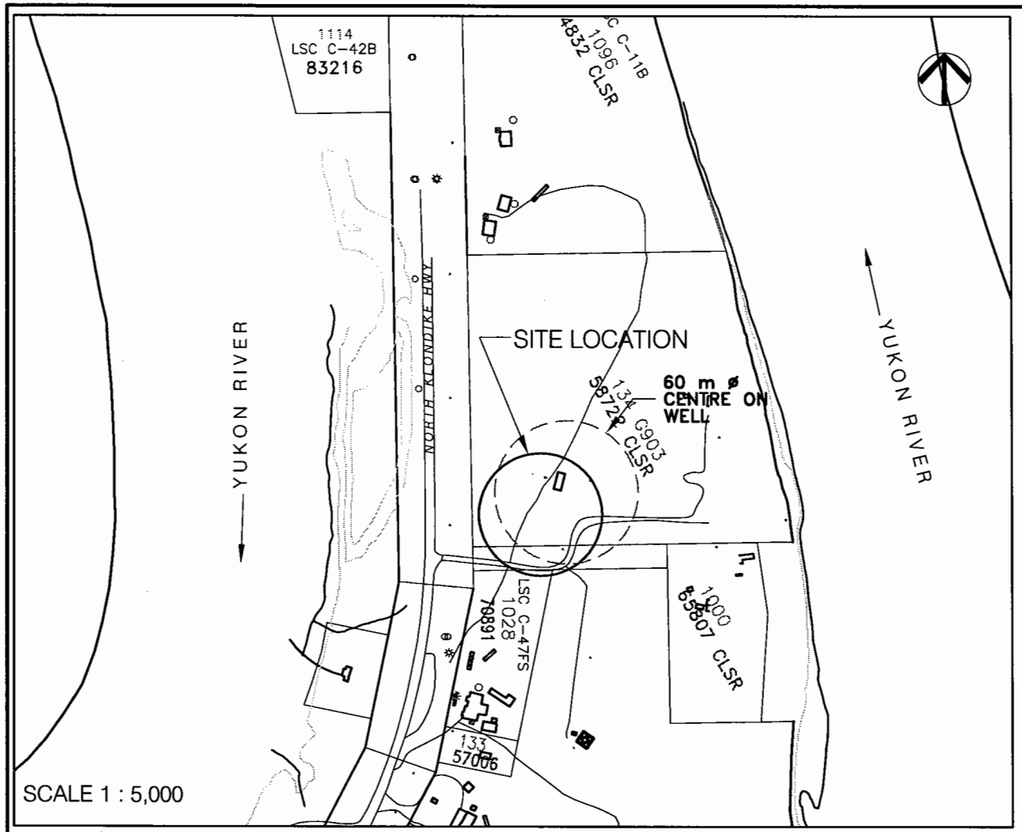
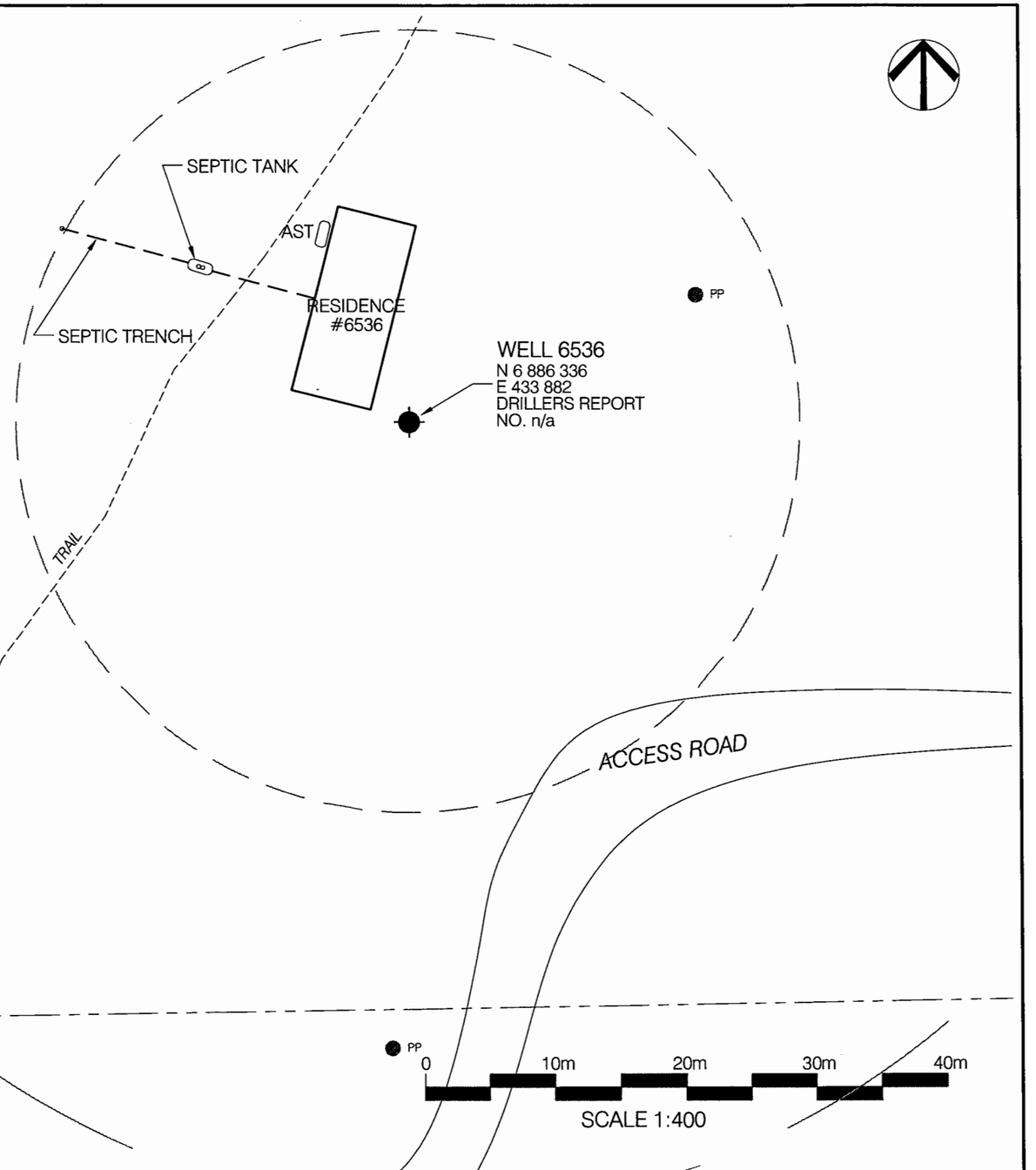
