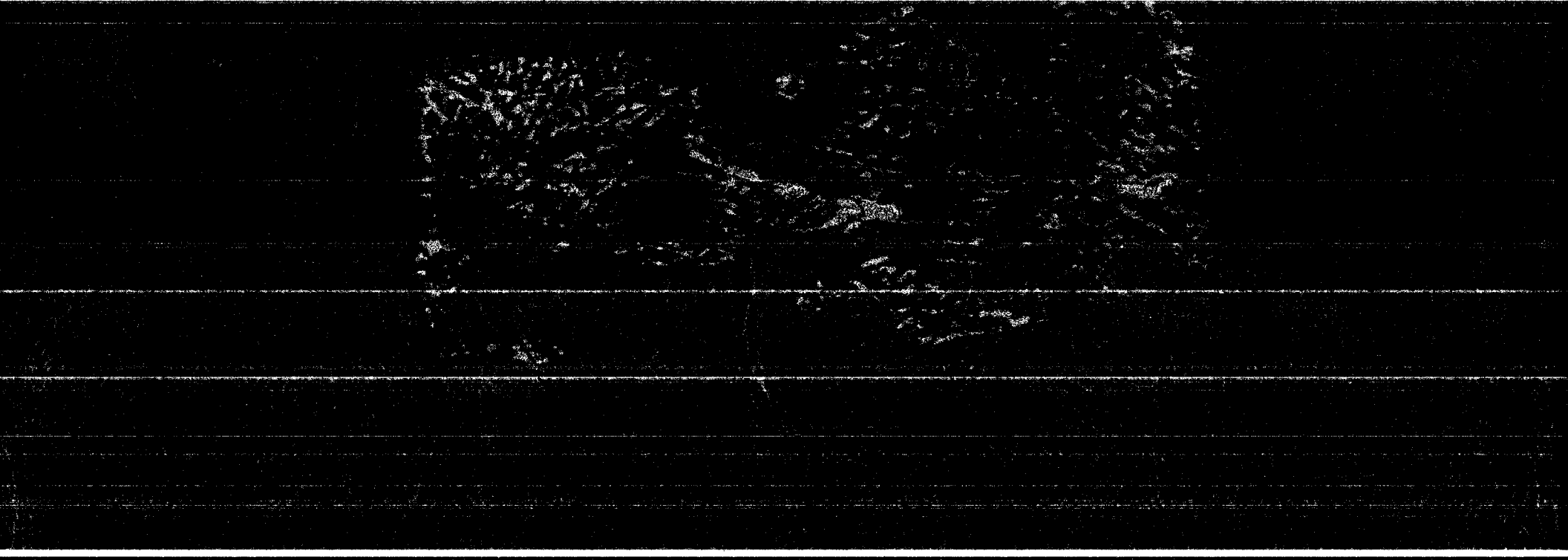


CHESTERVILLE INTERIM FLOOD CONTROL PROJECT

GROUNDWATER STUDY, SOUTH NATION RIVER

Evaluation of Effects of Proposed Channelization on Water Wells

Conducted With:

J.P. Jolly and Associates Ltd.

1.0 INTRODUCTION

The South Nation River Conservation Authority is in the process of channelizing the South Nation River upstream of the Village of Chesterville, Ontario. The work includes excavation to about 2 metres below the existing river bed and enlargement of the river cross section area.

During the summer of 1980, Contract Area 2 which is located between chainage 4 + 000 and 6 + 790 upstream of the Casselman dam and in Chesterville was channelized. Four wells apparently malfunctioned as a result of dewatering associated with construction activities.

During 1981 it is the intention of the Authority to proceed with the channelization of Contract Area 3 which is located between chainage 6 + 790 and 10 + 000. In order to identify the potential well problems that may occur, the Conservation Authority engaged Water and Earth Science Associates Limited to conduct a hydrogeological investigation of the aquifers and wells adjacent to the River. Areas 4, 5 and 6 which are proposed for channelization work sometime after 1981 were also included in the project.

The study terms of reference included the following work elements.

A) Review information on existing wells and collect information on performance from interviews and water quality from sampling.

B) Determine the effect of channelization works, including construction methods, on groundwater supply and water quality.

C) Determine other possible environmental impacts.

D) Review plans and construction methods within the contract area and evaluate the possibilities of changes to design or

construction methods to ensure short- and long-term water supply and water quality consistent with past performance of the water wells or remedial works which may be appropriate.

E) Prepare a work program for all affected water wells including scheduling and cost estimates for recommended remedial works contemplated before, during and after construction.

F) Detail and monitoring program for local wells and groundwater levels and evaluate the use of boreholes, pumping tests, etc.

G) Determine the potential effects of channelization on the groundwater regime from the Contract 3 area to the terminus of the channelization works. This will provide an overview for future detailed studies.

The report outlines the findings of our investigation.

1.1 Location of Study Area

To provide essential background information for our work, the geology and hydrogeology of the study area was investigated at a Regional scale. An approximately three kilometer corridor northwest and southeast of the South Nation River was included (Figure 1) and data were plotted on a 1:50,000 base map.

Individual hydrogeological investigations of properties close to the South Nation River required data evaluation at a local scale. A one-half kilometer corridor was defined from the river with data plotted at 1:25,000 and 1,1000 scales for these analyses.

1.2 Study Methodology

All published geological, hydrogeological and hydrological information about the study was analyzed. This included bedrock geology maps (Wilson 1946), surficial geological maps of

FIGURE 1

WELL LOG AND CONTRACT AREA LOCATION MAP

SOUTH NATION RIVER

LEGEND

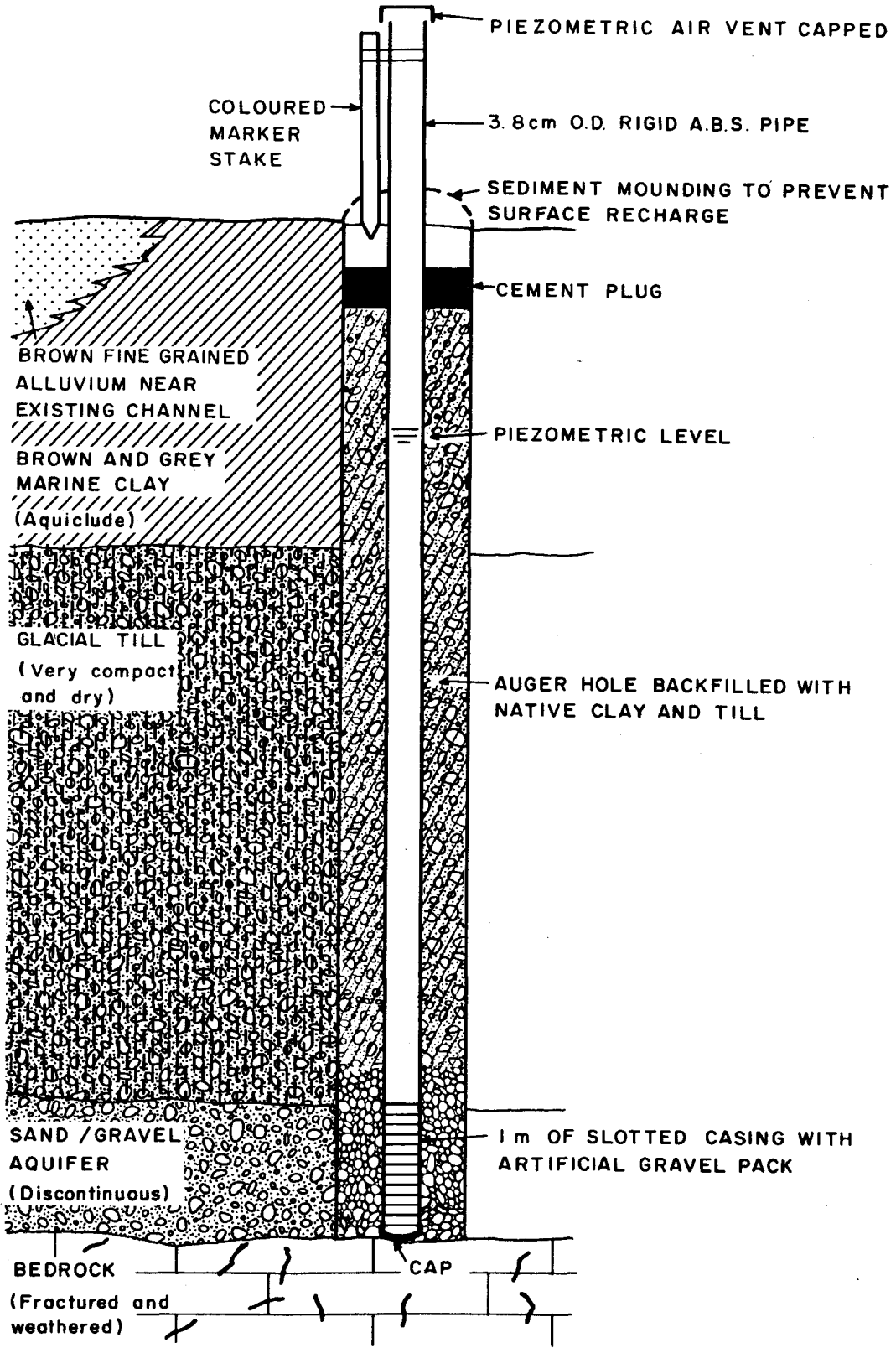
- 5 — CONTRACT AREA NUMBER
- 31• — WELL LOCATION AND NUMBER (M.O.E. well log.)
- T5• — TEST HOLE LOCATION AND NUMBER
- ——— BOUNDARY OF STUDY AREA

adjoining areas (Gadd et al 1980) and a hydrogeological evaluation of the South Nation Watershed (Ministry of Environment Water Resources Report 13, 1980). Unpublished information from Ministry of the Environment files (Water Supply of Canada), Dilon Engineering Ltd. and the South Nation River Authority about waterwells and the construction practises employed for Contract Area 2 was researched.

A hydrogeological investigation of four wells in Contract Area 2 (Geo-Analysis Ltd. 1980) was reviewed but was not utilized in the preparation of this report. The present investigators are not in agreement with the hydrogeological interpretations presented in this document.

A total of 118 water well records located for the study area were collected and plotted at a Regional scale. (These data are included as Appendix A.) Well locations are shown on Figure 1. Bedrock contour, gravel distribution and potentiometric maps were produced from this data. A house-to-house survey was conducted of all residences within one-half kilometre of the river in Contract Areas 3, 4, 5 and 6. A prepared checklist of well design, water use and related information was completed at each residence. Each water supply was sampled for chemical and bacterialogical analysis. Driller's water well records were matched to each farm and residence wherever possible. The resulting information is synthesized in Appendix B of this report.

To verify stratigraphic and hydrogeological information, eight test holes were drilled to bedrock in pertinent areas adjacent to the river. Piezometers were installed in eight of the test holes to permit groundwater flow monitoring. A pump test program will be conducted to define aquifer hydraulic and recharge characteristics (to be reported upon). Piezometer design is shown as Figure 2 of this report.



Note: Thicknesses of each stratigraphic unit variable.

FIGURE 2

GENERALIZED STRATIGRAPHY AND PIEZOMETER COMPLETION DIAGRAM

SOUTH NATION RIVER

2.0 SUMMARY OF REGIONAL DATA

Summaries of pertinent regional information is included here under the headings regional geology, regional hydrogeology, basin hydrology, construction practices and river hydraulics. This discussion forms a foundation on which conclusions about the potential dewatering of wells adjacent to the river in subsequent report sections have been based.

2.1 Regional Geology

Table 1 of this report outlines the major stratigraphic units which are present in the study area and very briefly summarizes their geological history.

Bedrock composed of grey limestone dolomite and shale of the Pamelia member of the Ottawa Formation (Ordovician age, 440 million years old) is overlain by alluvial and/or glaciofluvial sands and gravels, glacial till and marine clay. Bedrock was exposed to subaerial erosion for an immense time period. The upper bedrock surface is fractured, weathered and permeable as a consequence.

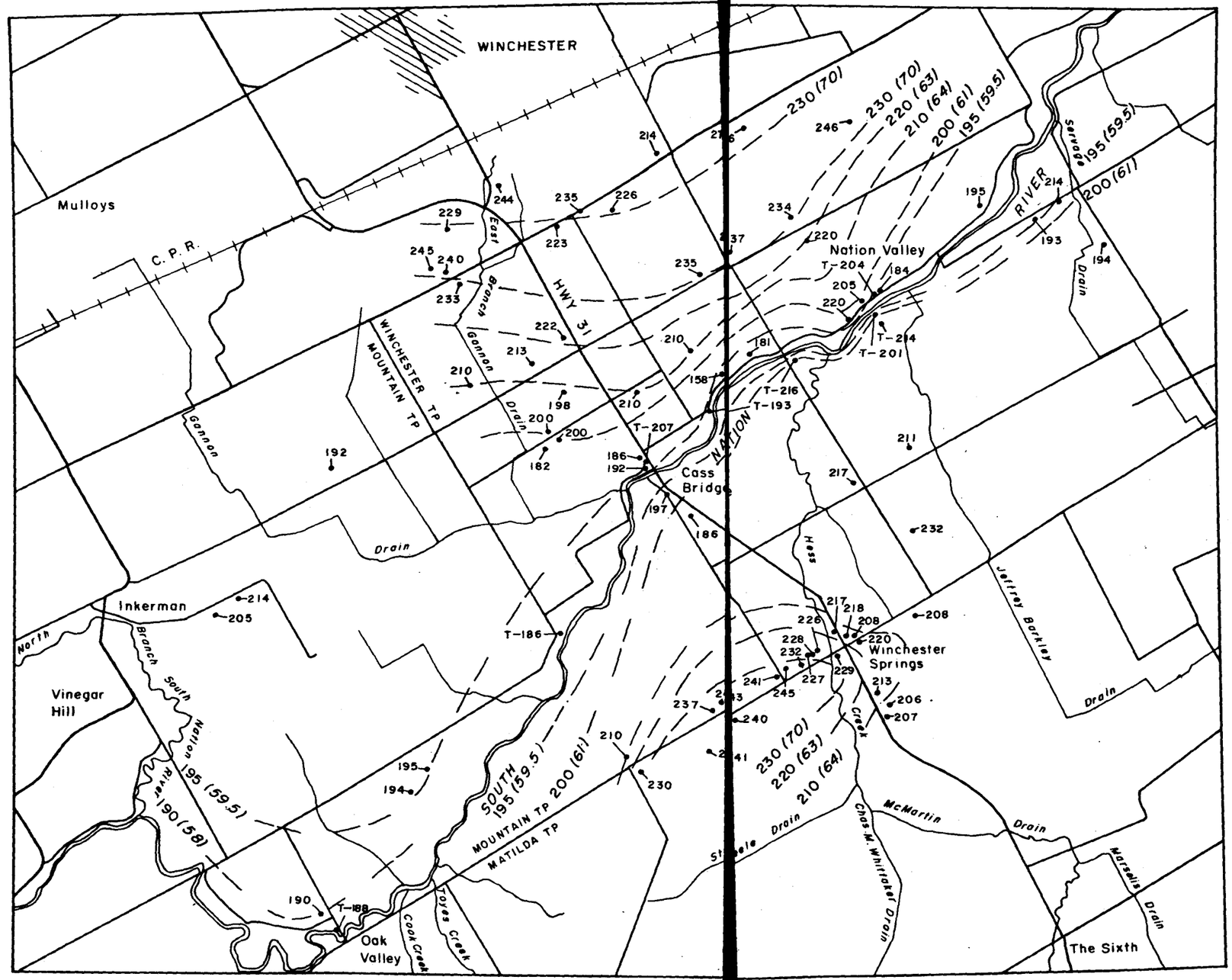
A bedrock contour map, Figure 3 shows that a deep river channel trending NE-SW was eroded into limestone during this time. This bedrock structure underlies the existing South Nation River channel and undoubtedly controlled the current location of the river.

The South Nation River Basin was glaciated at least four times in the Pleistocene Period which began some 2.5 million years ago. Prior to the last major ice re-advanced, called the Wisconsin, gravel and sand deposits which are likely to be partly alluvial and partly glaciofluvial origin were deposited in and adjacent to this buried valley structure. Subsequently, these granular deposits were over ridden by glacial ice and were covered

FIGURE 3

BEDROCK CONTOUR MAP

SOUTH NATION RIVER



LEGEND

- • WELL LOCATION
- T• TEST HOLE LOCATION
- 214 BEDROCK SURFACE ELEVATION (Feet A.S.L.)
- —200— BEDROCK SURFACE CONTOUR (Feet)
- —(61)— BEDROCK SURFACE CONTOUR (Metres)

(Based on well log data)

N

0 1/2 1 2 km

TABLE 1: GENERALIZED STRATIGRAPHY OF STUDY AREA

Thickness		Lithology	Origin	Comments
0-.5 m		Fine sand and silt	Alluvium	Thin, discontinuous veneer.
0-8 m		Brown or grey clay	(sea receeded about 10,600 B.P.) Champlain Sea clay	Brown where oxidized, thick, plastic where wet, very low permeability, in lowland areas.
11 m max.	Ⓒ	Silty and sandy till, grey with black limestone pebble clasts minor sand lenses, minor boulder horizons	(Ice retreat around 12,000 B.P.) Wisconsin glacial ice contact deposit	Generally becomes sandier with depth, very compact, only upper layers are water saturated, lower layer are dry.
0-1.5 m		Sand, grit, fine pebbley gravel	Pre-till Ancient alluvium and/or glacio-fluvial deposit	Stratified, very compact, water bearing, very localized in extent.
	Ⓑ	Fractured upper bedrock surface		
		Bedrock argillaceous limestone	Ordovician Sea deposit (400+ million years old)	Fractured and weathered upper surface.
	Ⓐ			

NOTE: Three aquifers are present.

A) Deep Bedrock Fractures - water comes from bedding planes, joints and fractures in bedrock limestone (confined conditions).

B) Gravel/Bedrock interface - water comes from gravels and fractured upper bedrock surface (confined conditions).

C) Surficial - water comes from sandy layers in till (unconfined conditions).

with a thick sheet of drumlinized glacial till. The gravel unit is black, stratified and composed of fine grained argillaceous limestone pebbles with a minor Precambrian granitic content. The gravel has a highly variable spatial distribution and thickness (Figure 4). Where present, gravel strata are water bearing, have a high hydraulic conductivity and are an excellent aquifer. It is likely that the gravel material is hydraulically connected to the weathered and fractured upper bedrock surface.

Glacial till material is grey, has a silty clay to fine sandy matrix, has predominantly pebble and few boulder sized clasts, is dense and is generally dry. Well logs indicate that sandy layers may exist in the compact till sequence. These are reported to be water bearing in places and appear to furnish low water yields to several shallow dug wells. This evidence was not supported by the test drilling conducted for this study, however.

