19.0 BUILDING M0201: CARMACKS RCMP HOUSING

19.1 Description of Existing Water Supply System

Building M0201, the Carmacks R.C.M.P. residence on Rawlinson St. currently has water supplied by a drilled well located in a below grade add-on to the basement of the house. A site diagram that shows the location of the wellhead and other details of the property is provided as Figure M0201-A and is located in Appendix A19. The system is equipped with a water softener; however, at the time of inspection the softener was out of salt regenerant and not operational. A schematic detailing the water supply system is provided as Figure M0201-B and is located in Appendix A19. The coordinates of the wellhead, as measured by a hand held GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6884996
- Easting: 432277

19.2 Description of Existing Wastewater Systems

The residence is serviced by a public piped sewage collection system provided by the Village of Carmacks. There are sewer mains and service line that are located within 30 m of the wellhead.

19.3 Water Quality Results

19.3.1 Water Quality Results from Previous Sampling

Bacteriological

Bacteriological sampling of water from the Carmacks R.C.M.P. Rawlinson St. Residence water system has previously been completed on a number of occasions by EBA for the Property Management Agency as part of a separate contract. EBA was provided access to the YTG database in order to review the results of this previous bacteriological sampling. Seven samples were collected from this system between October 2004 and March 2005 and were tested for total coliform and *E. coli* by Yukon Environmental Health Services using the presence/absence test method. Results are tabulated in Table M0201-1 located in Appendix A19.

According to the YTG database, *E. coli* and Total Coliform Bacteria were reported as absent in each of the seven samples for which results were provided.

Detailed Potability Analyses

A water sample was previously collected from the Carmacks R.C.M.P. Rawlinson St. Residence water system on October 5, 2005. The sample was collected from the kitchen tap and is considered to be representative of raw groundwater quality as the results indicate that the softener was not operational at the time of sampling. The sample was submitted to ETL EnviroTest in Surrey BC for detailed potability analyses. The results of these analyses are summarized in Table M0201-2 and are included in Appendix A19. EBA reviewed the analytical results to compare them with the Canadian Drinking Water Quality Guidelines (CDWQG) and to observe general water quality, identify and recommend additional sampling and analytical, and to identify potential indicators of contamination. Relevant result are summarized below:

- The water quality for the sample obtained on October 5, 2004 indicated that the groundwater source is calcium-bicarbonate type water with high hardness.
- At 1.5 NTU, the turbidity of the water exceeded the CDWQG MAC of 1.0 NTU. At 2.3 NTU, turbidity also exceeded 1 NTU on a follow up sampling event completed for PMA in July 2005.
- At 0.371 mg/L, the iron concentration exceeds the CDWQG aesthetic objective of 0.3 mg/L.
- At 0.077 mg/L, the manganese concentration exceeds the CDWQG aesthetic objective of 0.05 mg/L.
- The water quality results indicate that all other health based and aesthetic objectives were met for the parameters analyzed. The hardness (as $CaCO_3$) was reported to be 174 mg/L, and is considered high for aesthetic purposes.

19.3.2 Identification of Additional Analytical Testing Required

Additional analytical for the Carmacks R.C.M.P. Rawlinson St. Residence that was identified to be included during the water system assessments is detailed below:

- Since the total iron and manganese concentrations had previously exceeded the CDWQG aesthetic objectives, an analysis for both dissolved iron and dissolved manganese was recommended in order to assist in determining potential treatment or rehabilitation measures.
- UV absorbance, to determine potential for UV treatment as a disinfection option.

- Measurements in the field for total dissolved solids, conductivity, pH, and temperature.

Additional Analytical Results

A water sample was obtained during the water system assessment on May 19, 2005, and was submitted to ALS Environmental in Vancouver BC for dissolved iron and manganese analysis, as well as UV absorbance. These results are summarized in Table M0062-2 and the laboratory reports are included in Appendix B.

The additional analysis indicated that the dissolved iron concentration in the sample collected on May 13, 2005 was less than 0.030 mg/L, and was significantly less than the previously reported total iron concentration and the CDWQG aesthetic objectives. Since the dissolved iron was considerably less than the total iron content, most iron can be attributed to suspended particles. The dissolved manganese concentration; however, for this most recent sample was 0.068mg/L. This value is higher than the CDWQG aesthetic objective. The significance of the high concentration of dissolved manganese shows that the overall manganese content cannot be attributed to suspended particles. Therefore, although well rehabilitation to decrease turbidity, and/or filtration to remove suspended particles could be sufficient to reduce the iron content and turbidity, it would not likely reduce manganese concentrations to below the CDWQG aesthetic objectives.