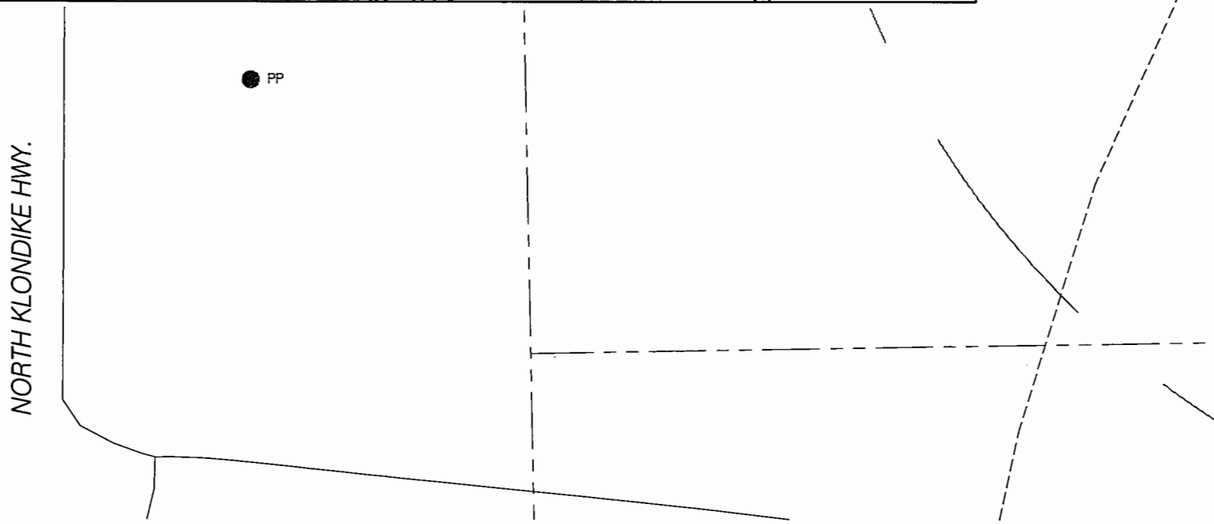