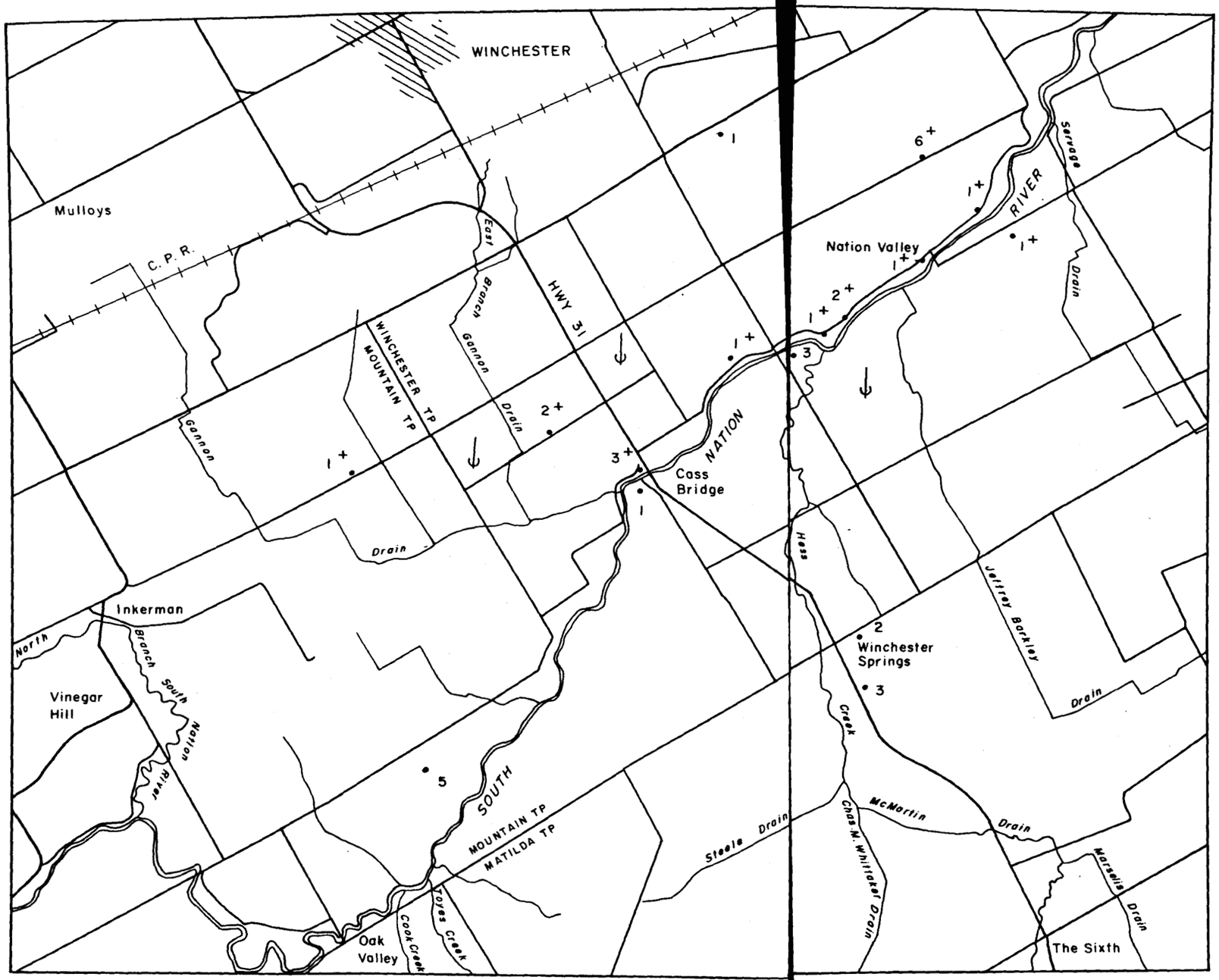
After glacial ice retreated from the South Nation River Basin, the area was submerged by a marine intrusion called the Champlain Sea. Thin deposits of grey, water-saturated, plastic clay were deposited in lowland depressions along the South Nation River floodplain. The upper surface of the clay material is often brown in colour and is silty due to the processes of marine reworking and oxidation. The Champlain Sea retreated some 10,600 years B.P. and the pre-glacial drainage pattern of river basin was re-established.

It is possible that the South Nation River initially flowed to the southwest but rapid isostatic rebound of the area caused flow to the northeast along the present channel to be established. The river channel was rapidly entrenched in the easily eroded clay and till materials. Some meander scars are evident on aerial photos in the study reigon, however, the deposition of fine grained alluvium in recent times is apparently restricted to areas very close to the existing river.

FIGURE 4

SAND / GRAVEL AQUIFER DISTRIBUTION MAP

SOUTH NATION RIVER



LEGEND

- DRUMLINS, INDICATING ICE FLOW DIRECTION
- • WELL LOCATION WHERE GRAVEL ENCOUNTERED
- 5 GRAVEL THICKNESS (Metres)

N

0 1/2 1 2 km

Two geological cross sections (Figures 5 and 6) have been prepared which permit the geology of the study area to be visualized in three dimensions. One profile extends along the river through Contract Areas 3 - 6 and the second cuts perpendicular to the river at Cass Bridge.

2.2 Regional Hydrogeology

Three aquifers are indicated in the study area as shown on Table 1: A) deep fractures in the bedrock, B) the gravel/bedrock surface interface, and C) permeable layers in or at the surface of the glacial till sheet. It should be noted that the marine clay is an aquilude and most of the till unit is barren of water.

A potentiometric map (Figure 7) produced from well log data of aquifers A and B (above) indicate that potentiometric contour parallel and slope towards the South Nation River from both the northwest and southeast. Regional groundwater flow in a southeasterly and northwesterly direction towards the river is indicated. Note that hydraulic gradients near the river are very flat. A 220 ft (67.0 m) contour can be drawn along both NW and SE sides of the river while river levels vary at elevations less than 219 ft (66.7 m) with seasonal fluctuations.

Field observations made during the channelization of Contract Area 2 showed that water discharge was occuring from lower depths of the banks of the river when the channel was pumped dry in places.

A review of the water well logs included in Appendix A revealed that all wells in the bedrock or gravel/bedrock surface interface had yields sufficient for present domestic residences. Many wells into these aquifers furnish water for large dairy cattle (100 head) and pig operations (1300 head).

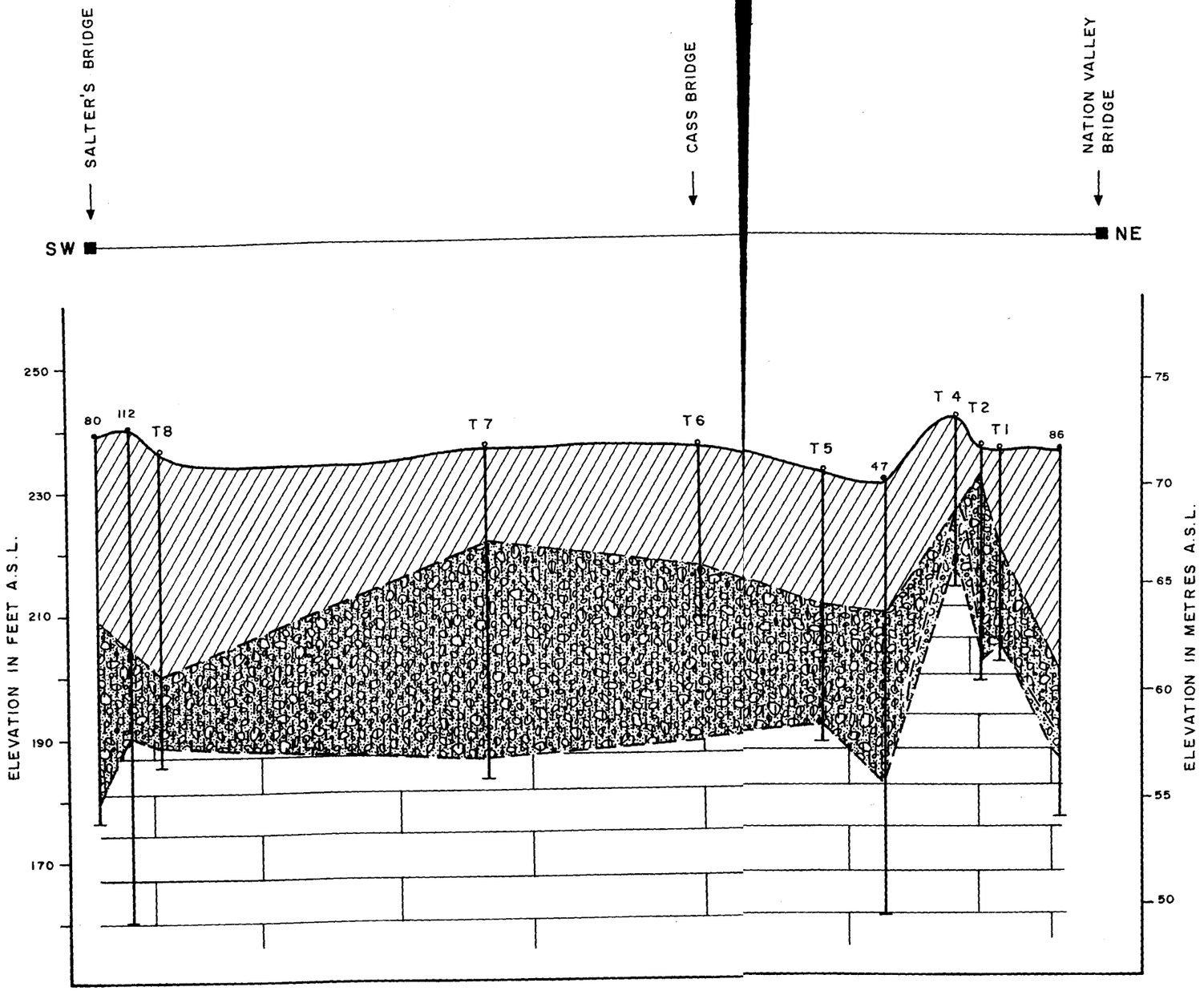


FIGURE 5

STRATIGRAPHIC PROFILE ALONG SOUTH NATION RIVER

LEGEND

- CLAY and SILT or SAND
- TILL
- GRAVEL
- LIMESTONE
- 83 • WELL LOCATION AND NUMBER
- T2 ° TEST HOLE LOCATION AND NUMBER

0 1/2 1 2 km

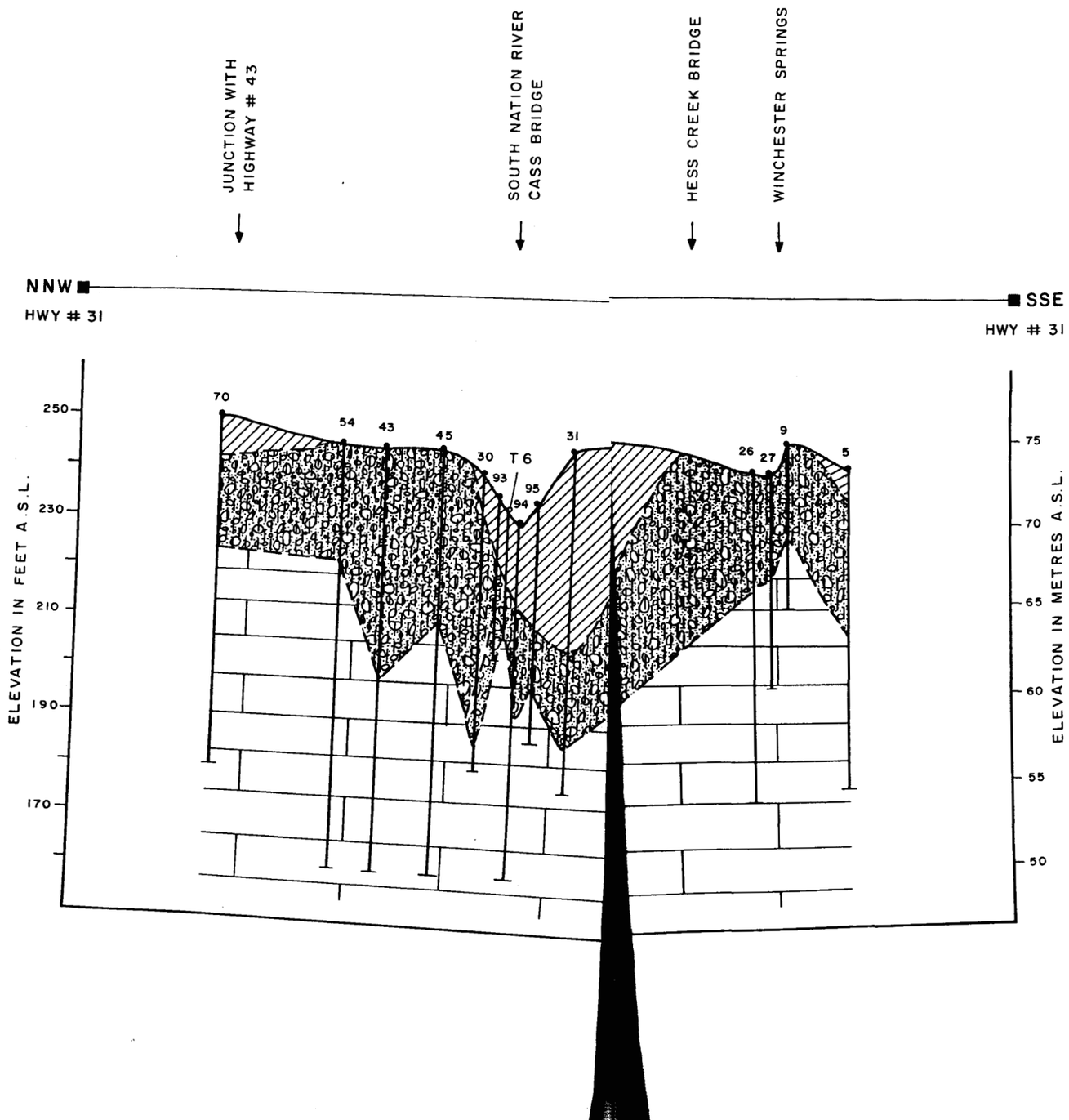


FIGURE 6.

STRATIGRAPHIC PROFILE ALONG HWY # 31 NEAR SOUTH NATION RIVER

LEGEND

- CLAY and SILT or SAND
- TILL
- GRAVEL
- LIMESTONE
- 45 • WELL LOCATION AND NUMBER
- T6 ° TEST HOLE LOCATION AND NUMBER

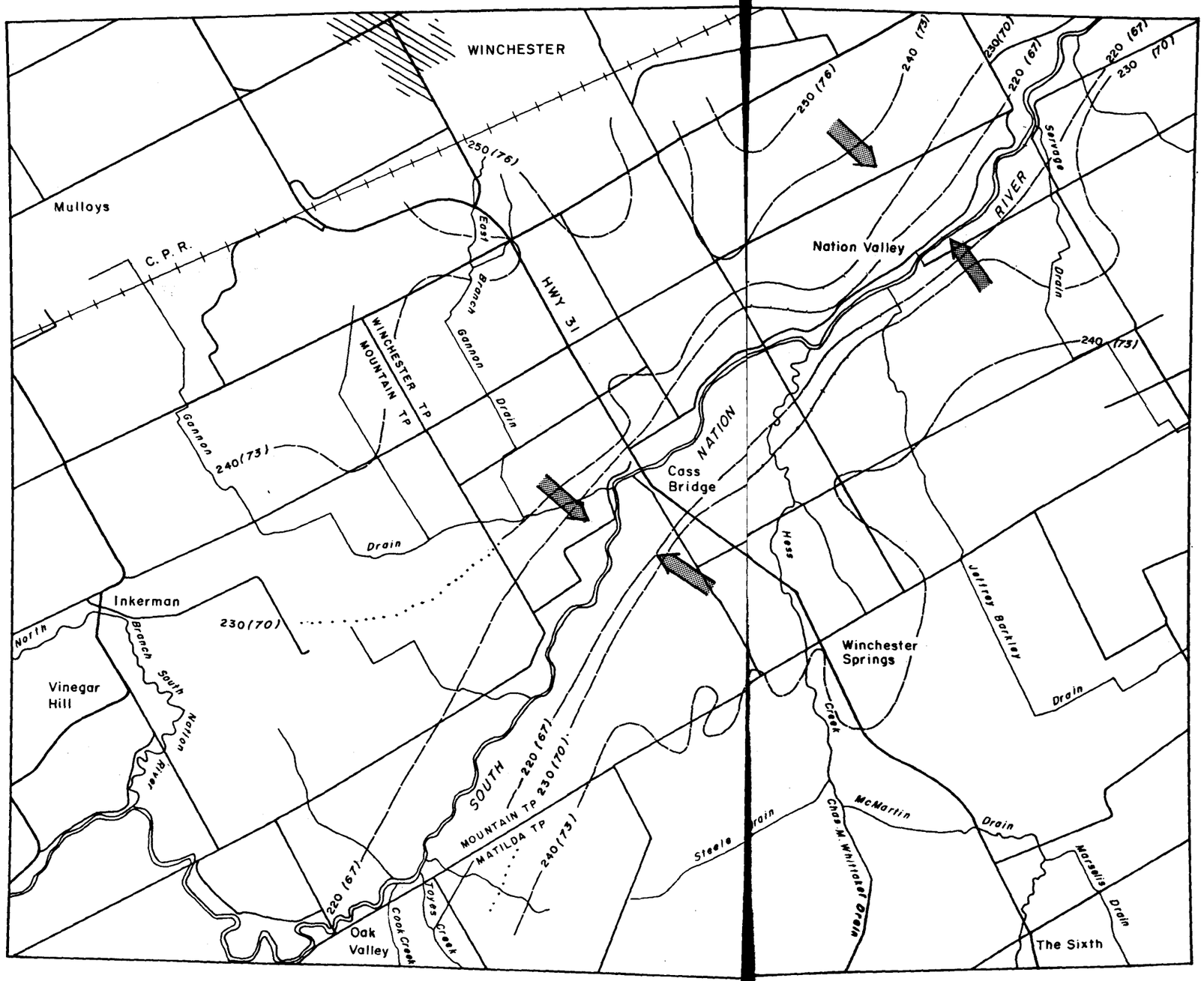
HORIZONTAL SCALE

0 1/2 1 2 km

FIGURE 7.

PIEZOMETRIC CONTOUR MAP

SOUTH NATION RIVER



LEGEND

GROUNDWATER FLOW DIRECTION

—240— PIEZOMETRIC SURFACE CONTOUR (Feet)

—(73)— PIEZOMETRIC SURFACE CONTOUR (Metres)

(Based on well log data.)

2.3 Basin Hydrology

The total drainage of the South Nation River is 3870 square kilometres. The twenty-five average annual water balance indicates 84 cm of precipitation, 50 cm of evapo-transpiration and 33 cm of runoff.

Two hydrometric stations pertinent to the present study on the main river are at Plantagenet Springs; where the drainage area is 3820 square kilometres, and at Chesterville immediately downstream of the study reaches where the drainage area is 1030 square kilometres. Flow records have been taken at Platagenet Springs since 1950 and at Chesterville since 1972. The long-term average flow at the former station is 39.4 m^3/second. The average mean daily flow for the three years 1972-74 at Chesterville is 16.6 m^3/second; however, the comparible statistics at Plantagenet Springs is 65.1 m^3/second or 1.66 times the long-term average. Thus the long-term mean daily flow at Chesterville most likely is approximately 9.9 m^3/second (16.6 m^3/second is equivalent to 49.8 cm of runoff over the drainage area upstream of Chesterville. (This value is at variance with the long-term water balance statistics).

Since 1975 only flow during the spring runoff period, approximately mid March to mid May have been recorded at Chesterville. The 1975 flow records for both hydrometric stations were examined. This year was wetter than normal and over the basin the annual run-off was 40.9 cm at Plantagenet Springs. Twenty-two percent (29.6 cm) of the yearly runoff occurred in the spring runoff period. At Chesterville the spring runoff was 23.3 cm less than of the larger drainage area of which it is a part.

