWIMMING POOL
☐ RIVER ☐ BEACH
OTHER _____

NAME T. W. HENNIGAR

ADDRESS GEOLOGIST, Dept of Mines
P.O. Box 1087 N.S.
HALIFAX, N.S.

Sept 25/70
DATE REPORTED

PLEASE SEE REVERSE SIDE.

KAD

LAB. NO. SEP 2470 73043 — 4 UNITS

REPORT

NUMBER OF COLIFORM MICROORGANISMS PER 100 ML OF SAMPLE

SEP 25 1970 240

GRADE (FOR UNTREATED WATER ONLY) C

INTERPRETATION

GRADE A. SATISFACTORY, LESS THAN 2 PER 100 ML. OF SAMPLE)
GRADE B. DOUBTFUL, BETWEEN 2 AND 10 PER 100 ML. OF SAMPLE)
GRADE C. UNSATISFACTORY, GREATER THAN 10 PER 100 ML. OF SAMPLE)

R. S. Martin
DIRECTOR
DIVISION OF LABORATORIES

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5800 UNIVERSITY AVENUE HALIFAX, N.S.

BACTERIOLOGICAL EXAM. OF WATER

SAMPLE TAKEN BY T W HENNIGAR

FOR Lands & Forests D.H.M.O.

DATE 24 SEPT/70

SOURCE OR LOCATION WELL No. 1 SHUBENACADIE

☐ TREATED ☐ RAW

☐ MUNICIPAL ☐ LAKE
☐ SPRING ☐ SWIMMING AREA
☐ WELL ☐ SWIMMING POOL
☐ RIVER ☐ BEACH
OTHER _____

NAME T.W. HENNIGAR

ADDRESS GEOLOGIST
P.O. Box 1087 N.S.
HALIFAX, N.S.

Sept 26/70
DATE REPORTED

PLEASE SEE REVERSE SIDE.

LAB. NO. SEP 2570 73166 — 4 UNITS

REPORT

NUMBER OF COLIFORM MICROORGANISMS PER 100 ML OF SAMPLE

18

GRADE (FOR UNTREATED WATER ONLY)

INTERPRETATION

GRADE A. SATISFACTORY, LESS THAN 2 PER 100 ML. OF SAMPLE)
GRADE B. DOUBTFUL, BETWEEN 2 AND 10 PER 100 ML. OF SAMPLE)
GRADE C. UNSATISFACTORY, GREATER THAN 10 PER 100 ML. OF SAMPLE)

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NOVA SCOTIA DEPT. OF PUBLIC HEALTH
5800 UNIVERSITY AVENUE HALIFAX, N.S.

BACTERIOLOGICAL EXAM. OF WATER

SAMPLE TAKEN BY T. W. HENNIGAR

FOR Dept of Lands & Forests D.H.M.O.

DATE 29 Oct 70

SOURCE OR LOCATION Open well at Wildlife Park, Shubenacadie

☐ TREATED ☑ RAW

☐ MUNICIPAL ☐ LAKE
☐ SPRING ☐ SWIMMING AREA
☑ WELL ☐ SWIMMING POOL
☐ RIVER ☐ BEACH
OTHER

NAME T. W. HENNIGAR

ADDRESS GEOLOGIST, N.S. Dept of Mines
P.O. Box 1087, HALIFAX N.S.

Nov 3
DATE REPORTED

PLEASE SEE REVERSE SIDE.

LAB. NO. Nov 270 76115 1 UNITS

REPORT

NUMBER OF COLIFORM MICROORGANISMS PER 100 ML OF SAMPLE

90

GRADE (FOR UNTREATED WATER ONLY) C

INTERPRETATION

GRADE A. SATISFACTORY, LESS THAN 2 PER 100 ML. OF SAMPLE
GRADE B. DOUBTFUL, BETWEEN 2 AND 10 PER 100 ML. OF SAMPLE
GRADE C. UNSATISFACTORY, GREATER THAN 10 PER 100 ML. OF SAMPLE

A.G. L. S. Martin
DIRECTOR
DIVISION OF LABORATORIES

NOVA SCOTIA DEPT. OF PUBLIC HEALTH

5800 UNIVERSITY AVENUE HALIFAX, N.S.

BACTERIOLOGICAL EXAM. OF WATER

SAMPLE TAKEN BY T. W. HENNIGAR

FOR N S DM D.H.M.O.

DATE 3 Nov 70

SOURCE OR LOCATION WELL POINT #2 WILDLIFE PARK SHUBENACADIE

☐ TREATED ☑ RAW

☐ MUNICIPAL ☐ LAKE
☐ SPRING ☐ SWIMMING AREA
☑ WELL ☐ SWIMMING POOL
☐ RIVER ☐ BEACH
OTHER

NAME T. W. HENNIGAR

ADDRESS GEOLOGIST, P.O. Box 1087
N.S. DEPT OF MINES N.S.
HALIFAX, N.S.

Nov 5
DATE REPORTED

PLEASE SEE REVERSE SIDE.

LAB. NO. Nov 471 76344 1 UNITS

REPORT

NUMBER OF COLIFORM MICROORGANISMS PER 100 ML OF SAMPLE

5

GRADE (FOR UNTREATED WATER ONLY) B

INTERPRETATION

GRADE A. SATISFACTORY, LESS THAN 2 PER 100 ML. OF SAMPLE
GRADE B. DOUBTFUL, BETWEEN 2 AND 10 PER 100 ML. OF SAMPLE
GRADE C. UNSATISFACTORY, GREATER THAN 10 PER 100 ML. OF SAMPLE

L. S. Martin
DIRECTOR
DIVISION OF LABORATORIES

NOVA SCOTIA DEPT. OF PUBLIC HEALTH

5800 UNIVERSITY AVENUE HALIFAX, N.S.

KAD