NOTES:
1. UTM COORDINATES OBTAINED WITH A HAND HELD GPS USING NAD83 SYSTEM AND ARE CONSIDERED TO BE ACCURATE TO 10.0 m, APPROXIMATELY.

30 m RADIUS FROM WATER WELL FOR CONSIDERATION OF PROXIMITY TO POTENTIAL CONTAMINANT SOURCES.

No.	DESCRIPTION	DATE	APPROVED
0	ISSUED FOR CLIENT REVIEW	DD/MM/YY	XXX

REVISION

EBA Engineering Consultants Ltd.

DESIGNED BY:	R. MARTIN
DRAWN BY:	J. BUYCK
DATE:	JUNE 2005
SCALE:	AS SHOWN
PROJECT No.:	1260002.001
ACAD FILENAME:	001-WHITEHORSE REGION

CLIENT: Yukon
Highways and Public Works
Property Management Branch

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
WHITEHORSE REGION

GOVERNMENT OF YUKON
HIGHWAYS & PUBLIC WORKS

CARMACKS FORESTRY CREW QUARTERS
BUILDING 6536
SITE LOCATION DIAGRAM
WELL ID: 6536

REVISION ISSUE: 0

DRAWING No.: FIGURE 6536A

Z:\0201Drawings\1260002 Water Assessment YTG\001 - Whitehorse Region\carmacks\1260002 Carmacks Overall Plan.dwg, 6/13/2005 10:58:13 AM, \\whi-eb-dc001\WHI201COMMON

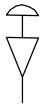
LEGEND


PUMP


PRESSURE GAUGE


GATE VALVE


CHECK VALVE

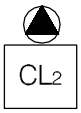

SOLENOID

#2 COMPONENT ID. No.
(SEE TABLE ON FOLLOWING PAGE)

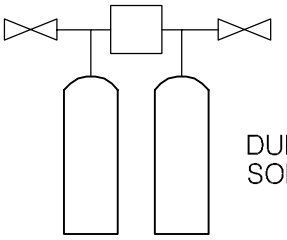
FLOW METER

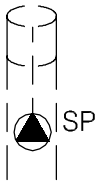
WATER FILTER
(CARTRIDGE TYPE)

PRESSURE TANK

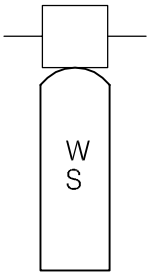


CHLORINE RESERVOIR AND
INJECTION PUMP


DUPLEX WATER
SOFTENER



WELL WITH
SUBMERSIBLE PUMP



ACTIVATED
CARBON

EBA Engineering Consultants Ltd.			PROJECT	SMALL PUBLIC WATER SYSTEMS ASSESSMENT WHITEHORSE REGION	
CLIENT Yukon Highways and Public Works Property Management Branch			TITLE	SCHEMATIC SYSTEM LEGEND	
DATE APRIL 2006	DWN. JSB	CHKD. RMM	FILE NO. 1260002		DRWG. LEGEND

TABLE 6536-1: SUMMARY OF BACTERIOLOGICAL RESULTS

Building #	Building Name	Number of Sampling Events	Time Period over which Sampling was Done	Any Positive Total Coliform Results? (yes or no)	Fraction of Positive Total Coliform Results vs. Total Sampling Events	Any positive E.Coli results? (yes or no)	Most Recent Sampling Event Available for EBA Review	Is Most Recent Result Positive?
6536	Crew Quarters	2	Apr-05 to May-05	no	0/2	no	May 05	no