The unit maximum daily mean flows in 1975 are 1.46 m^3/second per square kilometre at Plantagenet Springs which occurred on April 20th and .73 m^3/second per square kilometre at Chesterville on April 15th. Since, in general, a smaller drainage area has a higher unit maximum daily flow than a large area from the same

runoff producing event and there was five days between the occurrence of the two flow peaks, the two floods were not caused from the same combinations of snowmelt and rainfall. (Basinwide annual isolines are not available.) Hence it is assumed that the small drainage area produces either the same or more unit runoff values from the same precipitation amounts. Thus the long term runoff pattern shown in Table 2 is assumed applicable to the drainage upstream of Chesterville. As will be covered later, it has been found that the overburden groundwater table for the two Ministry of National Resources observation tables follow the same pattern.

2.4 Construction Practices

This section of the report outlines the construction practices that were used in Contract Area 2.

The channelization was undertaken during the summer of 1980 from station 3 + 900 to station 6 + 790 upstream of the Casselman Dam in Chesterville. The distance along the thalweg is approximately 2.9 kilometres. The invert of the new channel is at 64.5 metres above datum. During excavation the following geological material types were exposed at various places in the new channel bed: sand with some boulders, mixture of sand and silt, hardpan clayey till and, limestone. The slopes of the new channel consists of the following material: leya clay, sands and salts, and some gravels.

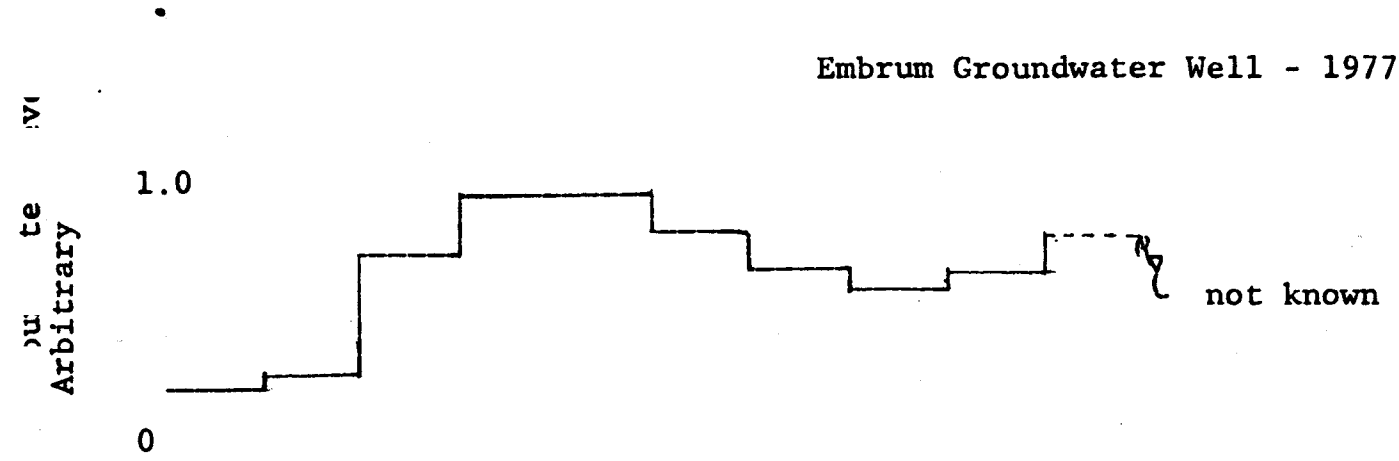
Two construction techniques were used to dredge the channel. The method used was determined by the bearing capacity of the bed materials. In locations where the bed could not support construction equipment a rock fill construction road was built longitudenal along the axis of the channel with an exit road to one shore, and a steam shovel dug the channel from each side of the road into trucks which transported the material to spoil areas. After the channel on each side of the road had been dug to the prescribed dimensions, the construction road was removed by the

TABLE 2: OBSERVATION WELL DATA

Chesterville Well

Year	Range of river level (spring only) (m)	Date of max. river water level	Max. river water level (AMSL)	Range of ground-water level in spring	Date of max. ground-water level (approx.)	Max. ground-water level Pf. (AMSL)	Min. ground-water level (non-freezing period)	Range of ground-water level (non-freezing period)	Range of ground-water table excluding spring run-off period (m)
1975	2.12	Apr. 17	66.78						
1976	3.64	Mar 28	68.48						0.48
1977	3.03	Mar. 15	68.09	1.39	Mar. 15	67.48	66.06	1.42	0.64
1978	2.57	Apr. 14	67.85	1.33	Apr. 15	67.00	65.12	1.88	0.60
1979	1.67	Mar. 25	66.78	0.45	Mar. 25	66.24	65.64	0.60	0.45
1980	2.64	Mar. 23	67.69						

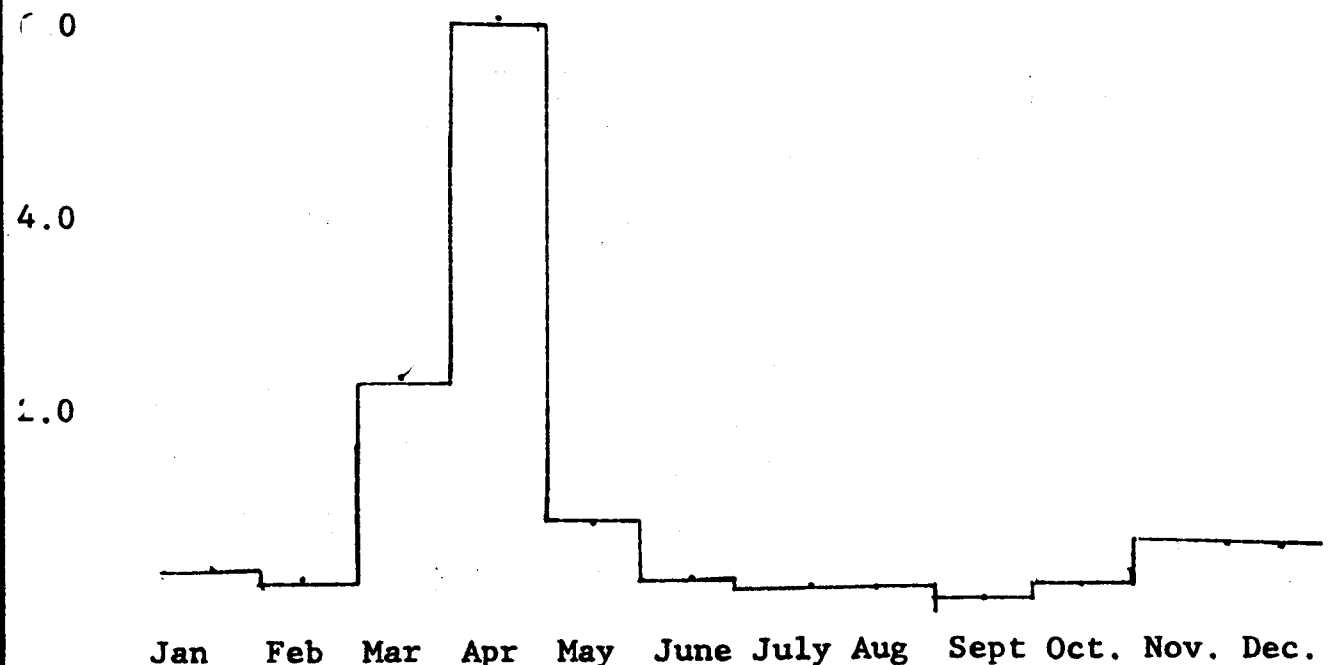
TABLE 3: EMBRUN WELL DATA



South Nation River

Long term average runoff

(determined from Plantagenet Springs Hydrometric Gauge)



shovel as it was moved farther upstream.

In the reaches where the stream bed could support the construction equipment directly, cells averaging between 50 and 300 metres long were built by placement of two coffer dams. The bed between the two coffer dams was pumped dry and the channel dug to the prescribed dimensions with bull dozers. During the execution of both construction techniques there were cases of water seeping from the channel slopes, below elevation 66.67 m and boiling from the channel bed material.

2.5 Reach Hydraulics Summary

The water levels in the study reaches are controlled by elevation of the stop log sills and the gate elevation at the Casselman Dam. During the 1980 construction period the stop log bills were set at elevation 219 feet (66.7 m) with the automatic gate movement mechanism set to open the gate when the water level reaches 219.6 feet and closes when the water level falls to elevation 219.5 feet. A visual examination of the stage recorder at the dam showed that during most of the 1980 construction period the water level was approximately 219.5 feet (66.51 m) but on some occasions it rose to 220.2 feet (66.73 m).

A back water analysis has not been carried out upstream of the dam, however it may be assumed that there is a one foot water level drop between Contract Area 3 and the dam head pond. As a consequence, the normal summer water level in the construction reach will be 220.5 feet.

It is recommended that the same construction practices be followed during dredging of Contract Area 3.

3.0 SUMMARY OF FIELD OBSERVATIONS

Data collected in the field are presented and analyzed under the headings; house-to-house surveys, water chemistry, test drilling and groundwater observation wells.

All the information gathered from interviews of individual home or farm owners, the results of water analyses and drillers' well log summaries is included in Appendix B of this report. These results are presented in this self-inclusive format so that all the information known about each well and residence can be consulted conveniently in one section of this report.

3.1 House-to-House Surveys

The following list summarizes the number and type of wells located in each Contract Area.

Contract Area 3

Drilled wells into bedrock aquifer	=	8
Drilled or dug wells into gravel aquifer	=	8
Dug wells into surficial aquifer	=	1
Well type could not be determined	=	1
TOTAL	=	18

Contract Area 4

Drilled wells into bedrock aquifer	=	5
Drilled or dug wells into gravel aquifer	=	3
Dug wells into surficial aquifer	=	1
Well type could not be determined	=	0
TOTAL	=	9

Contract Area 5

Drilled wells into bedrock aquifer	=	5
Drilled or dug wells into gravel aquifer	=	1
Dug wells into surficial aquifer	=	0

Well type could not be determined	=	0
TOTAL	=	6

Contract Area 6

Drilled wells into bedrock aquifer	=	0
Drilled or dug wells into gravel aquifer	=	7
Dug wells into surficial aquifer	=	0
Well type could not be determined	=	0
TOTAL	=	7

3.2 Water Chemistry

Results of a bacterial and chemical survey of homes adjacent to the South Nation River are summarized in Appendix B.

The following numbers of households in each contract area have water supplies which are considered unpotable for human consumption.

Contract Area 3 - 1 well
Contract Area 4 - 2 wells
Contract Area 5 - 0
Contract Area 6 - 2 wells

In summary, while minor chemical and some bacteriological contamination problems were identified, no water serious quality complaints (ie. high turbidity, colour, odour) which could be related to aquifer contamination by river water were received during the January 1981 sampling period. Several households with deep drilled wells have minor hydrogen sulphide odours, which is a natural condition associated with the geochemical nature of the bedrock in this area.

3.3 Test Drilling

Detailed stratigraphic logs and test drill hole location descriptions are included as Appendix C of this report.

Test holes are also located on Figure 1.

This information has been used to verify the geological information available from well drillers' logs and in the preparation of the various geological figures presented in this document. Several points of interest are worth highlighting from this material.

Presence of Buried Channel

The bedrock surface is deeper beneath the present channel of the South Nation River confirming the presence of a buried, bedrock incised channel under the river.

No Rock Removal Based on Available Information

Results indicate that bedrock is not found above or at the 64.9 m (213 ft) ASL elevation which is the invert of the new channel after channelization. Rock should not be encountered herefore during construction based on available data. Constrictions in the channel in Contract Area 3 (see test hole 1) are caused by dense till material not bedrock.

Gravel Present in Local Pockets

A gravel layer of up to 1.5 m in thickness is located in localized pockets along the river. This is postulated to be an old alluvial and/or glaciofluvial gravel which was overridden by the last glaciation; hence is highly compact but is water bearing. This aquifer is confined. Gravel is only present in one of the five test holes in Contract Area 3.

Analysis of Ministry of Natural Resources Ground Observation Well Data

The Ministry of the Environment has two groundwater observation wells situated in the South Nation River valley in the proximity of the study area. One is located in Chesterville 15 metres from the river bank and upstream of the new Casselman

Dam. The other is located in Embrum near the Castor River; a tributary that enters the South Nation River approximately twenty-five kilometers downstream from Chesterville. Both wells have been drilled into overburden only and are apparently utilizing the gravel/bedrock surface aquifer. Water level data from the Chesterville well are available and were studied from mid May 1976 to October 1979. The well is 4.8 m deep and its surface elevation is 68.6 m above mean sea level. It is located approximately 15 m from the river.

There is water level data available for the Embrun well from mid August 1976 unitl October 1977.

Water levels in the South Nation River at the second bridge upstream from the present Casselman dam are taken by the Water Survey of Canada for the months of March, April and May of each year. The data for the years 1975 through 1980 inclusive were obtained from the Water Survey Ottawa District office and compared with the Chesterville well data.

Although there is not enough information to draw firm conclusions, some hydraulic inferences can be made based on the Chesterville well data.

(1) The maximum piezometric level occurs when the spring peak flow occurs. This indicates that there is a good connection between the river and the adjacent gravel aquifer.

(2) The range of spring piezometric levels fifty feet from this river is approximately one-half the spring range of river water level, and the piezometric level is lower than the river water level during the spring peak flow. During the remainder of the non-freezing period, the piezometric surface is higher than the river level.

During high river flow groundwater movement from the river into the aquifer will occur. Normal low flow groundwater movement is towards the river however (potentiometric map, Figure 7).

It should also be noted that pumping of wells adjacent to the river channel will reverse gradients and cause direct water movement from the river to the well. A pumping test conducted by Dillon Engineering Ltd. in a similar terrain situation in Contract Area 2 confirmed this point. The Mackler household well pumped turbid, colour and contaminated river water within several hours of initiating the pump test. (Archie Dobson, personal communication).

(3) When the period of spring runoff is excluded, the range of piezometric level changes varies between 45 and 64 cm ASL in all years studied. Piezometric levels fell (with a few exceptions when heavy summer rain occured) from a maximum in spring flood to a minimum in late July, then rose to a second lower peak in October.

The Embrum well stratigraphy is 0 to 4.5 m red clay; 4.5 to 14.0 m blue clay; 14.0 m to 14.3 m black gravel; and below 14.3 m dolomite. This stratigraphy is similar to that found in most holes drilled in February 1981 along side the study reaches. There is data available for 1976 and 1979 only. The non-spring range is 24 cm in 1976 and 18 cm in 1977. These magnitudes are less than those measured in the Chesterville well. However, their monthly averages follow the same pattern as river runoff during the non-freezing period of the year - highest in April - May and lowest in August. (Table 3.)

4.0 EVALUATION OF POTENTIAL WELL WATER QUANTITY AND QUALITY PROBLEMS

The potential of each well located within one-half kilometer of the study corridor is evaluated in this section of the report. It is assumed that construction methods will be similar to those used in the channelization of Contract Area 2 during the summer of 1980. (Section 2.4).

Briefly, the question to be answered is whether dewatering of reaches of the river and dredging and lowering of the channel invert by 2.0-2.6 metres will cause dewatering or contamination of the various aquifers being utilized by wells near the channel.

First a hydrogeological model which explains the causes of well dewatering and potential water quality degradation is presented. Secondly, some additional points of evidence which support this hypothesis but are not mentioned in Sections 2 and 3 of this report are summarized. Finally, each individual well in Contract Areas 3, 4, 5 and 6 is rated and potential problems are predicted.

4.1 Causes of Well Dewatering

The gravel/bedrock aquifer is likely to extend through much of the study area and to yield particularly high water yields where lenses of gravel occur above bedrock. Strong evidence has been presented to verify that this aquifer is hydraulically connected to the South Nation River. Because of its relatively shallow depth from the ground surface many drilled and dug wells have been constructed into this zone throughout the study region. It should be noted that based on the available evidence neither deep bedrock fracture systems or shallow intra-till sand aquifers are thought to be directly connected to the river.

During summer low flow conditions when channelization takes place, groundwater flows into the river channel from the

river banks except where the flow direction is artificially reversed by well pumping. This is undoubtedly occuring from the gravel aquifer which was, for example, exposed in places in stream bed and banks during the deepening of Contract Area 2.

Dredging exposes more of the aquifer than under natural conditions and channel dewatering increases the water discharge from this aquifer to the river significantly. An increase in hydraulic gradient takes place towards the river as a result. A decrease in piezometric levels in wells adjacent to the river which utilize the gravel/bedrock surface aquifer thereby occurs. This decrease is inversely proportional to the distance between the well and the river.

Since most wells are outfitted with shallow well pumps, which are not capable of drawing water at depths greater than about 6.5 metres, water supply to homes and farms will be interrupted. During this period of construction localized dewatering of the aquifer will occur. This condition is likely to occur until re-establishment of normal river water levels is permitted.

It is probable that the fine grained alluvial material which covers the channel bed is acting as a chemical and microbiological filter (e.g. by cation exchange processes). During dredging operations this filter will be temporarily disturbed and as a result a degredation of the aquifer water quality may occur. Natural resealing of the channel bed should result in the return of the pre-existing water quality conditions in the aquifer.

In summary, it is believed that only wells utilizing the gravel/bedrock interface aquifer will be adversely affected by the channelization operation. Shallow dug wells and deep bedrock wells will not be affected by this process.

4.2 Additional Supporting Evidence

The following field and office derived evidence supports the dewatering model presented above:

a) A number of homes experienced dewatering problems in Area 2 during construction work in 1980. It is likely that most of these wells were utilizing the gravel aquifer. (Geo-Analysis 1980). Two wells at the Byvelds farm (chainage 6 + 750) which are completed into this aquifer experienced water supply problems in 1980 and are situated in close proximity to Contract Area 2.

b) House-to-house surveys revealed a number of residences who mentioned that historically their wells had experienced taste or colour problems during high flow periods. A direct hydraulic connection of a gravel aquifer well to the river explains these historical observations in each case.

c) Piezometric Levels

Preliminary field measurements of piezometric levels and test drilling observations has shown that:

i) the gravel/bedrock aquifer is confined,
ii) water entered piezometers quickly from either the gravel material or the fractured bedrock surface were present, and
iii) water levels in all piezometers were very similar to present river water levels.

Accurate surveying of water levels and pump testing and Hvorslev's recovery analyses (Freeze and Cherry) could not be completed before presentation of this draft final report due to unusual February flood conditions. These results will be included in the final report.

4.3 Potential of Wells to be Effected by Channelization

Each well within the study corridor is included on Table 4 of this report for each contract area. Detailed well locations are shown on Figure 8. The aquifer utilized, well depth and type, dewatering risk and necessity for remedial action is indicated. Details of this information for each well is included in Appendix B.

Wells are rated as having a low, high or naturally high probability to be dewatered.

Wells with a low probability are deep drilled wells utilizing the deep bedrock aquifers. Static levels are usually different from the Nation River levels and suggest penetration of a different groundwater flow regime.

It should be noted that due to the methods usually employed by rotary drillers during the construction of bedrock wells, some of the deep rock wells in each contract area may be receiving water from the gravel/bedrock interface aquifer. In these cases, a decline in static levels may also occur during channel dewatering. This is a factor which cannot be predicted accurately.

Wells with a high probability of being dewatered are those utilizing the gravel/bedrock surface interface aquifer and hence are hydraulically connected to the river.

Wells with a high natural potential to dewater are surficial wells which tend to dry up in low precipitation months due to the low storage and restricted recharge nature of the aquifer. These wells are felt to be unconnected to the river and will not be effected by channelization.

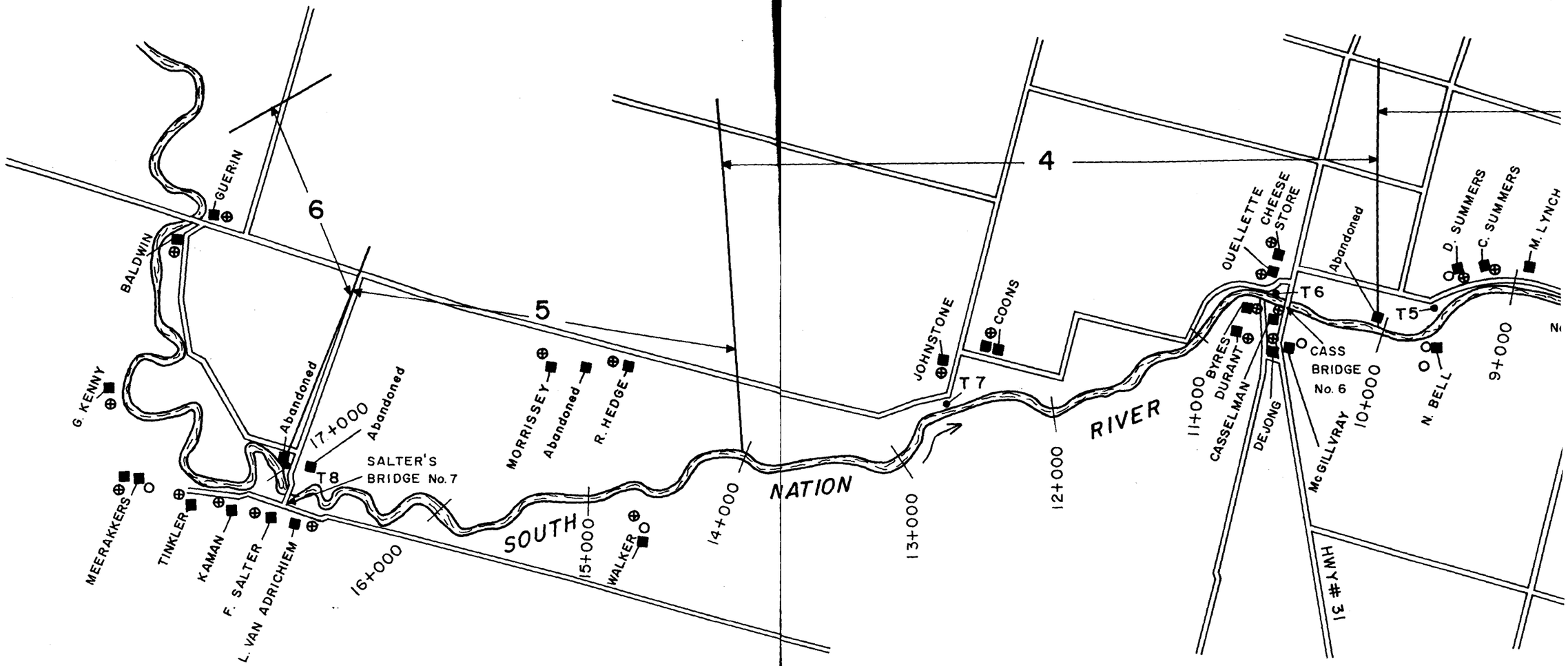
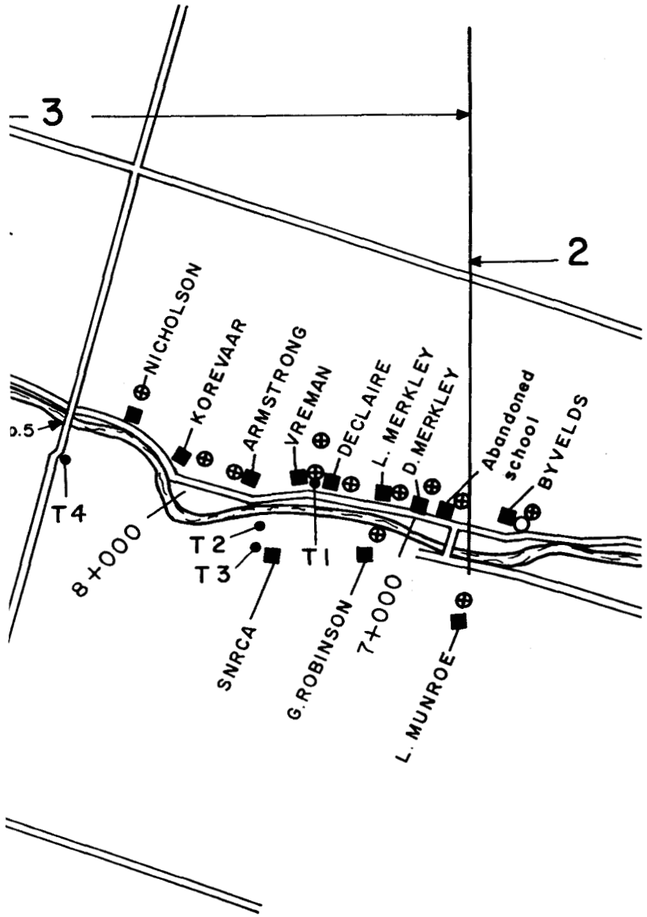

4
5
6
BALDWIN
GUERIN
G. KENNY
Abandoned
17+000
Abandoned
SALTER'S
BRIDGE No. 7
T8
MEERAKKERS
TINKLER
KAMAN
F. SALTER
L. VAN ADRICHIEM
16+000
SOUTH
15+000
WALKER
MORRISSEY
Abandoned
R. HEDGE
14+000
NATION
13+000
JOHNSTONE
COONS
T7
12+000
RIVER
11+000
BYRES
DURANT
CASSELMAN
DEJONG
OUELLETTE
CHEESE
STORE
Abandoned
T6
T5
CASS
BRIDGE
No. 6
McGILLVRAY
10+000
D. SUMMERS
C. SUMMERS
M. LYNCH
N. BELL
9+000
HWY # 31

FIGURE 8

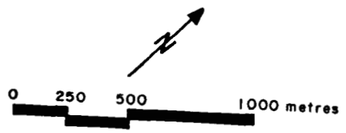
RESIDENCE LOCATION MAP

SOUTH NATION RIVER



LEGEND

R. HEDGE ■	RESIDENCE LOCATION AND OWNER
T2 •	TEST HOLE LOCATION AND NUMBER
⊕	DRILLED WELL
O	DUG WELL
←3→	CONTRACT AREA NUMBER AND LOCATION
7 +000 km m	CHAINING DISTANCE FROM CHESTERVILLE DAM



Potential of Wells to be Dewatered

Contract Area 3

Low potential	= 8	
High potential	= 8	
High natural potential	= 1	Total to be affected by
Could not be determined	= 1	dewatering = 8
TOTAL	= 18	

Contract Area 4

Low potential	= 5	
High potential	= 3	Total to be affected by
High natural potential	= 1	dewatering = 3
TOTAL	= 9	

Contract Area 5

Low potential	= 5	
High potential	= 1	Total to be affected by
High natural potential	= 0	dewatering = 1
TOTAL	= 6	

Contract Area 6

Low potential	= 0	
High potential	= 7	Total to be affected by
High natural potential	= 0	dewatering = 7
TOTAL	= 7	

TABLE 4: SUMMARY CHART

Contract Area 3

Homeowner	No. of Wells	Type	Depth	Aquifer	Potential for Dewatering (based on well log data)	Remedial Action required (see Appendix B)
W. Byvelds	2	drilled dug	unknown unknown	both from gravel/bdrk interface	high	yes
M. Korevarr	1	drilled	44' (13.4 m)	gravel/bdrk interface	high	yes
N. Bell	2	dug dug	house 28' (8.5 m) barn 30' (9.1 m)	gravel/bdrk interface	high high	yes yes
D. Merkley	1	drilled	59' (17.9 m)	gravel/bdrk	high	yes
L. Merkley	1	dug/ drilled	71' (21.6 m)	deep bed-rock (59')	low	no
D.J. Vreman	2	drilled drilled	54' barn (16.4 m) 40' home (12.1 m)	deep bed-rock gravel/bdrk interface	low high	no yes
G. Robinson	1	drilled	63' (19.2 m)	deep bed-rock	low	no
Declaire	1	drilled	unknown	unknown	unknown	yes

Contract Area 3 (cont'd)

Armstrong	1	drilled	65' (19.8 m)	deep bedrock	low	no
Lyle Monroe	1	drilled	130'	deep bedrock	low	no
Mike Lynch	1	dug/ drilled	151'	deep bedrock	low	no
G. Nicholson	1	drilled	33' approx.	gravel/bdrk interface	high	yes
D. Summers	2	drilled	65'	deep bedrock (57')	low	no
		dug	25'	surficial	naturally high	no
C. Summers	1	drilled	148'	deep bedrock (148')	low	no

Contract Area 4

Homeowner	No. of Wells	Type	Depth	Aquifer	Potential for Dewatering (based on well log data)	Remedial Action Required (see Appendix B
Casselman	1	drilled	85' (25.8 m)	deep bdrk	low	no
Dejong	1	drilled	unknown	unknown	likely low due to distance from river	no
Byres	1	drilled	unknown	unknown	likely low due to distance from river	yes
McGillvray	1	dug	12' (3.6 m)	surficial	naturally high	no
Durant	1	drilled	300' (91.4 m)	deep bdrk	low	no
Cloverdale Cheese Store	1	dug/ drilled	unknown	unknown	high	yes
D. Ouellette	1	drilled	60' (18.2 m)	gravel/bdrk interface	high	yes
Coons	1	drilled	unknown	gravel/bdrk likely	low	no
Johnstone	1	drilled	unknown	gravel/bdrk likely	low	no

Contract Area 5

Homeowner	No. of Wells	Type	Depth	Aquifer	Potential for Dewatering (based on well log data)	Remedial Action Required (see Appendix B)
D. Walker	2	dug (house)	25' (7.6 m)	gravel/bdrk interface	low	no
		drilled (barn)	78' (23.7 m)	deep bdrk	low	no
R.G. Hedge	1	drilled	23' (7.0 m)	gravel/bdrk interface	low	no
B. Morrisey	1	dug/ drilled	55' (16.7 m)	deep bdrk	low	no
L. Van Adrichern	1	drilled	105' (32 m)	deep bdrk	low	no
F. Salters	1	drilled	63' (19.2 m)	gravel/bdrk aquifer	high	yes

Contract Area 6

Homeowner	No. of Wells	Type	Depth	Aquifer	Potential for Dewatering (based on well log data)	Remedial Action Required (see Appendix B)
Kaman	1	drilled	unknown	gravel/bdrk interface	high	yes
N. Tinkler	1	drilled	60'	gravel/bdrk interface	high	yes
P. VAn de Meerakker	1	dug	unknown	gravel/bdrk interface	high	yes
W. Van de Meerakker	1	drilled	53'	gravel	high	yes
Kenney	1	dug/ drilled	78'	gravel/bdrk interface	high	yes
Baldwin	1	drilled	35'	gravel/bdrk interface	high	yes
Guerin	1	drilled	30'	gravel/bdrk interface	high	yes

5.0 RECOMMENDATINS FOR REMEDIAL ACTIONS

Recommendations for A) the establishement of a program by which groundwater supply fluctuations can be monitored, B) a list of remedial actions which will resolve water supply difficulties in each well, and C) recommendations for alternate construction techniques are summarized below.

5.1 1981 - Summer Monitoring Program

Eight 15cm diameter holes have been drilled in February 1981 to bedrock adjacent to the river in the study area. Piezometers were installed in each hole with screens at the bedrock surface. It is recommended that the water levels in these piezometers be measured once a week until September 1981 with the measurements being made on the same day every week. In addition to these piezometric measurements water levels are to be made at these intervals in one abandoned well near Salters bridge and in two other abandoned wells on the south side of the river adjacent the farm recently bought by the South Nation Conservation Authority near the new Nation Valley Bridge. Also three staff guages are to be installed in the river - one in the vicinity of Nation Valley, one at the Cass and Salter's Bridges, respectively and the river water surface levels measured at these locations at the same time as the well water levels are being made.

The surface elevations at each well and the data of the three staff guages are to be surveyed into a bench mark elevation in the spring of 1981.

By taking these measurements weekly and once a day for a few days after a storm has caused a marked rise in river water levels and the results analyzed the hydraulic connection between the aquifer and the river can be studied. Hence the groundwater table fluctuations throughout the non-freezing portion of the year can be analyzed and any detrimental effects of river de-watering

can be determined, hopefully in time so that remedial measures can be made before local residents suffer any hardships.

5.2 Remedial Action

If well dewatering occurs the following things should be done at once:

i) Pump intakes lowered as much as possible 6.7 m (22 ft) using existing pumps and the well test pumped.

ii) A deep well jet pump is to be installed with a much deeper pump intake.

iii) If the well is of insufficient depth for (ii), then the well is to be deepened with an air rotary or cable tool rig before the deep well pump is installed. Water would have to be trucked to the residence during this remedial work.

iv) If poor well construction precludes action (iii), then a new properly constructed well would have to be constructed and outfitted with a deep well pump.

5.3 Alternate Construction Techniques

The only other construction technique that could be applied to dredging to the upstream Contract Areas 3, 4, 5, and 6 is using a drag line from one shore and excavating "in the wet". This would lessen the dewatering effects on the neighbouring wells.

Howevever, the dredging work will remove the alluvial "filter" which is present on the natural river bed and will likely permit high turbidity, highly coloured and bacterialogically

polluted groundwater to move toward pumped wells. Widespread aquifer contamination may result.

This wet construction method is not recommended as a consequence.

Respectfully submitted,

Derek P. Smith, M.Sc., F.G.A.C.

David Creasy, Ph.D. (Pending)

Peter Jolly, Ph.D., P.Eng.

6.0 SELECTED AND CITED REFERENCES

Gadd, Nelson R. (1963). Surficial Geology of Ottawa Map-Area Ontario and Quebec 31 G/5. Geological Survey of Canada, Paper 62.16, Ottawa.

Ministry of the Environment (1976). Water Well Records for 1946 - 1972. Water Resources Bulletin 2-18, Toronto.

Sobanski, A.A. (1970). Ground Water Survey Regional Municipality of Ottawa-Carleton. The Ontario Water Resources Commission.

Wilson, Alice E. (1964). Geology of the Ottawa St. Lawrence Lowland, Ontario and Quebec. Geological Survey of Canada Memoir 241, Ottawa.

Freeze and Cherry 1980, Groundwater, Prentice Hall.

Geo-Analysis 1980, Well Survey, South Nation River Valley, Unpublished.

APPENDIX A

Regional Well Log Data

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
1	8	29	5	SU FR	35 45	4	8	5	1/00	ST	McMillan B clay 0020 hpan 0032 lmsn 0050
2	8	31	5	FR	36	7	12	18	4/00	DO	Levere J.H. brwn clay 0021 grey lmsn 0036
3	8	31	4	FR	28	15	15	7	1/00	DO	James M hpan 0021 lmsn 0030
4	8	31	5	FR	35	10	20	10	2/00	ST	Thomson B hpan 0020 clay 0032 lmsn 0040
5	8	31	6	FR	55	4	30	17	1/00	DO	Allison & Sons Ltd. brwn tpsl 0002 brwn clay sand 0006 brwn grvl clay sand 0033 grey lmsn 0063
6	8	31	5	FR	87	12	20	17	2/00	DO	Serviss G clay 0030 lmsn 0087
7	8	32	5	FR	41	10	30	4	4/00	DO	Kirkwood R brwn hpan 0012 grey lmsn 0041
8	8	32	4	FR	25	10	10	2	1/00	DO	Lecarre R hpan 0017 lmsn 0026
9	8	32	5	FR	27	6	19	20	1/00	DO	Holmes H tpsl 0002 bldr clay msnd 0017 lmsn 0032

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
10	8	35	5	FR	30	6	14	13	1/00	DO	Allison R.S. bldr fill 0003 hpan 0018 lmsn 0033
11	8	35	6	FR	120	15	45	17	12/00	ST DO	Robinson D prdg 0014 grey lmsn 0130
12	8	36	6	FR	116	14	25	14	1/00	ST DO	Casselman P tpsl 0004 msnd clay grvl 0014 lmsn 0126
13	8	37	6	FR	101	9	30	17	2/00	ST DO	Mac Davidson prdg 0020 grey grvl clay 0022 grey lmsn 0116
14	1	1	5	FR	104	6	50	18	2/00	DO	Robinson Dalton brwn hpan bldr 0040 grey rock 0104
15	1	1	6	FR	111	12	26	20	1/00	ST	Dejong W clay 0005 clay bldr 0015 lmsn 0121
16	1	2	6	FR	120	19	75	12	4/00	ST DO	Munroe E clay 0004 hpan 0007 grey lmsn 0131
17	1	2		FR	36	12	30	6	1/00	ST DO	Allison L prdg 0036 lmsn 0039
18	1	2	6	FR FR	75 120	22	40	6	3/00	DO	United Counties silt 0010 hpan bldr 0018 brwn lmsn 0122

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
19	1	2	5	FR	50	18	24	17	1/00	DO	McIntosh E clay msnd bldr 0015 lmsn 0056
20	1	3	5	SU	220	20	90	6	4/00	ST	Westonbrock A prdr 0122 grey lmsn 0228
21	1	4	5	FR	102	8	28	.9	1/00	DO	McIntosh P tpsl 0002 clay msnd stns 0010 lmsn 0114
22	1	4	5	FR	77	14	44	17	1/00	ST	Allison R.S. prdg 0006 lmsn 0088
23	1	4	6	FR	44	8	44	8	1/00	DO	Smith H clay bldr 0013 lmsn 0044
24	1	5	6	SU	25	12	25	3	1/00	DO	McPherson R grvl bldr clay 0018 lmsn 0033
25	1	5	4	SU	23	15	20	5	1/00	DO	Keyes M hpan 0019 lmsn 0025
26	1	5	5	FR	65	4	25	12	3/00	DO	Timmons D grey clay 0023 grey lmsn 0065
27	1	5	6	FR	26	3	23	17	1/00	CO DO	Allison & Sons Ltd. grey tpsl clay 0005 grey clay grvl bldr 0022 grey lmsn 0033

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
28	1	5	5	SU	59	8	20	12	3/00	DO	Fawcett B grey clay 0032 grey lmsn 0059
29	1	7	5	FR	25 40	5	20	15	1/00	ST DO	Harold H hpan 0013 lmsn 0041
30	2	3	4	FR	59	13	24	12	1/00	DO	MacCarkner M clay grvl msnd 0024 grvl clay 0054 lmsn 0059
31	2	4	5	FR	67	10	11	20	7/00	ST DO	Thompson V clay 0040 clay grvl 0059 grey lmsn 0068
32	2	6	5	FR FR	30 55	5	10	15	2/00	ST	Barklay L clay 0020 hpan 0028 lmsn 0057
33	2	7	4	FR	37	22	22	10	2/00	DO	Ropars C hpan 0037 lmsn 0039
34	2	7	5	FR	42	8	18	10	2/00	ST	Ropars C brwn hpan 0034 lmsn 0045
35	2	10	5	FR	55	3	21	5	4/00	ST DO	Melenhorst J prdg 0006 clay 0030 hpan clay 0051 grvl msnd 0059
36	2	11	4	FR	48	10	20	8	2/00	ST	Barkley H clay 0048 grvl 0050