Table 6536-2: Water Quality Results

SOURCE:	Building 6536 - Forestry Crew Quarters		GCDWQ Criteria		
Location/ Resident	Carmacks				
Address	Lot 12 Parcel C-1				
Treatment	No				
Source of Water	On-Site Well				
Purpose of Sampling	Baseline	Additional Sampling			
Sample Location		Kitchen Tap			
Date Sampled	5-Oct-04	25-May-05	**Lower Limit**	**Upper Limit**	
Physical Tests *(ALS)*			**AO**	**MAC**	**AO**
Colour (CU)	5				15
Conductivity (uS/cm)	310				
Total Dissolved Solids	213				500
Hardness CaCO3	197		AO >200 = poor, > 500 unacceptable[A]		
pH	8.0		6.5		8.5
Turbidity (NTU)	0.95			1	5
UV Absorbance		<0.0010			
Dissolved Anions *(ALS)*					
Alkalinity-Total CaCO3	190				
Chloride Cl	2				250
Fluoride F	0.21			1.5	
Sulphate SO4	18.1				500
Nitrate Nitrogen N	<0.1			10	
Nitrite Nitrogen N	<0.05			1	
Total Metals *(ALS)*					
Aluminum T-Al	<0.02			0.1	
Antimony T-Sb	0.0007			0.006	
Arsenic T-As	0.0009			0.025	
Barium T-Ba	0.0739			1	
Boron T-B	<0.02			5	
Cadmium T-Cd	<0.0002			0.005	
Calcium T-Ca	56.4				
Chromium T-Cr	<0.0008			0.05	
Copper T-Cu	0.001			1	
Iron T-Fe	0.131				0.3
Lead T-Pb	0.0003			0.01	
Magnesium T-Mg	12.7				
Manganese T-Mn	0.021				0.05
Mercury T-Hg	<0.0002			0.001	
Potassium T-K	2.3				
Selenium T-Se	<0.0004			0.01	
Sodium T-Na	6				200
Uranium T-U	0.0011			0.02	
Zinc T-Zn	0.004				5
Field Chemistry (EBA)					
pH		8.72	6.5		8.5
TDS		79			500
EC (uS/cm)		158			
Temperature		6.5			
Free Available Chlorine					250

Notes:

A. Guidelines indicated for hardness are not CDWQG, rather they are general aesthetic guidelines - exceedences are indicated in yellow highlighting.

Shading indicates exceedence of Proposed MAC guideline (arsenic).

Bold Underline with Yellow shading indicates exceedence of CDWQG MAC

Results are expressed as milligrams per litre except for pH and Colour (CU), Conductivity (umhos/cm),Temperature (^{o}C) and Turbidity (NTU)

< = Less than the detection limit indicated.

AO = Aesthetic Objective

MAC = Maximum Acceptable Concentration (Health Based)

Table 6536-3: Summary of Well Assessment Results
SMALL PUBLIC DRINKING WATER SYSTEMS

Well Identification and Location					
Building #	**Building Name**	**Location**	**Northing (+/- 10 m)**	**Easting (+/- 10 m)**	**Grade Elevation (+/- 10 m)**
6536	**Crew Quarters**	**Carmacks**	6886336	433882	526

Well Details							
Well Casing Diameter (mm)	**Year Well Installed**	**Well Log?**	**Well Depth (m bg)**	**Reported Low Permeabilty Protective Layer?**	**Pump Setting (m bg)**	**Well Capacity - Tested, or Reported by User**	**Static Water Level Below Ground (m-btwc)**
125	?	No	10.460	No, shallow well	?	?	6.090

Well Construction Details				
Wellhead Above ground (m)	**Well Cap**	**Well Screen**	**Surface Seal**	**Apron Grading**
0.5 above grade	Split Cap Gasket	No	No	No, ground is even

Table 6536-4: Potential Contaminant Sources
Building 6536 – Carmacks Forestry Crew Quarters