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
37	2	12	4	FR	32	15	15	9	10/00	DO	Munro H hpan 0026 lmsn 0036
38	2	12	5	FR	50	12	18	20	1/00	DO	Munroe D prdg 0019 clay grvl msnd 0046 lmsn 0056
39	2	13	5	FR	57	9	30	10	1/00	ST DO	Shay A tpsl 0004 clay msnd 0057
40	3	2	5	FR	48	10	35			DO	Saunder J blue clay 0022 grey hpan 0040 blck grvl 0045 grey lmsn 0058
41	3	2	5	SU	105	8	62	10	1/00	ST	Johnston J fill 0002 clay 0038 clay grvl 0058 lmsn 0014
42	3	2	5	FR FR	46 52	10	35	4	1/00	DO	Barkley R clay 0020 hpan 0045 lmsn 0055
43	3	3	5	FR	117	25	30	10	1/00	ST DO	Dawson B grvl bldr 0047 lmsn 0117
44	3	4		FR	180	32	41	13	1/00	ST	Link D prdr 0086 grey lmsn 0190
45	3	4	5	FR	103	8	38	16	1/00	DO	Halliday D tpsl 0001 clay msnd stns 0035 lmsn 0113

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
46	3	5	5	SU	59	19	27	5	1/00	ST	Merkley L bldr clay 0018 hpan clay 0035 grey lmsn 0071
47	3	6	5	FR	148	3	23	15	2/00	ST DO	Summers C prdg 0021 clay bldr 0072 lmsn 0148
48	3	6	5	FR	151	10	40	5	4/00	ST DO	Lynch M prdg 0021 clay bldr 0049 lmsn 0151
49	3	7	4	FR	43	7	25	20	2/00	ST DO	Korevaar M hpan 0020 msnd 0040 grvl 0044
50	3	8	5	FR	96	15	25	8	4/00	ST DO	Wilson W clay 0025 grvl 0030 blck lmsn 0097
51	3	8	5	FR	53	5	16	10	1/00	ST	Vreman Derk John hpan 0040 lmsn 0055
52	3	11	6	FR	25	10	20	5	1/00	DO	Larose R brwn grvl bldr 0011 grey grvl bldr 0025
53	4	1	5	SU	93	4	34	10	1/00	ST	Holmes E prdg 0012 clay grvl msnd 0030 lmsn 0103
54	4	3	6	FR FR	60 100	10	36	6	3/00	ST DO	Pendleton E prdg 0015 hpan bldr 0023 grey lmsn 0101

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
55	4	3	4	FR	178	9	50	2	1/00	DO	Carkner C bldr grvl clay 0018 lmsn grvl caly 0032 lmsn 0186
56	4	5	5	FR	53	6	8	20	1/00	ST	Lannin H tpsl 0002 shle 0015 lmsn 0064
57	4	5	3	FR	90	4	4	17	1/00	ST DO	Summers E grey clay 0024 grey lmsn 0170
58	4	6	5	FR	120	17	48	17	1/00	ST	Summers E hpan bldr 0007 clay 0015 grey lmsn 0130
59	4	7	5	FR	85	3	10	8	10/00	ST DO	Rae D clay 0015 grey lmsn 0086
60	4	8	5	FR FR	50 75	3	16	10	2/00	DO	Archer B.T. hpan 0028 grvl 0034 lmsn 0080
61	4	8	4	FR	45	21	30	15	1/00	DO	Allison R hpan 0021 lmsn 0050
62	4	10	5	FR Fr	45 59	16	22	5	/30	ST DO	Redmond D tpsl 0003 clay msnd stns 0019 lmsn 0065
63	4	11	4	FR	49	29				ST	Dixon W prdg 0040 grvl 0059

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
64	5	2	5	FR	79	8	12	12	3/00	ST	Holmes S grey clay 0010 grey lmsn 0079
65	5	2	5	FR	60	11	20	8	2/00	ST DO	Holmes F clay 0004 hpan bldr 0021 grey lmsn 0060
66	5	2	5	FR	147	14	100	17	3/00	ST DO	Holmes S clay 0010 lmsn 0147
67	5	2	5	FR	177	30	140	4	4/00	ST DO	Holmes F clay bldr 0027 lmsn 0177
68	5	4	5	FR	150	14	22	8	1/00	DO	Blair D.F. tpsl 0006 lmsn 0163
69	5	4	4	FR	290	15	20	13	1/00	CO	DHO Patrol Garage prdr 0096 lmsn 0300
70	5	4	5	FR	75	7	10	30	4/00	DO	Holmes F clay 0008 hpan 0027 grey lmsn 0075
71	5	5	5			15	60	5	1/00	ST DO	Lannin H.S. prdr 0027 rock 0060
72	5	6	5	FR	65	9	59	7	1/00	ST	Lannin H.S. clay 0018 clay grvl hpan 0032 lmsn 0065
73	3	18	5	FR	30	4	16	10	1/00	ST DO	Baker A.L. clay 0020 hpan 0028 grvl 0030

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
74	3	20	5	FR	140	25	60	10	2/00	ST DO	Barkley L prdg 0026 clay bldr 0040 grey lmsn 0140
75	3	20	4	FR	60	12	25	15	1/00	ST DO	McIntosh A.C. hpan 0031 lmsn 0061
76	4	18	5	FR	70	6	7	17	1/00	DO	McIntosh G clay bldr 0023 lmsn 0070
77	4	19	5	FR	54	17	40	20	2/00	ST DO	Frances T hpan bldr 0036 lmsn 0054
78	4	22	5	FR	98	10	12	15	2/00	ST	Holmes Charles prdg 0024 brwn hpan 0053 grey lmsn 0099
79	4	22	5	FR	75	4	7	17	4/00	ST DO	Guy D clay 0020 hpan bldr 0065 grvl 0075
80	1	18	5	FR	116	top	40	15	3/00	PS	Oak Valley School clay 0035 clay grvl 0050 lmsn 0116
81	1	22	4	FR	53	15	25	10	2/00	ST	Lemery A hpan 0043 lmsn 0055
82	1	21	5	FR	121	12	30	15	2/00	ST DO	MacIntosh A clay 0005 hpan bldr 0045 grvl 0054 lmsn 0121

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
83	3	8	5	FR	96	15	25	8	4/00	DO	Anderson clay 0025, grvl 0030 blck rock 0097
84	3	8	6	FR	63	12	35	10	1/00	DO	Armstrong brwn till 0010, hdpn 0026, grey lmsn 0063
85	3	9	5	FR	53	14	40	12	1/00	DO	Merkley, K hdpn 0020, clay 0030 hdpn 0046, lmsn 0055
86	3	9	6	FR	55	25	42	7	1/00	DO	Merkley, D clay brwn 0035, hdpn 0049, grvl 0055, lmsn 0059
87	4	11	6	FR	25	10	20	5	1/00	DO	Larose R grvl bldr 0011, grvl bldr 0025
88	3	11	6	FR	52	10	40	10	1/00	DO	Loucks, D hdpn 0049, grvl 0050, lmsn 0053
89			5	FR	53	5	10	15	1/00	DO	Hollister, C hdpn 0025, lmsn 0056
90			6	FR	56	6	35	20	1/00	DO	Byers, W grvl 0006, hdpn 0035 lmsn 0065
91	8	10	6	FR	63	10	60	16	1/00	DO	Salter, F clay 0030, hdpn 0060 lmsn 0063

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
92			6	FR	34	6	35	3	1/00	DO	Kirkwood, W hdpn 0017, lmsn 0043
93	2	3	6	FR	32	10	25	20	1/00	PS	Allison, R fill 0001, clay 0024 grvl 0032
94	2	4	6	FR	77	18	40	5	1/00	DO	Hitsman, M tpsl clay 0002, clay 0018, bldr 0038 lmsn 0085
95	2	4	5	FR	45	18	20	15	1/00	DO	Hollister, C hdpn 0038, lmsn 0048
96	2	12	5	FR	52	12	18	20	1/00	DO ST	Munroe, D hdpn 0020, sand 0042, hdpn 0047, lmsn 0056
97					295	12	50	3			Hutt, N tpsl sand 0001, clay 0018, lmsn hard 0268 lmsn soft 0300
98					309	17	90	5			McIntosh, G tpsl 0001, bldr 0015 lmsn 0319
99				FR FR FR	55 65 85	12	75	8			Wesienbroeck, A hdpn 0010, lmsn 0090
100					34	6	35	3			Kirkwood, W hdpn 0017, lmsn 0043

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
101					86	12	50	12			Holmes, I tpsl 0002, clay 0010 grvl 0011, lmsn 0093
102					43	7	12	15			Adams, M hdpn 0015, lmsn 0043
103					35	8	35	20			Roughton Gen. Store tpsl 0001, clay bldr 0013, lmsn 0045
104					56	10	40	5			Allison, L fill 0002, tpsl 0003, clay bldr 0022, grvl sand 0032, lmsn 0065
105					34	8	30	5			Bierworth, R tpsl 0002, clay bldr 0021, sand grvl 0026 lmsn 0043
106					34	6	30	3			Sears, P hdpn 0023, lmsn 0043
107					35 40	7	20	20			Barkley, R hdpn 0015, lmsn 0042
108					97	12	60	5			Steele, E.R. tpsl 0001, clay bldr 0008, lmsn 0105
109					133	20	120	5			McIntosh, D till 0005, lmsn 0143
110					68			25			Whicker, E clay 0010, hdpn bldr 0045, lmsn 0073

Well No.	Con No.	Lot No.	Csg Dia Ins	Kind of H_2O	Water Found Feet	Stat Lvl Feet	Pump Lvl Feet	Test Rate GPM	Test Time Hr/Mn	H_2O Use	Owner/Log Depths in feet to which Formations Extend
111					52	1	15	15			McCooeye clay 0013, lmsn 0052
112					37	15	25	5			Levers, C clay 0014, lmsn 0040
113	8	11	6	FR	53	9	52	12	1/00	DO ST	Van de Meerakker, W clay 0020, till 0052 grvl 0053
114	8	10	5	FR	105	7	60	4	3/00	DO ST	Van Adriechen, L dug well 0017, clay bldr 0077, lmsn 0105
115	3		6	FR	57	10	35	20	1/00	DO ST	Summers, D tpsl 0001, clay bldr 0036, lmsn 0065
116	1	17	5	FR	68	13	15	20	1/00	DO	Kenny, G clay- clay 0030, grvl 0039 lmsn 0078
117	1	18	5	FR	66	top	40	4	3/00	PS	Oak Valley School clay 0035, sand grvl 0060, lmsn 0066

APPENDIX C

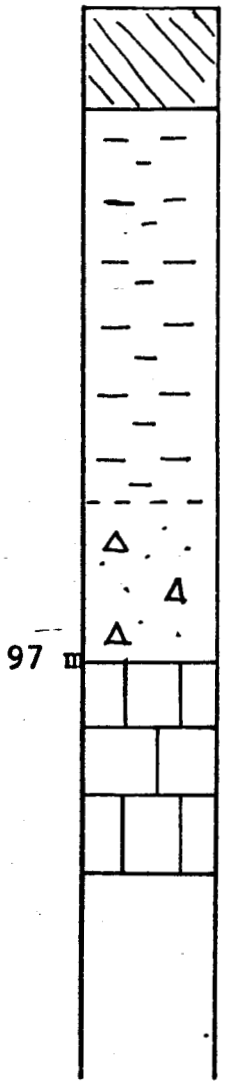
Test Hole
Stratigraphic Logs

Test Hole: 1

Chainage: 7 + 640

Contract Area: 3

Distance from River: 40 metres

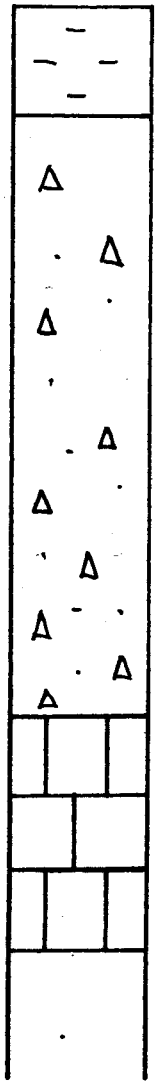


Lithology	Description	Observations
fill	gravel used in road construction	surface elevation 71.8 m
grey clay	plastic	water saturated
grey clay tile		
limestone bedrock		

Observation Well No. 1 is located on the north side of the South Nation River between the road and the river mid way from the Declaire and Vreemans farms. Chainage from Chesterville Dam is 7 + 630 m. The well is approximately 40 metres north of the centreline of proposed channel. Ground level is 68.5 m (rough). (15 m from river edge.)

Test Hole: 2 Chainage: 7 + 750 Contract Area: 3

Distance from River: 75 metres



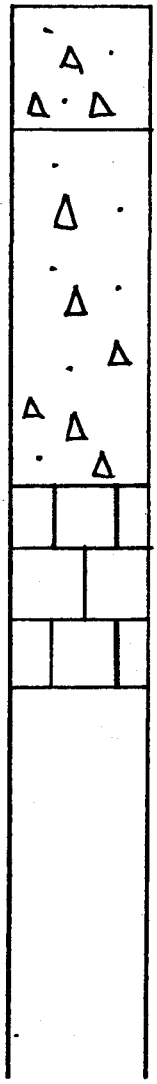
Depth	Lithology	Description	Observations
	clay	brown silty clay	surface elevation 71.8 m alluvium in part
1.2m	till	clay rich matrix, pebble clasts, some boulders, very dense and compact with depth, becomes sandy below several metres	low hydraulic conductivity; lower depths dry
10.4m	limestone bedrock	no sample taken	water enters well at bedrock surface

Observation Well No. 2 is situated on land known as Leonard Shane property which has been purchased by the South Nation River Conservation Authority. Its location is on a line extending from the driveway coming into the farm from the road. The well is 80 metres south of the proposed channel centerline at chainage 7 + 620 m and 45 metres from the north west corner of the large barn. The surface elevation is 71.8 metres (55 metres from river edge).

Test Hole: 3 Chainage: 7 + 750 Contract Area: 3

Distance from River: 165 metres

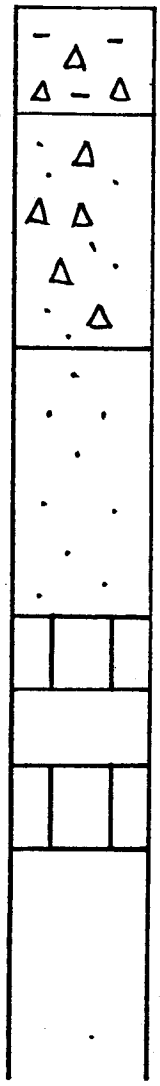
Depth	Lithology	Description	Observations
	Glacial till	brown clay matrix, pebbles with minor boulder content	surface elevation 72.0 m aquilude, water saturated
2.7m	glacial till	grey, silty clay matrix, increased sand content in places, boulder horizons	dry, low hydraulic conductivity
6.7m	bedrock limestone	weathered and fractured upper surface	water entered piezometer



Observation Well No. 3 is situated between the driveway and the south west corner of the barn of farm bought by the South Nation Valley Authority from Leonard Shane. The well is located 145 metres south of the centreline of proposed channelization at chainage 7 + 630 m. This well is in line with well no. 2 and 65 metres from it at right to the proposed channelization. Surface elevation is roughtly 71.8 metres. (140 metres from river edge.)

Test Hole: 4 Chainage: 8 + 900 Contract Area: 3

Distance from River: 100 metres

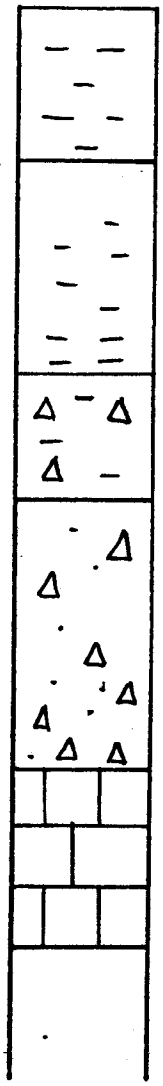


Depth	Lithology	Description	Observations
1.5 m	glacial till	brown, silty clay matrix, limestone pebbles	surface elevation 73.2 m not fractured, not water bearing
	glacial till	grey, santy till, very compact coarser grained with depth, pebble till	dry, gradational contact
4.5 m	sand/gravel	poorly sorted grit, pebble lenses, limestone, granite fragments	water saturated, confined aquifer
7.4 m	limestone bedrock	upper fractured and weathered zone	water bearing

Observation Well No. 4 is situated on the road right-of-way on the south side of the new Nation Valley Bridge (Bridge #5). It is located 110 metres south and at right angles to the proposed channelization at chainage 8 + 900. Surface elevation is 73 metres. (100 metres from river edge.)

Test Hole: 5 Chainage: 9 + 940 Contract Area: 3

Distance from River: 85 metres

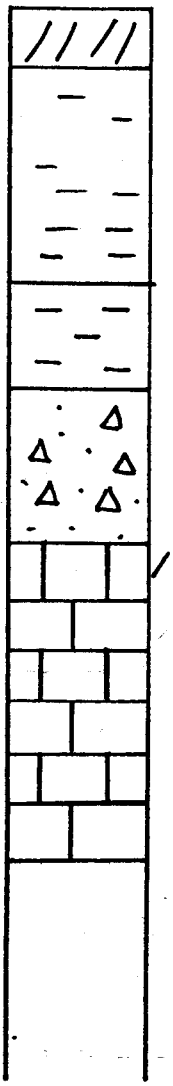


Lithology	Description	Observations
clay (marine)	brown silty clay, stiff	surface elevation 70.5 m not water bearing, reworked, alluvial in part
clay (grey)	increased plasticity, silty horizons	water saturated, aquilude
till	grey, clay rich matrix, wet	aquilude, low hydraulic conductivity
till	grey, sandy silty till, limestone pebbles, very dense and compact	dry, minor sandy lenses
limestone bedrock	weathered and fractured upper zone	no gravel aquifer present, water encountered at rock surface

Observation Well No. 5 is on the north side of the South Nation River at right angles to the proposed channelization at chainage 9 + 920 m and 80 metres to the northwest from it. The surface elevation is 70.8 (?) m.).

Test Hole: 6 Chainage: 10 + 990 Contract Area: 4

Distance from River: 60 metres

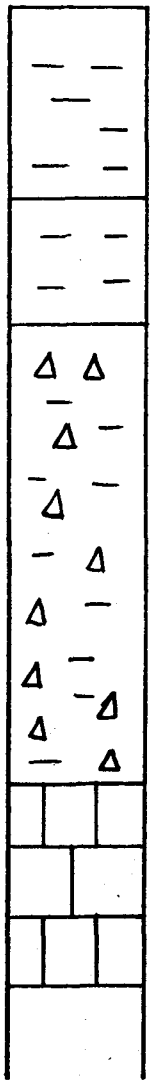


Depth	Lithology	Description	Observations
	fill	road granular material	surface elevation 71.5 m
.6 m	brown clay	brown clay, some oxidation zones and varves	water saturated
4.0 m	grey clay	plastic	water saturated
5.5 m	till	grey, very dense, pebble clasts, minor boulders	dry
3.3 m	drilled to refusal, depth uncertain		
	bedrock	upper surface weathered and fractured	water enters hole from rock surface, confined conditions

Observation Well No. 6 is situated just to the south of the Cass Bridge Road and between the road and the South Nation River 70 metres west of Highway 31. It is located 120 metres from the centreline of the proposed channelization at chainage 11 + 000 metres. The surface elevation is 71.5 metres. (110 metres from river edge.)