Potential Contaminant Source	Potential Contaminants	Distance from Water Source	Northing	Easting
Dump or Landfill	***Organic*** and inorganic chemicals.	3500 m		
Cemetery	***Biological***[1]***,*** inorganic[2] and organic parameters.	2600 m		
Sewage lagoon	***Biological,*** inorganic and organic parameters.	>300 m		
Sewage lines, tanks and lift stations	***Biological,*** inorganic and organic parameters.	**Approx.12 m**		
Septic fields	***Biological and Inorganic*** parameters.	**20 m likely up-gradient**	6886342	433866
Helicopter Fueling Station	***Organic and Inorganic*** parameters.	150m		
Undergrounds Fuel Storage Tanks (USTs)	***Organic*** parameters.	>>30 m		
Above ground storage tanks (ASTs)	***Organic*** *parameters.*	**14 m**	6886346	433875
Naturally occurring sources of contamination	***Radionuclides, Bacteria and Viruses from surfacewater sources.***	>150 m		

Notes: ***Bold highlighting of distances indicates non-compliance with proposed guidelines***

1- Biological parameters include: bacteria, viruses, protozoa (parasitic organisms), helminthes (intestinal worms), and bio aerosols (inhalable moulds and fungi).

2 – Inorganic contaminants could include arsenic in embalming chemicals (prior to early 1900's), and heavy metals in caskets.

Required Setback Distances Draft Guidelines for Part III – Small Public Drinking Water Systems:

300 m (1,000 ft) from a sewage lagoon or pit and manure heaps
120 m (400 ft) from a solid waste dump or a cemetery
30 m (100 ft) from any other potential source of contamination

*No Well Log

EBA Engineering Consultants Ltd.

Creating and Delivering Better Solutions

6530
6528

SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin
Luke Lebel

Date May 13, 2005

WELL ID #	Owner	Location Description
6536	YTG	Carmacks Forestry Crew Quarters ↳ Across River

1. Well Location and Potential Contaminant Sources

a. General location of well: (Community, Subdivision, etc.)
Carmacks

b. Specific location: (Road or street, Building number, name of owner and/, legal description,
Forestry compound off of the North Klondike highway

c. GPS location: 433882 Easting 6886336 Northing 526m elevation

d Is there electric power? ☒ Yes ☐ No

e. Does the well system have:

☐ 15 or more service connections to a piped distribution system ? If so how many No
Services crew quarters (1 building)

☐ 5 or more delivery sites on a trucked distribution system? If so how many NO

f. Nearest building, specify Carmacks Forestry Crew Quarters

g. Distance from well to building 3m

h. If there is an effluent disposal field, is its location known? ☒ Yes ☐ No

i. Distance from well to nearest point of known field: 20m

j. Well location relative to field: ☐ upslope ☐ downslope ☒ lateral
likely up gradient from well

k. Is there any part of a sewage disposal system(s)or other potential sources of pollution that may pose a health and safety risk within 30 m? ☒ Yes ☐ No
Septic is ~ 20m from the well

l. Is the well located within 300 m from a sewage lagoon or pit? ☐ Yes ☒ No

m. Is the well located within 120 m from a solid waste site or dump, cemetery? ☐ Yes ☒ No

n. Is the infrastructure protecting the wellhead, pumphouse, storage tank and/or water treatment plant designed and secured to prevent:

Unauthorized access by humans? ☐ Yes ☒ No The well head is outside at the front of the crew quarters
Entrance by animals? ☐ Yes ☒ No The well is directly outside

o. Is well site subject to flooding? ☐ Yes ☒ No

p. Is the well site well drained? ☒ Yes ☐ No

q. Is there a buried fuel tank on the property? ☐ Yes ☒ No very unlikely

If yes, is it ☐ in use ☐ abandoned

Is the location known? ☐ Yes ☐ No
Distance from the well to known buried tank _____

r. Are there any other known contaminant sources on the property?