Test Hole: 7 Chainage: 13 + 170 Contract Area: 4

Distance from River: 50 metres

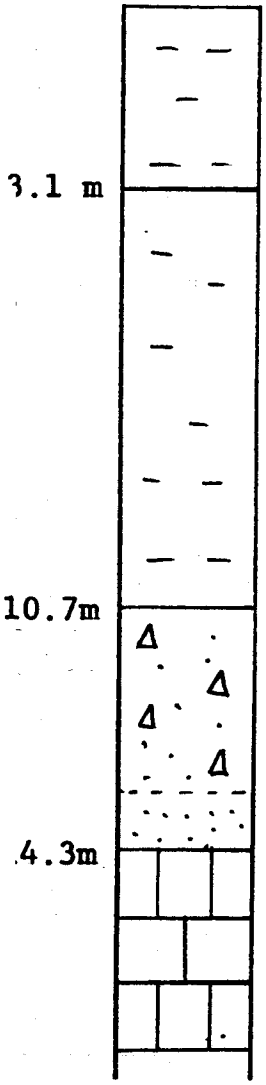


Lithology	Description	Observations
brown clay	very dense	surface elevation 72.0 m aquilude, moisture in clay
grey clay	plastic	wet
glacial till	grey, very densely packed, some boulder horizons, limestone clasts predominate	dry below upper 2 metres
bedrock		water from bedrock interface, confined conditions

Observation Well No. 7 is situated between the Cass Bridge Road and the South Nation River at chainage 13 + 170 m (on the line extending from the road running southwest from Johnstone farm). The distance from the well to the proposed channelization is 55 metres. The surface elevation is 71 metres (55 metres from river edge).

Test Hole: 8 Chainage: 17 + 580 Contract Area: 5

Distance from River: 50 m (15 m from flood level)



Lithology	Description	Observations
brown clay	plastic, oxidized	surface elevation 71.5 m water saturated
grey clay	plastic, varved or banded with dark layers	water saturated
glacial till	grey, sandy silty till, limestone pebbles	
gravel (?)	poorly sorted grit limestone pebbles	
limestone bedrock		

Observation Well No. 8 is located on the north side of the South Nation River to the east of the Cass Bridge Road at chainage 17 + 500. The surface elevation is 71.5 metres. The well is located in the school yard approximately 4 metres east of the abandoned school wells.

APPENDIX B

House to House
Well Survey Sheets

(With Water Chemistry Results)

CONTRACT AREA 3

CONTRACT AREA: (2) 3 Boundary
CHAINAGE: 6 + 750

DATA SUMMARY SHEET

HOMEOWNER: W. Byvelds

WHEN THEY MOVED IN: 1978, L. Lynch and G. Oosterbaan previous owners

TYPE OF RESIDENCE: Domestic/farm; farm 70 years old

NUMBER OF WELLS: 2

AGE OF WELLS: unknown

TYPE OF CONSTRUCTION: one drilled, one dug; shallow well pumps

DEPTH: unknown

WATER USE: cattle and home

WATER QUANTITY COMMENTS: dug well went dry in July 1979
drilled well went dry in July/August 1979

WATER QUALITY COMMENTS: rotten taste from dug well; drilled has swampy taste and odour recently

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure near barn

GENERAL COMMENTS: homeowner relates well quantity problems to dredging operations

LOCATION OF WELLS

PROXIMITY TO RIVER: 110 metres drilled well
50 metres dug well

WELL LOG DATA: (no well log available)

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA (drilled well frozen, sample from dug well)

Alkalinity	376 mg/l (as $CaCO_3$)
Hardness	640 mg/l (as $CaCO_3$)
Chloride	140 mg/l
Nitrate	0.04 mg/l
Nitrite	<0.002 mg/l
Ammonia	0.17 mg/l
Iron	1.1 mg/l
Sulphate	235 mg/l
Others:	Total Coliform <2 (colonies/100 ml)
	Faecal Coliform 0

SUMMARY AND RECOMMENDATIONS: (High Risk)

Both drilled and dug wells likely utilize the gravel/rock interface aquifer. Both wells went dry in July/August 1980 due to contract 2 construction. Both wells are likely to be effected by river dewatering. The water quality is excellent.

The intake of the shallow well pump should be deepened as much as possible. If the problem remains, a deep well pump with a lower intake should be installed in the drilled well.

CONTRACT AREA: 3

CHAINAGE: 6 + 920

DATA SUMMARY SHEET

HOMEOWNER: Lyle Monroe

WHEN THEY MOVED IN: 1946

TYPE OF RESIDENCE: Farm

NUMBER OF WELLS: 1

AGE OF WELLS: pre-1946

TYPE OF CONSTRUCTION: dug to 20', then drilled

DEPTH: 130'

WATER USE: 26 head cattle and house

WATER QUANTITY COMMENTS: none

WATER QUALITY COMMENTS: none

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure piles behind barn

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: ~ 250 metres

WELL LOG DATA: well log data not available (pre-1946)

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	380 mg/l (as $CaCO_3$)	
Hardness	536 mg/l (as $CaCO_3$)	
Chloride	27 mg/l	
Nitrate	0.36 mg/l	
Nitrite	<0.002 mg/l	
Ammonia	0.88 mg/l	
Iron	0.15 mg/l	
Sulphate	215 mg/l	
Others:	Total Coliform <2	(colonies/100 ml)
	Faecal Coliform 0	

SUMMARY AND RECOMMENDATIONS: (low risk)

This drilled well is 250 metres from the river. It was not affected by Contract Area 2 construction work. The well should not be affected by Contract Area 3 dewatering. The water quality is excellent. No remedial work is recommended.

CONTRACT AREA: 3
CHAINAGE: 7 + 050

DATA SUMMARY SHEET

HOMEOWNER: D. Merkley

WHEN THEY MOVED IN: 1978

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS: 1

AGE OF WELLS: 1978

TYPE OF CONSTRUCTION: drilled

DEPTH: 38' estimate

WATER USE: domestic

WATER QUANTITY COMMENTS: no problems

WATER QUALITY COMMENTS: good

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: septic tank only

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 130 metres

WELL LOG DATA:

Well drilled for: Doug Merkley

Year drilled: 1978

Casing diameter: 6"

Name of driller: Gauthier

Grouting record: not grouted

Casing depth:

Static level: 25'

Pumped level after test: 42'

Test rate: 7 IGPM

Test duration: 1 hr

Type of water: fresh

Stratigraphic log: Brown clay 35, hardpan 49, gravel 151, limestone 59

General comments: water found at 59'

WATER QUALITY DATA

Alkalinity	178 mg/l (as $CaCO_3$)	
Hardness	144 mg/l (as $CaCO_3$)	
Chloride	14 mg/l	
Nitrate	< 0.02 mg/l	
Nitrite	< 0.002 mg/l	
Ammonia	0.14 mg/l	
Iron	0.30 mg/l	
Sulphate	18 mg/l	
Others:	Total Coliform < 2	(colonies/100 ml)
	Faecal Coliform 2	

SUMMARY AND RECOMMENDATIONS: (high risk)

The well is apparently drawing water from the gravel/bedrock surface aquifer. The well has a high risk of being dewatered by construction activities. The water quality is excellent.

The intake of the shallow well pump should be deepened. If problems persist, a deep well pump with an intake at 12 - 14 m should be installed in the well.

CONTRACT AREA: 3
CHAINAGE: 7 + 300

DATA SUMMARY SHEET

HOMEOWNER: L. Merkley

WHEN THEY MOVED IN: -

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 1

AGE OF WELLS: 20 years old

TYPE OF CONSTRUCTION; cribbed well with drilled well inside

DEPTH: unknown

WATER USE: 30 head cows and house

WATER QUANTITY COMMENTS: no complaints

WATER QUALITY COMMENTS: no complaints

TYPE OF SEWAGE SYSTEM:

ON SITE CONTAMINATION SOURCES: manure pile behind barn

GENERAL COMMENTS: water is softened

LOCATION OF WELLS

PROXIMITY TO RIVER: 170 metres

WELL LOG DATA:

Well drilled for: L. Merkley

Year drilled: -

Casing diameter: 5"

Name of driller: Raymond Castleman

Grouting record: none

Casing depth: unknown

Static level: 19'

Pumped level after test: 27'

Test rate: 5 IGPM

Test duration: 1 hr

Type of water: hydrogen sulphide

Stratigraphic log: bldr clay 018, hdpan clay 35, limestone 071

General comments: water found at 71'

WATER QUALITY DATA

Alkalinity	164 mg/l (as $CaCO_3$)	
Hardness	158 mg/l (as $CaCO_3$)	
Chloride	2.8 mg/l	
Nitrate	$<$0.02 mg/l	
Nitrite	0.002 mg/l	
Ammonia	0.12 mg/l	
Iron	0.05 mg/l	
Sulphate	12 mg/l	
Others:	Total Coliform $<$2	(colonies/100 ml)
	Faecal Coliform 0	

SUMMARY AND RECOMMENDATIONS: (low risk)

The drilled well is reported to be obtaining water from 71'. The water quality is excellent.

The well should be unaffected by construction work and no remedial action is recommended.

CONTRACT AREA: 3

CHAINAGE: 7 + 350

DATA SUMMARY SHEET

HOMEOWNER: Glen Robinson

WHEN THEY MOVED IN: 1967, previous owner John Mellenhorst

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS: 1

AGE OF WELLS: 1979, drilled by Instant Water Wells Ltd.

TYPE OF CONSTRUCTION:

DEPTH: 63'

WATER USE: domestic

WATER QUANTITY COMMENTS: good yields

WATER QUALITY COMMENTS: strong hydrogen sulphide smell

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: none

GENERAL COMMENTS: well equipped iwth pitless adaptor and deep well submersible pump.

LOCATION OF WELLS

PROXIMITY TO RIVER: 55 metres

WELL LOG DATA: (well log data unavailable)

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	252 mg/l (as $CaCO_3$)	
Hardness	84 mg/l (as $CaCO_3$)	
Chloride	36 mg/l	
Nitrate	< 0.02 mg/l	
Nitrite	< 0.002 mg/l	
Ammonia	0.25 mg/l	
Iron	0.05 mg/l	
Sulphate	10 mg/l	
Others:	Total Coliform < 2	(colonies/100 ml)
	Faecal Coliform 0	

SUMMARY AND RECOMMENDATIONS: (low risk)

This drilled well has a hydrogen sulphide smell which indicates that a deep bedrock aquifer is being utilized. The water quality is excellent.

No remedial action is required.

CONTRACT AREA: 3
CHAINAGE: 7 + 520

DATA SUMMARY SHEET

HOMEOWNER: Declaire

WHEN THEY MOVED IN: 1977

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS: 1

AGE OF WELLS: unknown

TYPE OF CONSTRUCTION: drilled, shallow well pump

DEPTH: unknown

WATER USE: domestic, dishwasher, clotheswasher

WATER QUANTITY COMMENTS: good yields

WATER QUALITY COMMENTS: no complaints

TYPE OF SEWAGE SYSTEM: none

ON SITE CONTAMINATION SOURCES: no sewage system

GENERAL COMMENTS: basement filled when clamp came off pressure tank

LOCATION OF WELLS

PROXIMITY TO RIVER: 55 metres

WELL LOG DATA: No well log available

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA no sample taken - frozen well

Alkalinity

Hardness

Chloride

Nitrate

Nitrite

Ammonia

Iron

Sulphate

Others:

SUMMARY AND RECOMMENDATIONS: (risk could not be determined)

Insufficient data are available to evaluate potential well dewatering problems.

Monitoring is recommended during construction work.

CONTRACT AREA: 3
CHAINAGE: 7 + 750

DATA SUMMARY SHEET

HOMEOWNER: D.J. Vreman

WHEN THEY MOVED IN: 1955

TYPE OF RESIDENCE: pig operation

NUMBER OF WELLS: 2

AGE OF WELLS: 1969

TYPE OF CONSTRUCTION: drilled

DEPTH: 55' at barn, 40' at home, both wells have shallow well pumps

WATER USE: home, 1300 pigs

WATER QUANTITY COMMENTS: no complaints

WATER QUALITY COMMENTS: no complaints

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure behind barn

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 130 metres (home)

WELL LOG DATA: (barn well) Home well is old and no well log is available.

Well drilled for: D.J. Ureman

Year drilled: 1969

Casing diameter: 5"

Name of driller: Gauthier

Grouting record: none

Casing depth: -

Static level: 5

Pumped level after test: 16

Test rate: 10 IGPM

Test duration: 1 hr

Type of water: fresh

Stratigraphic log: hardpan 040, limestone 055

General comments: water found at 54'

WATER QUALITY DATA

Alkalinity

Hardness

Chloride 2.0 mg/l

Nitrate 0.04 mg/l

Nitrite < 0.002 mg/l

Ammonia 0.11 mg/l

Iron

Sulphate 8.5 mg/l

Others:

	Home	Barn	
Total Coliform	< 2	< 2	(colonies/100 ml)
Faecal Coliform	0	0	

SUMMARY AND RECOMMENDATIONS: (high risk - home
low risk - barn)

Both wells on the Ureman property are drilled wells. The barn well is completed at least 5 metres into bedrock. The home well utilizes the gravel aquifer. Water quality is excellent.

The home well will probably be affected by dewatering. The barn well should not be affected because it apparently is utilizing a deep fracture system.

Both wells should be monitored closely because well construction practices are suspect (e.g. no cement grout in the hole) and the gravel/bedrock aquifer may be partially utilized in the barn well. If problems occur, the lowering of pump intakes should be attempted first. However the installation of a deep well pump in the house well and perhaps in the barn well will most likely be required.

CONTRACT AREA: 3
CHAINAGE: 7 + 980

DATA SUMMARY SHEET

HOMEOWNER: Armstrong

WHEN THEY MOVED IN: 16 years

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS 1

AGE OF WELLS: unknown, old

TYPE OF CONSTRUCTION: drilled in 1978

DEPTH 60-65'

WATER USE: domestic

WATER QUANTITY COMMENTS: no complaints

WATER QUALITY COMMENTS: no complaints

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: none

GENERAL COMMENTS: drilled well completed when surficial dug well went dry 2 years ago. Dug well is now abandoned.

LOCATION OF WELLS:

PROXIMITY TO RIVER: 80 metres

WELL LOG DATA: No well log data available

Well drilled for:

Year drilled:

Casing diameter:

Name of driller: Ramon Castleman

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity		
Hardness		
Chloride	15 mg/l	
Nitrate	<0.02 mg/l	
Nitrite	0.002 mg/l	
Ammonia	0.15 mg/l	
Iron		
Sulphate	85 mg/l	
Others:	Total Coliform <2	(colonies/100ml
	Faecal Coliform 0	

SUMMARY AND RECOMMENDATIONS: (low risk)

This drilled well is believed to be utilizing a deep bedrock aquifer. Water quality is good at present.

No remedial action is recommended.

CONTRACT AREA: 3
CHAINAGE: 8 + 350

DATA SUMMARY SHEET

HOMEOWNER: M. Korevaar

WHEN THEY MOVED IN:

TYPE OF RESIDENCE:

NUMBER OF WELLS:

AGE OF WELLS:

TYPE OF CONSTRUCTION:

DEPTH:

(No one at residence during survey)

WATER USE:

WATER QUANTITY COMMENTS:

WATER QUALITY COMMENTS:

TYPE OF SEWAGE SYSTEM:

ON SITE CONTAMINATION SOURCES:

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: less than 50 metres

WELL LOG DATA:

Well drilled for: M. Korevarr

Year drilled: -

Casing diameter: 4"

Name of driller: Gauthier Ltd.

Grouting record: none

Casing depth: unknown

Static level: 7'

Pumped level after test: 25

Test rate: 20 IGPM

Test duration: 2 hours

Type of water: fresh

Stratigraphic log: hardpan 020, medium sand 040, gravel 044

General comments:

WATER QUALITY DATA (sample not taken; absent homeowner)

Alkalinity

Hardness

Chloride

Nitrate

Nitrite

Ammonia

Iron

Sulphate

Others:

SUMMARY AND RECOMMENDATIONS: (high risk)

Available well construction information suggest that well is hydraulically connected to the river and that the well bore is drilled into the gravel fractured bedrock aquifer. The well should be classified as high risk type because of its proximity to the river. Recommendations in the event that the well goes dry during the dredging project include:

1) lowering shallow well intake pipe (40-45')
2) installation of deep well pump
3) deepen existing well into bedrock

CONTRACT AREA: 3

CHAINAGE: 8 + 550

DATA SUMMARY SHEET

HOMEOWNER: G. Nicholson

WHEN THEY MOVED IN: pre 1955

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 1 drilled before owner

AGE OF WELLS: >25 years

TYPE OF CONSTRUCTION: cased, foot valve down 25-30'

DEPTH: say 33' + ; log not available

WATER USE: livestock watering and domestic

WATER QUANTITY COMMENTS: none

WATER QUALITY COMMENTS: none

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: Manure piles & septic system

GENERAL COMMENTS: owner says rock is present in river in front of home

LOCATION OF WELLS

PROXIMITY TO RIVER: 90 metres

WELL LOG DATA: (no log available)

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	294 mg/l (as $CaCO_3$)	
Hardness	392 mg/l (as $CaCO_3$)	
Chloride	44 mg/l	
Nitrate	$<$0.02 mg/l	
Nitrite	$<$0.002 mg/l	
Ammonia	0.10 mg/l	
Iron	0.35 mg/l	
Sulphate	43 mg/l	
Others:	Total Coliform $<$2 Faecal Coliform 0	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (high risk)

Well construction information and observations made by owner suggest that well is hydraulically connected to the river and that the well bore is likely drilled into the gravel fractured bedrock aquifer. No significant contamination of water supply was noted based on M.O.E. water analyses. The well should be classified as a high risk type because of its proximity to the river. Recommendations in the event that the well goes dry during the dredging project include:

1) lowering shallow well intake pipe
2) installation of deep well pump
3) deepen existing well into bedrock

CONTRACT AREA: 3
CHAINAGE: 9 + 200

DATA SUMMARY SHEET

HOMEOWNER: Mike Lynch

WHEN THEY MOVED IN: over 20 years ago

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS: 1

AGE OF WELLS: 1959

TYPE OF CONSTRUCTION: dug to 22', then drilled: casing to top of dug well (ie ground surface). Shallow well pump

WATER USE: 1 person

WATER QUANTITY COMMENTS: none

WATER QUALITY COMMENTS: some "sulphur" problems

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: none, except tile bed

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 60 metres

WELL LOG DATA:

Well drilled for: Mike Lynch

Year drilled: 1959

Casing diameter: 5"

Name of driller: Simzer Ltd.

Grouting record: none

Casing depth: -

Static level: 10'

Pumped level after test: 40'

Test rate: 5 IGPM

Test duration: 4/00 hrs

Type of water: fresh

Stratigraphic log: dug well 021, clay boulders 049, limestone 151

General comments:

WATER QUALITY DATA

Alkalinity	278 mg/l	(as $CaCO_3$)
Hardness	280 mg/l	(as $CaCO_3$)
Chloride	205 mg/l	
Nitrate	0.06 mg/l	
Nitrite	<0.002 mg/l	
Ammonia	0.32 mg/l	
Iron	0.35 mg/l	
Sulphate	155 mg/l	
Others:	Total Coliform <2 Faecal Coliform 0	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (low risk)

This deep drilled well is cased into bedrock and sould not be unaffected by channelization activities. The water quality is good at present.