☐ Yes ☐ No Describe _____

If yes, specify the source: ☐ dump ☐ sewage lagoon ☐ cemetery ☐ other

Potential Source 1: AST ; Distance from well to Potential Source 1: ~ 14m
Potential Source 2: _____ ; Distance from well to Potential Source 2: _____
Potential Source 3: _____ ; Distance from well to Potential Source 3: _____
Potential Source 4: _____ ; Distance from well to Potential Source 4: _____

s. Are there other wells on this property? ☐ Yes ☒ No

How many? _____ ☐ in use ☐ abandoned ☐ require proper sealing

2. Well and Wellhead information:

a. When was well installed? Year [illegible] Month [illegible]

b. Type: ☒ drilled ☐ dug ☐ sand point ☐ other _____

c. Is there a drillers log for the well: ☐ Yes ☐ No

d. Is there a surface seal to 6 m ☐ Yes ☒ No ☐ unknown ☐ unlikely

e. Surface casing: ☐ Yes Diameter _____ ☒ No
well is outside

f. Well casing: Diameter 15cm Material: ☒ steel ☐ plastic ☐ concrete

g. Depth of well: 10.960m bc ☒ measured (if possible) ☐ reported ☒ from log

h. Static water level below ground: 6.090m bc

☒ measured (if possible) ☐ reported ☐ from log ☐ flowing

i. (If granular) Is the well completed: ☐ open end casing ☐ with a well screen

☐ with slotted pipe ☐ unknown other _____

j. (If bedrock) Does the well have a liner? ☐ yes ☐ No ☐ steel ☐ plastic

k. If there is a well screen: length _____ slot size(s) _____
Location of screen: from _____ to _____ from log reported

l. Is there a sump below the screen? ☐ Yes ☐ No unknown

m. Is the well head: ☐ in pumphouse ☐ in pit ☐ pitless adaptor ☐ in a building

☐ in a wooden enclosure other, describe In nothing. The well is outside

n. If the well head is located in a wooden enclosure,

i. Is the well head below grade? describe in detail no, well is 0.5m above grade

ii. Are there signs of ponding on the enclosure(e.g. water stains, etc.)? ☑ Yes ☐ No
There is no enclosure

iii. Is the wellhead enclosed by fiberglass insulations? ☐ Yes ☒ No

iv. Any evidence of rodents? Specify Likely, the well is outside

v. Does the well casing have a proper seal cap? ☒ Yes ☐ No

If no, describe condition split cap gasket

3. Water Supplying This Well:

a. By definition is the water from a surface water source or under the direct influence of surface water?

☒ Yes ☐ No ☐ farther investigation required.

If yes is there treatment ☐ Yes ☐ No

Explain (filtration, disinfection etc…)_____

---

4. Aquifer Supplying This Well:

a. The aquifer is: ☐ bedrock ☒ granular sediment ☐ unknown

b. Does water level and/or well capacity show seasonal fluctuation? ☐ Yes ☒ No
No reports of seasonal fluctuation

5. Pump Installation:

a. Is the well equipped with a pump? ☒ yes ☐ No

b. Type of pump: ☐ hand ☐ electric submersible ☒ jet

☐ shallow well centrifugal ☐ other, _____

c. Description: Manufacturer _____ Model _____

horsepower _____ capacity _____ voltage _____

d. Date installed: _____ By: _____

e. For submersible pump, depth of setting below surface _____

f. Drop pipe for submersible pump: ☒ steel ☐ plastic

g. Pump delivers water to: ☐ pressure tank ☐ elevated tank ☐ other
unknown

h. Are there automatic pump controls: ☐ Yes ☐ No
unknown

i. Is there provision for taking water samples before water reaches storage? ☐ Yes ☐ No
unknown

j. Is there a water meter on the system? ☐ Yes ☐ No
unknown

k. Is the pump and piping protected from freezing? ☐ Yes ☒ No
The well is directly outside with no heat trace, no insulation, no encasing. The well appears to be under construction
If yes, describe: _____

l. Comments on pump installation: Could not access the inside of building

6. Conclusions

a. Comments on overall installation:

b. Recommendations:

Driller's Report 109010067

Location: YTG Forestry Well Portion of Lot 1066 CRMK LIKELY CREW QUARTERS - OTHER SIDE RIVER.

NAD 83 **Zone** 8 **Easting** 437838 **Northing** 6887580 **Elevation ASL** 1778 ft.

Location Accuracy: **Horizontal** 300-1000 (topo) **Vertical** 30.5 metres (100ft)

Purpose of well: Commercial - not fabrication or manufacturing

Permafrost encountered? No

LOG OF OVERBURDEN AND BEDROCK MATERIALS

Layer	From	To		General Colour	Most Common Material	Secondary Material	General Description
1	0	4	ft.		Silty CLAY		
2	4	5	ft.		SAND		
3	5	8	ft.		GRAVEL	Cobbles	
4	8	28	ft.		SAND and GRAVEL		
5	28	30	ft.		loose GRAVEL		
6	30	40	ft.		SAND and GRAVEL		

WELL CONSTRUCTION

Well No. 1090100671 **Completion date** 7/12/1974 **Drilling method** Air Rotary (conventional) **Well type** Overburden

Casing: **OS Diameter** 5 in. **Material** Steel **Wall thickness** **Depth to** 41 ft.

Comments

Surface/Env'l seal: **Material** **Diameter** **Depth from** **to** **Volume**

Gravel Pack ? ☐ **Material** **Diameter** **Depth from** **to**

Well Screen Information

OS Diameter	Material	Screen Type	Comments
		Perforated	

Screen Sections

Section	From	to	Slot size/ perforation diameter
1	29	34 ft.	

WELL DEVELOPMENT AND STATUS

Well ID	Developed by	Wellhead completion	Adapter depth	Static water level	Yield Estimate	Estimate method
1090100671	Air lifting	None		15.16 ft.	30 gpm	Bailing

Final Status New, in use for intended purpose

No

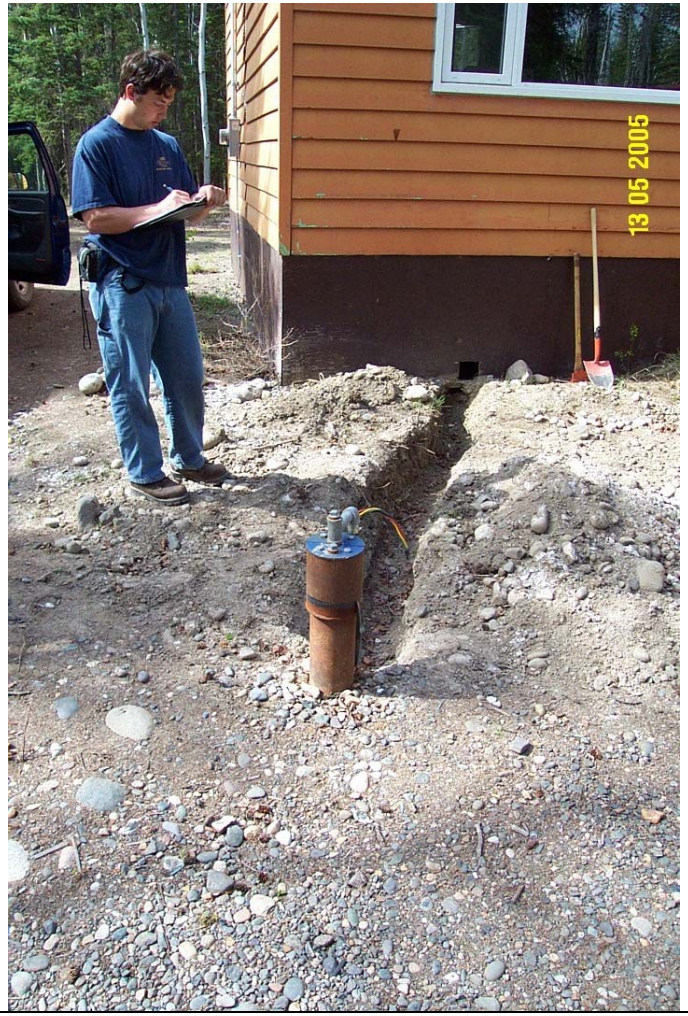


Photo 0163: 6536 Wellhead (front) and Forestry Crew Quarters (back)

Photo 0164: 6536 Wellhead

Photo 0165: 6536 Septic Field (left) and Forestry Crew Quarters (right)