No remedial action is recommended.

CONTRACT AREA: 3
CHAINAGE: 9 + 430

DATA SUMMARY SHEET

HOMEOWNER: C. Summers

WHEN THEY MOVED IN:

TYPE OF RESIDENCE: home

NUMBER OF WELLS: 1, (2 dug wells not used and abandoned)

AGE OF WELLS: 1958 estimate

TYPE OF CONSTRUCTION: drilled, shallow well pump

DEPTH: over 100' estimate

WATER USE: domestic only

WATER QUANTITY COMMENTS: no complaints, high yield

WATER QUALITY COMMENTS: no complaints, slight swampy taste

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES:

GENERAL COMMETNS: well flows in spring

LOCATION OF WELLS

PROXIMTIY TO RIVER: 60 metres

WELL LOG DATA:

Well drilled for: C.A. Summers

Year drilled: -

Casing diameter: 5"

Name of driller: Simzer Ltd.

Grouting record: none

Casing depth: unknown

Static level: 3'

Pumped level after test: 23'

Test rate: 15 IGPM

Test duration: 2 hours

Type of water: fresh

Stratigraphic log: previously dug 21, clay bldr 72, limestone 148

General comments: water found at 148'

WATER QUALITY DATA

Alkalinity	260 mg/l	(as $CaCO_3$)
Hardness	112 mg/l	(as $CaCO_3$)
Chloride	56 mg/l	
Nitrate	0.02 mg/l	
Nitrite	< 0.002 mg/l	
Ammonia	0.22 mg/l	
Iron	0.45 mg/l	
Sulphate	5 mg/l	
Others:	Total coliform < 2	(colonies/100 ml)
	Faecal coliform 0	

SUMMARY AND RECOMMENDATIONS: (low risk)

This deep drilled well is utilizing a deep bedrock fracture system as a water source. The well should be unaffected by dewatering. The existing water quality is good.

No remedial action is recommended.

CONTRACT AREA: 3
CHAINAGE: 9 + 570

DATA SUMMARY SHEET

HOMEOWNER: D. Sumers

WHEN THEY MOVED IN: late 1950's

TYPE OF RESIDENCE: domestic house and farm

NUMBER OF WELLS: 1 drilled (1 dug)

AGE OF WELLS: 3-4 yrs. old (1977)

TYPE OF CONSTRUCTION: dug well and drilled well

DEPTH: dug well 25'; drilled well 65' (estimate)

WATER USE: domestic and pigs/cattle

WATER QUANTITY COMMENTS: always enough water in drilled well
dug well low during dry season

WATER QUALITY COMMENTS: no complaints

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure pile and sewage system

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 60 metres

WELL LOG DATA: well log data unavailable

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA - drilled

Alkalinity	284 mg/l	(as $CaCO_3$)	
Hardness	236 mg/l	(as $CaCO_3$)	
Chloride	40 mg/l		
Nitrate	<0.02 mg/l		
Nitrite	<0.002 mg/l		
Ammonia	0.17 mg/l		
Iron	0.55 mg/l		
Sulphate	115 mg/l		
Others:	Total Coliform	2	(colonies/100 ml)
	Faecal Coliform	0	

SUMMARY AND RECOMMENDATIONS: (high risk)

Well construction information and observations made by owner is of poor quality but suggests that the drilled well is hydraulically connected to the river and that the well bore is likely being fed from the gravel fractured bedrock aquifer. No significant contamination of water supply was noted based on M.O.E. water analyses. The well should be classified as a high risk type because of its proximity to the river. Recommendations in the event that the well goes dry during the dredging project include:

1) lowering shallow well intake pipe
2) installation of deep well pump
3) deepening well bore into bedrock.

The dug well naturally runs low of water during dry periods of the year and is not recommended for remedial work.

CONTRACT AREA: 3

CHAINAGE: 10 + 010

DATA SUMMARY SHEET

HOMEOWNER: Norman Bell

WHEN THEY MOVED IN: fourth generation in same family

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 2

AGE OF WELLS: over 25 years

TYPE OF CONSTRUCTION: dug, stone cribbed

DEPTH: house well is 28' and barn well is 30' deep

WATER USE: 50 head cattle and home

WATER QUANTITY COMMENTS: none

WATER QUALITY COMMENTS: good drinking water, hard

TYPE OF SEWAGE SYSTEM: no septic system

ON SITE CONTAMINATION SOURCES: manure piles behind barn, straw over well tp prevent freezing

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 40 metres

WELL LOG DATA: (no logs made for dug wells)

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA (sample from barn well because house well frozen)

Alkalinity	430 mg/l (as $CaCO_3$)
Hardness	590 mg/l (as $CaCO_3$)
Chloride	120 mg/l
Nitrate	2.8 mg/l
Nitrite	<0.002 mg/l
Ammonia	<0.01 mg/l
Iron	0.10 mg/l
Sulphate	215 mg/l
Others:	Total Coliform: 6 (colonies/100 ml) Faecal Coliform: 6

SUMMARY AND RECOMMENDATIONS: (high risk)

Well construction information and observations made by owner suggest that both dug wells are hydraulically connected to the river through the gravel fractured bedrock aquifer. The barn well is bacterialogically contaminated and is unfit for human consumption. These wells should be classified as high risk types because of their proximity to the river. Recommendations in the event that the well goes dry during the dredging project include:

1) lowering shallow well intake pipe
2) installation of deep well pump
3) drilling of a deep bedrock well

CONTRACT AREA 4

CONTRACT AREA; 4
CHAINAGE: 10 + 900

DATA SUMMARY SHEET

HOMEOWNER: McGillvray

WHEN THEY MOVED IN: 1960

TYPE OF RESIDENCE: home

NUMBER OF WELLS:

AGE OF WELLS: 1959-60

TYPE OF CONSTRUCTION: 1

DEPTH: dug to ~12'

WATER USE: domestic

WATER QUANTITY COMMENTS: goes dry in summer

WATER QUALITY COMMENTS: bad during floods; iron staining present

TYPE OF SEWAGE SYSTEM: unknown

ON SITE CONTAMINATION SOURCES: domestic sewage

GENERAL COMMENTS: likely highly polluted

LOCATION OF WELLS

PROXIMITY TO RIVER: 170 metres

WELL LOG DATA: no information available

Well drilled for:

Year drilled:

Casing Diameter:

Name of Driller:

Grouting record:

casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	374 mg/l	(as $CaCO_3$)
Hardness	452 mg/l	(as $CaCO_3$)
Chloride	70 mg/l	
Nitrate	6.0 mg/l	
Nitrite	0.004 mg/l	
Ammonia	0.02 mg/l	
Iron	<0.05 mg/l	
Sulphate	85 mg/l	
Others:	Total Coliform 18 Faecal Coliform 2	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (high natural risk)

Observations made by owner suggest that well is not hydraulically connected to the river is receiving water from local sources near the ground surface. The water supply is severely contaminated by nitrate, total coliform and faecal coliform which indicates that leaking around the well bore is occurring. Based on the general appearance of the residence, it is highly probable that sewage contamination of the water supply is taking place. The well should be classified as a high natural risk type which will not be affected by channelization activities. Remedial work is considered to be the responsibility of the owner.

CONTRACT AREA: 4

CHAINAGE: 10 + 950

DATA SUMMARY SHEET

HOMEOWNER: Ed Dejong (Claire Hollister previous owner)

WHEN THEY MOVED IN: 1975

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS: 1

AGE OF WELLS: 5 - 5 yrs?

TYPE OF CONSTRUCTION: drilled; shallow pump well

DEPTH: unknown

WATER USE: domestic only

WATER QUANTITY COMMENTS: never a shortage of water

WATER QUALITY COMMENTS: some sulphur

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: septic tank only

GENERAL COMMENTS: no taste or colour problems in spring

LOCATION OF WELLS

PROXIMITY TO RIVER: ~ 200 + metres

WELL LOG DATA: well log unavailable

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity			
Hardness			
Chloride	140 mg/l		
Nitrate	<0.02 mg/l		
Nitrite	<0.002 mg/l		
Ammonia	0.20 mg/l		
Iron			
Sulphate	35 mg/l		
Others:	total coliform	2	(colonies/100 ml)
	Faecal coliform	0	

SUMMARY AND RECOMMENDATIONS: (low risk)

Well log information was not available, but the well is likely a low risk type owing to the large distance between the well bore and the river.

CONTRACT AREA: 4

CHAINAGE: 11 + 000

DATA SUMMARY SHEET

HOMEOWNER: Casselman (previous owner Mary Hitsman)

WHEN THEY MOVED IN: 1974

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS: 1

AGE OF WELLS: 1973

TYPE OF CONSTRUCTION: drilled, shallow well pump

DEPTH: 85' approximate

WATER USE: domestic

WATER QUANTITY COMMENTS: no complaints

WATER QUALITY COMMENTS: hydrogen sulphide or swampy taste, gets worse in heavy rain

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: septic tank only

GENERAL COMMENTS: dug well until 1971, went dry when bridge construction undertaken

LOCATION OF WELLS

PROXIMITY TO RIVER: 20 metres

WELL LOG DATA:

Well drilled for:

Year drilled:

Casing diameter: 6"

Name of driller:

Grouting record:

Casing depth: 40'

Static level: 18

Pumped level after test: 40

Test rate: 5 IGPM

Test duration: 1 hour

Type of water: fresh

Stratigraphic log: clay 0018, boulders 0038, limestone 0085

General comments: water found at 77'

WATER QUALITY DATA

Alkalinity		
Hardness		
Chloride	270 mg/l	
Nitrate	<0.02 mg/l	
Nitrite	<0.002 mg/l	
Ammonia	0.27 mg/l	
Iron		
Sulphate	30 mg/l	
Others:	Total coliform <2 Faecal coliform 0	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (low risk)

Well construction information and observations made by owner suggest that the well may be, in part, hydraulically connected to the river. The well bore is likely drilled into the fractured bedrock/bedrock aquifer. The well should be classified as a low risk type, but careful monitoring of piezometric levels should be undertaken during the river drainage phase of the project in contract area 4.

CONTRACT AREA: 4

CHAINAGE: 11 + 020

DATA SUMMARY SHEET

HOMEOWNER: Cloverdale Cheese Store

WHEN THEY MOVED IN: 1973, there was an old cheese plant in this location

TYPE OF RESIDENCE: store/commercial

NUMBER OF WELLS: 1

AGE OF WELLS: dug part is 50 years old

TYPE OF CONSTRUCTION: dug to 20', then drilled

DEPTH: unknown

WATER USE: store washrooms

WATER QUANTITY COMMENTS: no complaints: sufficient for domestic use

WATER QUALITY COMMENTS: minor "sulphur" smell

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: septic system

GENERAL COMMENTS: 70/ well to tile bed spacing

LOCATION OF WELLS

PROXIMITY TO RIVER: 200 metres

WELL LOG DATA: (well log unavailable)

Well drilled for: Ault Foods Ltd., Winchester

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	315 mg/l (as $CaCO_3$)	
Hardness	810 mg/l (as $CaCO_3$)	
Chloride	388 mg/l	
Nitrate	<0.02 mg/l	
Nitrite	<0.002 mg/l	
Ammonia	0.07 mg/l	
Iron	1.2 mg/l	
Sulphate	85 mg/l	
Others:	Total coliform <2 Faecal coliform 0	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (high risk)

Well log information was not available, but the proximity of the well to the river suggests that dewatering is likely to take place during the dredging project (high risk type). Recommendations in the event that the well goes dry include:

1) lowering of shallow well pump intake pipe
2) installation of deep well pump
3) deepen well into bedrock

CONTRACT AREA: 4
CHAINAGE: 11 + 040

DATA SUMMARY SHEET

HOMEOWNER: Denis Ouellette

WHEN THEY MOVED IN:

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS: 1

AGE OF WELLS: 1974

TYPE OF CONSTRUCTION: drilled, shallow well pump

DEPTH: about 60'

WATER USE: services 1 home and 2 trailers

WATER QUANTITY COMMENTS:

WATER QUALITY COMMENTS: hard, high iron, swampy taste

TYPE OF SEWAGE SYSTEM:

ON SITE CONTAMINATION SOURCES: none, except septic

GENERAL COMMENTS: well has softener, water has high turbidity when it rains, dirty in spring.

LOCATION OF WELLS

PROXIMITY TO RIVER: 140 metres

WELL LOG DATA: (well log unavailable)

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity		
Hardness		
Chloride	108 mg/l	
Nitrate	< 0.02 mg/l	
Nitrite	< 0.002 mg/l	
Ammonia	0.30 mg/l	
Iron		
Sulphate	125 mg/l	
Others:	Total coliform < 2	(colonies/100 ml)
	Faecal coliform 0	

SUMMARY AND RECOMMENDATIONS: (high risk)

Well log information was not available, but the proximity of the well to the river combined with observations made by the owner indicate that dewatering will likely occur during the dredging project. The well site should be classified as a high risk type and remedial action to be undertaken if the well goes dry include:

1) lowering of shallow well pump intake pipe
2) installation of deep well pump
3) drill well deeper into bedrock

CONTRACT AREA: 4
CHAINAGE: 11 + 050

DATA SUMMARY SHEET

HOMEOWNER: Byres (Kelley owner)

WHEN THEY MOVED IN: renting, 1980

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS: 1

AGE OF WELLS: unknown

TYPE OF CONSTRUCTION: drilled

DEPTH: unkwnown

WATER USE: 2 people

WATER QUANTITY COMMENTS: no complaints in last 6 months

WATER QUALITY COMMENTS: as above

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: none

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 40 metres

WELL LOG DATA: Well log unavailable

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	
Hardness	
Chloride	278 mg/l
Nitrate	<0.02 mg/l
Nitrite	<0.002 mg/l
Ammonia	0.26 mg/l
Iron	
Sulphate	35 mg/l
Others:	Total coliform <2 (colonies/100 ml) Faecal coliform 0

SUMMARY AND RECOMMENDATIONS: (high risk)

Well log information was not available, but owing to the proximity of the well to the river it is likely that water supply will be affected during the dredging project. This well should be classified as a high risk type and remedial action in the event that the well goes dry include:

1) lowering of shallow well pump intake pipe.
2) installation of deep well pump.
3) deepening existing well if required.

CONTRACT AREA: 4
CHAINAGE: 11 + 110

DATA SUMMARY SHEET

HOMEOWNER: Durant Farm

WHEN THEY MOVED IN: 1977

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS: 1

AGE OF WELLS: at least 24 years old

TYPE OF CONSTRUCTION: drilled; static level 12' with foot valve at 25'

DEPTH: 300' estimate?

WATER USE: 70 head cattle and house

WATER QUANTITY COMMENTS: good yields

WATER QUALITY COMMENTS: hydrogen sulphide

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure piles behind barn

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 160 metres

WELL LOG DATA: well log unavailable

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	214 mg/l	(as $CaCO_3$)
Hardness	176 mg/l	(as $CaCO_3$)
Chloride	180 mg/l	
Nitrate	<0.02 mg/l	
Nitrite	<0.002 mg/l	
Ammonia	0.23 mg/l	
Iron	0.05 mg/l	
Sulphate	40 mg/l	
Others:	total coliform 54	(colonies/100 ml)
	faecal coliform 0	

SUMMARY AND RECOMMENDATIONS: (low risk)

Well log information was not available, but water analysis data indicates that leaking around the well is occurring (high total coliform counts). Based on water quality data, the well water is not a potable water supply. This problem could probably be rectified by proper grouting of the well to eliminate coliform bacteria infiltration from surface manure piles. The well should be classified as a low risk type based on information from the owner (300' deep well), and no remedial action is recommended.

CONTRACT AREA: 4

CHAINAGE: 12 + 350

DATA SUMMARY SHEET

HOMEOWNER: Coons Farm

WHEN THEY MOVED IN: 1948

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 1

AGE OF WELLS: pre 1948 drilled by previous owner (G. Baldwin)

TYPE OF CONSTRUCTION: drilled

DEPTH: - no well log available

WATER USE: stock and domestic; 90 head of cattle

WATER QUANTITY COMMENTS: none

WATER QUALITY ,COMMENTS: none

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure piles behind barn and septic system

GENERAL COMMENTS: never had problems with well

LOCATION OF WELLS

PROXIMITY TO RIVER: 600 metres to river

WELL LOG DATA: no well log data available

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	382 mg/l (as $CaCO_3$)
Hardness	560 mg/l (as $CaCO_3$)
Chloride	51 mg/l
Nitrate	<0.02 mg/l
Nitrite	<0.002 mg/l
Ammonia	0.05 mg/l
Iron	2.4 mg/l
Sulphate	150 mg/l
Others:	Total coliform <2 (colonies/100 ml) Faecal coliform 0

SUMMARY AND RECOMMENDATIONS: (low risk)

Well construction information and observations made by owner suggest that well is associated with the fractured bedrock aquifer. No significant contamination of the water supply was noted based on M.O.E. water analyses. The well should be classified as a low risk type because of the large distance between the well bore and the river.

CONTRACT AREA: 4

CHAINAGE: 13 + 000

DATA SUMMARY SHEET

HOMEOWNER: Johnstone

WHEN THEY MOVED IN: over 40 years ago

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 1

AGE OF WELLS:

TYPE OF CONSTRUCTION: dug to 28', then drilled deeper: shallow well pump

DEPTH: unknown

WATER USE: 100 head cattle + 2 homes

WATER QUANTITY COMMENTS: none

WATER QUALITY COMMENTS: none

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure piles

GENERAL COMMENTS: high static level in spring; well "runs over" when snowmelt occurs.

LOCATION OF WELLS

PROXIMITY TO RIVER: 500 metres

WELL LOG DATA: data not available

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	276 mg/l	(as $CaCO_3$)
Hardness	400 mg/l	(as $CaCO_3$)
Chloride	23 mg/l	
Nitrate	0.02 mg/l	
Nitrite	<.002 mg/l	
Ammonia	0.01 mg/l	
Iron	1.1 mg/l	
Sulphate	105 mg/l	
Others:	Total coliform 2 Faecal coliform 0	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (low risk)

Well construction information and observations made by owner suggest that well is associated with the fractured bedrock aquifer. No significant contamination of the water supply was noted based on M.O.E. water analyses. The well should be classified as a low risk type because of the large distance between the well bore and the river. However, monitoring of static levels in Test Hole 7 should be undertaken to study piezometric drawdown during river drainage phase of the project in contract area 4.

CONTRACT AREA 5

CONTRACT AREA: 5
CHAINAGE: 15 + 150

DATA SUMMARY SHEET

HOMEOWNER: D. Walker - household & barn

WHEN THEY MOVED IN: 1918

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 2

AGE OF WELLS: drilled in 1958

TYPE OF CONSTRUCTION: dug at house, drilled at barn

DEPTH: drilled is 78' deep, dug is 25'

WATER USE: 24 head cattle and home

WATER QUANTITY COMMENTS: good yields

WATER QUALITY COMMENTS: high iron, hard

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure near barn

GENERAL COMMENTS: deep well has softer water than shallow well.

LOCATION OF WELLS

PROXIMITY TO RIVER: 500 metres

WELL LOG DATA: well log not available

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA	House (dug)	Barn (drilled)
Alkalinity	284 mg/l (as $CaCO_3$)	244 mg/l
Hardness	420 mg/l (as $CaCO_3$)	208 mg/l
Chloride	42 mg/l	330 mg/l
Nitrate	26 mg/l	0.06 mg/l
Nitrite	0.002 mg/l	<0.002 mg/l
Ammonia	0.01 mg/l	0.26 mg/l
Iron	0.05 mg/l	0.20 mg/l
Sulphate	70 mg/l	110 mg/l
Others:	Total coliform <2 (colonies/100 ml) Faecal coliform 0	Total coliform 20 (colonies/ Faecal coliform 2 100 ml)

SUMMARY AND RECOMMENDATIONS: (low risk)

Shallow well construction of the drilled well combined with the presence of high chloride, ammonia, total coliform and faecal coliform values indicate that leaking around the well bore is occurring. The aquifer source for the well is likely the bedrock aquifer, but surface contamination has made the water supply unpotable. This problem could probably be rectified by proper grouting of the well to eliminate bacteria and chemical contamination from surface manure piles. Relocation of manure piles may also be a necessary measure to prevent well water contamination.

Due to the large distance between the wells and the river, the well should be classified as a low risk type.

CONTRACT AREA: 5

CHAINAGE: 15 + 150

DATA SUMMARY SHEET

HOMEOWNER: R.G. Hedge

WHEN THEY MOVED IN: 1972, previous owner D. Dillabaugh

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 1

AGE OF WELLS: 1967

TYPE OF CONSTRUCTION: drilled

DEPTH: 23' estimate, shallow well pump

WATER USE: domestic, 80 head cattle

WATER QUANTITY COMMENTS: no problems, very high yields

WATER QUALITY COMMENTS: no complaints

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure pile near well

GENERAL COMMENTS: Well will overflow during a wet season. Drilled well at burnt and abandoned farm immediately west of this project.

LOCATION OF WELLS

PROXIMITY TO RIVER: 750 metres

WELL LOG DATA: well log unavailable

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	274 mg/l	(as $CaCO_3$)
Hardness	348 mg/l	(as $CaCO_3$)
Chloride	58 mg/l	
Nitrate	< 0.02 mg/l	
Nitrite	< 0.002 mg/l	
Ammonia	0.13 mg/l	
Iron	0.20 mg/l	
Sulphate	110 mg/l	
Others:	Total coliform <2 Faecal coliform 0	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (low risk)

No well log data was available, but based on discussions with owner no water quality problems have ever been encountered. The well should be classified as a low risk type because it is so far away from the river.

CONTRACT AREA: 5
CHAINAGE: 15 + 900

DATA SUMMARY SHEET

HOMEOWNER: Brian Morrisey

WHEN THEY MOVED IN: 1979

TYPE OF RESIDENCE: occasional home

NUMBER OF WELLS: 1

AGE OF WELLS:

TYPE OF CONSTRUCTION: dug the drilled (?)

DEPTH: unknown

WATER USE: domestic

WATER QUANTITY COMMENTS:

WATER QUALITY COMMENTS:

TYPE OF SEWAGE SYSTEM:

ON SITE CONTAMINATION SOURCES:

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 600 metres

WELL LOG DATA:

Well drilled for: A. Lemery

Year drilled: January 1961

Casing diameter: 4"

Name of driller:

Grouting record: not grouted

Casing depth:

Static level: 15'

Pumped level after test: 25'

Test rate: 10 IGPM

Test duration: 2 hours

Type of water: fresh

Stratigraphic log: till 0043, limestone 0055

General comments: well not currently used.

WATER QUALITY DATA

Alkalinity

Hardness

Chloride

Nitrate

Nitrite

Ammonia

Iron

Sulphate

Others:

SUMMARY AND RECOMMENDATIONS: (low risk)

No water sample was collected during the door-to-door survey since the residence is only used as a summer house. The well should be classified as a low risk type because it is so far away from the river.

CONTRACT AREA: 5
CHAINAGE: 17 + 400

DATA SUMMARY SHEET

HOMEOWNER: Leo Van Adrichem

WHEN THEY MOVED IN:

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 1

AGE OF WELLS: 1961

TYPE OF CONSTRUCTION: drilled, shallow well pump

DEPTH: 108' estimate

WATER USE: fresh

WATER QUANTITY COMMENTS: no complaints

WATER QUALITY COMMENTS: no complaints

TYPE OF SEWAGE SYSTEM: none

ON SITE CONTAMINATION SOURCES: -

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 25 metres from south branch
120 metres from main river

WELL LOG DATA:

Well drilled for: Leo Van Adrichen

Year drilled: 1961

Casing diameter: 5"

Name of driller: Simzer

Grouting record: not grouted

Casing depth: 80'

Static level: 7'

Pumped level after test: 70'

Test rate: 4 IGPM

Test duration: 3 hrs

Type of water: fresh

Stratigraphic log: dug well 17, clay boulders 77, limestone 105

General comments: water found at 105 ft.

WATER QUALITY DATA

Alkalinity	218 mg/l	(as $CaCO_3$)
Hardness	244 mg/l	(as $CaCO_3$)
Chloride	190 mg/l	
Nitrate	< 0.02 mg/l	
Nitrite	< 0.002 mg/l	
Ammonia	0.42 mg/l	
Iron	0.15 mg/l	
Sulphate	145 mg/l	
Others:	total coliform < 2 faecal coliform 0	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (low risk)

Based on the high sulphur (as SO_4^{2-}) content found in the water sample analyzed and the well log data, indicate that the well is probably drilled into the deep bedrock aquifer. However, the proximity of the well to the river warrants that close monitoring of this site should be undertaken during the trenching project. No other remedial action is recommended.

CONTRACT AREA: 5
CHAINAGE: 17 + 520

DATA SUMMARY SHEET

HOMEOWNER: Frank Salters

WHEN THEY MOVED IN: over 100 years in family

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 1

AGE OF WELLS: 1962

TYPE OF CONSTRUCTION: drilled, shallow well pump

DEPTH: estimated 52', log says 63'

WATER USE: stock and domestic, 24 head of cattle

WATER QUANTITY COMMENTS: none

WATER QUALITY COMMENTS: some "sulphur" smell

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: septic system

GENERAL COMMENTS: no colour or other water quality problems in spring static level is high

LOCATION OF WELLS

PROXIMITY TO RIVER: 30 metres

WELL LOG DATA:

Well drilled for: Frank Salters

Year drilled: Sept. 1962

Casing diameter: 6"

Name of driller: Dufresne Ltd., Ottawa

Grouting record: not grouted

Casing depth: 62', steel casing

Static level: 10'

Pumped level after test: -

Test rate: 17 IGPM

Test duration: 1 hour

Type of water: clear

Stratigraphic log: clay 030, hardpan 060, limestone 063

General comments: well likely hydraulically connected to river

WATER QUALITY DATA

Alkalinity	192 mg/l	(as $CaCO_3$)
Hardness	172 mg/l	(as $CaCO_3$)
Chloride	195 mg/l	
Nitrate	0.06 mg/l	
Nitrite	0.002 mg/l	
Ammonia	0.35 mg/l	
Iron	0.25 mg/l	
Sulphate	120 mg/l	
Others:	Total coliform <2 Faecal coliform 0	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (high risk)

Well construction information and observations made by owner suggest that well is hydraulically connected to the river and that the well bore is likely drilled into the gravel fractured bedrock aquifer. No significant contamination of water supply was noted based on M.O.E. water analyses. The well should be classified as a high risk type because of its proximity to the river. Recommendations in the event that the well goes dry during the dredging project include:

1) lowering shallow well intake pipe
2) installation of deep well pump
3) deepening well into bedrock

CONTRACT AREA 6

CONTRACT AREA: 6

CHAINAGE: 17 + 850

DATA SUMMARY SHEET

HOMEOWNER: Kaman

WHEN THEY MOVED IN: 1976

TYPE OF RESIDENCE: home and hobby farm

NUMBER OF WELLS: 1

AGE OF WELLS: unknown, pre 1950

TYPE OF CONSTRUCTION: drilled

DEPTH: unknown

WATER USE: domestic only at present

WATER QUANTITY COMMENTS: no complaints

WATER QUALITY COMMENTS: no complaints

TYPE OF SEWAGE SYSTEM: Class Iv

ON SITE CONTAMINATION SOURCES: septic system only

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 45 metres

WELL LOG DATA: well log unavailable

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	212 mg/l (as $CaCO_3$)
Hardness	236 mg/l (as $CaCO_3$)
Chloride	145 mg/l
Nitrate	2.7 mg/l
Nitrite	0.002 mg/l
Ammonia	0.08 mg/l
Iron	< 0.05 mg/l
Sulphate	95 mg/l
Others:	total coliform <2 (colonies/100 ml) faecal coliform 0

SUMMARY AND RECOMMENDATIONS: (high risk)

Well construction information was unavailable, but the presence of nitrate and chloride in well water indicates that leaking around the well bore is occurring. The aquifer source is likely the fractured bedrock-gravel unit which is directly connected to the river. The well should be classified as a high risk type because of its proximity to the river. Recommendations in the event that the well goes dry include:

1) lowering shallow well intake pipe
2) installation of deep well pump
3) extend depth in existing well.

CONTRACT AREA: 6

CHAINAGE: not available

DATA SUMMARY SHEET

HOMEOWNER: N. Tinkler

WHEN THEY MOVED IN: 1938

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 1

AGE OF WELLS: unknown

TYPE OF CONSTRUCTION: drilled, shallow well pump

DEPTH: 60' estimate

WATER USE: 100 head cattle + home

WATER QUANTITY COMMENTS: no complaints

WATER QUALITY COMMENTS: high iron, hardness, some "sulphur" smell

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure pile at back of barn

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 30 metres

WELL LOG DATA: well log unavailable

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	212 mg/l	(as $CaCO_3$)
Hardness	180 mg/l	(As $CaCO_3$)
Chloride	153 mg/l	
Nitrate	<0.02 mg/l	
Nitrite	<0.002 mg/l	
Ammonia	0.34 mg/l	
Iron	0.05 mg/l	
Sulphate	90 mg/l	
Others:	Total coliform 4 Faecal coliform 0	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (high risk)

Shallow well construction combined with the presence of chloride, ammonia and coliform bacteria indicate that leaking around the well bore is occurring. The aquifer source for the well is likely the fractured bedrock-gravel unit which is directly connected to the river. Based on water quality data, the well water is not a potable water supply. This problem could probably be rectified by proper grouting of the well to eliminate coliform bacteria infiltration from surface manure piles.

The well should be classified as a high risk type and recommendations in the event that the well goes dry include:

1) lowering shallow well intake pipe
2) installation of deep well pump

CONTRACT AREA: 6

CHAINAGE: not available

DATA SUMMARY SHEET

HOMEOWNER: P. Van De Meerakker

WHEN THEY MOVED IN:

TYPE OF RESIDENCE: farmhouse

NUMBER OF WELLS: 1

AGE OF WELLS:

TYPE OF CONSTRUCTION: dug well

DEPTH:

WATER USE: farmhouse only

WATER QUANTITY COMMENTS: none

WATER QUALITY COMMENTS: none

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure piles behind barn and sewage system mainly

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 30 metres

WELL LOG DATA: well log unavailable

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	402 mg/l	(as $CaCO_3$)
Hardness	500 mg/l	(as $CaCO_3$)
Chloride	65 mg/l	
Nitrate	7.4 mg/l	
Nitrite	$<$ 0.002 mg/l	
Ammonia	0.01 mg/l	
Iron	0.05 mg/l	
Sulphate	75 mg/l	
Others:	Total coliform $>$160 (colonies/100 ml) Faecal coliform 20	

SUMMARY AND RECOMMENDATIONS: (high risk)

Well construction information shows that well is shallow but is probably connected to bedrock surface aquifer. Contamination of the well by fresh sewage is severe as indicated by high nitrate, total coliform and faecal coliform values, hence the well should not be used as a potable water supply. This problem might be rectified by proper grouting of the well to eliminate seepage of sewage down the well bore and/or modification of the existing seepage tile bed. The establishment of a pipeline to the drilled well at the W. Van de Meerakker farm for domestic use would also rectify the existing contaminated water problem.

The well should be classified as a high risk type because of its proximity to the river. Recommendations in the event that the well goes dry during the dredging project include:

1) lowering shallow well intake pipe
2) installation of deep well pump
3) extending the depth of the existing well.

CONTRACT AREA: 6

CHAINAGE: not available

DATA SUMMARY SHEET

HOMEOWNER: W. Van De Meerakker

WHEN THEY MOVED IN: 1959

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 1

AGE OF WELLS:

TYPE OF CONSTRUCTION: drilled well 1962-63

DEPTH: 53' into gravel only

WATER USE: farmhouse - domestic and barn - cattle

WATER QUANTITY COMMENTS: good, but hard, no complaints

WATER QUALITY COMMENTS: no problems - no H_2S smell

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: manure pile behind barn, sewage system

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 75 metres

WELL LOG DATA:

Well drilled for: Van de Meerakker

Year drilled: Sept. 1962

Casing diameter: 5"

Name of driller: Dufresne & Co. Ltd.

Grouting record:

Casing depth:

Static level: 15'

Pumped level after test: 25'

Test rate: 15 IGPM

Test duration: 1 hour

Type of water: fresh

Stratigraphic log: clay 0020, till 0052, gravel 0053

General comments: well in valley; used for farm & mobile home

WATER QUALITY DATA

Alkalinity	210 mg/l	(as $CaCO_3$)
Hardness	112 mg/l	(as $CaCO_3$)
Chloride	153 mg/l	
Nitrate	0.02 mg/l	
Nitrite	0.002 mg/l	
Ammonia	0.27 mg/l	
Iron	0.05 mg/l	
Sulphate	75 mg/l	
Others:	Total coliform <2	(colonies/100 ml)
	Faecal coliform 0	

SUMMARY AND RECOMMENDATIONS: (high risk)

Well log data indicates that the well is drilled into gravel aquifer which is probably directly connected to the river. No sewage contamination was evident in this water. The well should be classified as a high risk type owing to the fact that it has been drilled into the gravel aquifer. Recommendations in the event that the well goes dry include:

1) lowering shallow well intake pipe
2) installation of deep well pump
3) extending depth of the existing well

CONTRACT AREA: 6

CHAINAGE: not available

DATA SUMMARY SHEET

HOMEOWNER: G. Kenney

WHEN THEY MOVED IN: pre 1950

TYPE OF RESIDENCE: farm

NUMBER OF WELLS: 1

AGE OF WELLS: 1959-60 by Raman Castleman

TYPE OF CONSTRUCTION: dug, then drilled to 78'

DEPTH: 78'

WATER USE: farm and domestic

WATER QUANTITY COMMENTS: head goes down with river - poor yield

WATER QUALITY COMMENTS: coloured water occassionally

TYPE OF SEWAGE SYSTEM:

ON SITE CONTAMINATION SOURCES: manure piles and sewage system

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 25 metres

WELL LOG DATA:

Well drilled for: Glen Kenney

Year drilled: December 1960

Casing diameter: 5"

Name of driller: Casselman

Grouting record:

Casing depth:

Static level: 13'

Pumped level after test: 15'

Test rate: 20 IGPM

Test duration: 1 hour

Type of water: fresh

Stratigraphic log: clay 0030, clay gravel 39, limestone 78

General comments:

WATER QUALITY DATA

Alkalinity	250 mg/l	(as $CaCO_3$)
Hardness	158 mg/l	(as $CaCO_3$)
Chloride	22 mg/l	
Nitrate	0.02 mg/l	
Nitrite	< 0.002 mg/l	
Ammonia	0.01 mg/l	
Iron	0.60 mg/l	
Sulphate	10 mg/l	
Others:	Total coliform <2 Faecal coliform 0	(colonies/100 ml)

SUMMARY AND RECOMMENDATIONS: (high risk)

Well construction information and observations made by owner suggest that well is hydraulically connected to the river and is obtaining water from the fractured bedrock aquifer. No significant contamination of water supply was noted based on M.O.E. water analyses. The well should be classified as a high risk type because of its proximity to the river and the fact that a direct hydraulic connection to the river is evident. Recommendations in the event that the well goes dry include:

1) lowering shallow well intake pipe
2) installation of deep well pump

CONTRACT AREA: 6
CHAINAGE: not available

DATA SUMMARY SHEET

HOMEOWNER: Baldwin

WHEN THEY MOVED IN: several generations ago

TYPE OF RESIDENCE: domestic

NUMBER OF WELLS: 1

AGE OF WELLS: pre 1950

TYPE OF CONSTRUCTION: drilled, shallow well pump

DEPTH: 30-35' estimate

WATER USE: domestic only

WATER QUANTITY COMMENTS: no complaints, good yields

WATER QUALITY COMMENTS: very hard, high iron, hydrogen sulphide

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: septic tank only

GENERAL COMMENTS:

LOCATION OF WELLS

PROXIMITY TO RIVER: 25 metres

WELL LOG DATA: well log unavailable

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	482 mg/l	(as $CaCO_3$)
Hardness	670 mg/l	(as $CaCO_3$)
Chloride	125 mg/l	
Nitrate	0.03 mg/l	
Nitrite	0.006 mg/l	
Ammonia	0.14 mg/l	
Iron	0.60 mg/l	
Sulphate	145 mg/l	
Others:	Total coliform <2	(colonies/100 ml)
	Faecal coliform 0	

SUMMARY AND RECOMMENDATIONS: (high risk)

Well construction information was unavailable but shallow depth (according to owner) suggests that aquifer source is likely the fracture bedrock unit which is connected to the river. The well should be classified as a high risk type because of the proximity to the river. Recommendations in the event that the well goes dry include:

1) lowering shallow well intake pipe (to 40-45')
2) installation of deep well pump
3) extending depth of existing well.

CONTRACT AREA: 6

CHAINAGE: not available

DATA SUMMARY SHEET

HOMEOWNER: Guerin

WHEN THEY MOVED IN:

TYPE OF RESIDENCE: domestic, only 2 people

NUMBER OF WELLS: 1

AGE OF WELLS:

TYPE OF CONSTRUCTION: drilled, shallow pump well

DEPTH: 30'

WATER USE: domestic only

WATER QUANTITY COMMENTS: ran out 2 yrs ago in November - lowered foot valve 15' and got water

WATER QUALITY COMMENTS: no complaints - some colour in spring

TYPE OF SEWAGE SYSTEM: Class IV

ON SITE CONTAMINATION SOURCES: None other than septic tank.

GENERAL COMMENTS: colour in spring.
definite hydraulic convection to river

LOCATION OF WELLS

PROXIMITY TO RIVER: 25 metres

WELL LOG DATA: well log unavailable

Well drilled for:

Year drilled:

Casing diameter:

Name of driller:

Grouting record:

Casing depth:

Static level:

Pumped level after test:

Test rate:

Test duration:

Type of water:

Stratigraphic log:

General comments:

WATER QUALITY DATA

Alkalinity	
Hardness	
Chloride	63 mg/l
Nitrate	3.6 mg/l
Nitrite	0.002 mg/l
Ammonia	<0.01 mg/l
Iron	
Sulphate	135 mg/l
Others:	Total coliform <2 (colonies/100 ml) Faecal coliform 0

SUMMARY AND RECOMMENDATIONS: (high risk)

Well construction information and observations made by owner suggest that well is hydraulically connected to the river. The well bore is likely drilled into the fractured bedrock/gravel aquifer but high nitrate value indicates that sewage (?)/fertilizer contamination is occurring. This contamination may be the result of leakage around the well bore or more likely from the river itself since no coliform was found in the collected water sample. The well should be classified as a high risk type because of its proximity to the river and the fact that a direct hydraulic connection to the river is evident. Recommendations in the event that the well goes dry include:

1) lowering shallow well intake pipe
2) installation of deep well pump
3) extending depth of existing well into bedrock.