19.3.3 Indicators of Potential Contamination

Chloride, nitrate and nitrite concentrations can indicate impacts from surfacewater sources or septic waste. The chloride concentration for the sample obtained on October 5 2004 was low and can be considered to be within the normal background range for groundwater in the Carmacks area. Nitrate and nitrite concentrations for this sample were also low and within the normal background range for the Carmacks area.

19.4 Conceptual Hydrogeology

Residents of the central Village of Carmacks obtain their water supply from wells completed in a permeable unconfined sand and gravel aquifer in glaciofluvial and recent alluvial deposits. The regional groundwater flow direction is northeast towards the Yukon River.

19.5 Potential Contaminant Sources

Potential contaminant sources from observations during the site investigation are compiled in Table M0201-4 in Appendix A19. Photos of potential contaminant sources are provided in Appendix A19.

A summary of potential contaminant sources within 30 m of the wells is provided below:

- Adjacent well at 22 m,
- Above ground fuel storage tank at 3 m, and
- Above ground fuel storage tank at 24 m.

19.5.1 Spills Records and Contaminated Sites Search Results

Investigation of available spills record information and contaminated sites search results did not identify any concerns for this site.

19.6 Identified Water System Deficiencies and Associated Risk

19.6.1 High and Medium Risk Deficiencies

The following deficiencies were identified as being medium to high risk for the M0201 R.C.M.P. residence:

- The wellhead is located within 30 m of potential sources of contamination. There are two above ground fuel storage tanks located 3 m and 24 m from the well. In addition, there is an adjacent well 22 m from the M0201 well;
- Poor surface completion of the wellhead below ground (located in an attachment to the basement of the residence);
- There is no surface sanitary seal (grout or bentonite seal as required by the Canadian Groundwater Association's Well Construction Guidelines);
- By definition of the Draft Yukon GUDI Assessment Guideline, the well is potentially under the direct influence of surface water because it does not meet the requirements of the Guidelines for Water Well Construction;
- Based upon the hydrogeology of the area and the depths of many surrounding wells, this well is likely approximately 15 m deep, and as thus would be considered to be a shallow well. The well, therefore, would be considered to be at high-risk of contamination from surfacewater sources.
- Turbidity of the water is in exceedence of CDWQG MAC.

19.6.2 Low Risk Deficiencies

The following deficiencies were identified as being low-risk for the M0201 R.C.M.P. Residence:

- It was found during the site investigation that the water softener was out of salt regenerant. Additionally, water quality analysis from previous sampling in October 2004, indicated that the water softener was not functioning properly at that time either. This deficiency is identified as being low-risk, but due to the high iron and manganese in the water, if a UV disinfection system were to be installed then this deficiency would be upgraded to high-risk because UV treatment requires a properly functioning water softener if it is to be able to function properly.
- The pressure tank is located directly on top of the wellhead. This blocks access to the well so that maintenance or proper inspection is difficult. In addition, the pressure tank is likely too small and inefficient for a residence that currently houses a family of four or five.
- The submersible pump is in disrepair, and will likely need replacement in the near future.

19.7 Mitigative Options for Deficiencies

Mitigative options were developed to address the deficiencies identified in the previous section. Deficiencies are categorized by recommended level of priority (with Priority 1 being most critical).

19.7.1 Priority 1

There are two options available to mitigate the deficiencies identified for the M0201 Carmacks R.C.M.P. Residence. For both options, the following Priority 1 mitigative options should be completed:

- A treatment system should be installed consisting of a NSF 61 certified inline filtration system capable of removing particles to 1 micron absolute and a NSF/ANSI 55 certified UV disinfection system, using the existing water softener for pretreatment. This is a conceptual design recommendation based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications;
- Further sampling will be required to determine if the softener is an adequate pretreatment system for UV disinfection; and,
- Secondary containment should be installed on the two above ground storage tanks, or they should be replaced with double walled fuel storage tanks.

19.7.2 Priority 2

To address remaining deficiencies, the following options are presented:

Option 1:

- The first option involves upgrading the existing wellhead construction. In order to mitigate the high-risk deficiencies identified in this report, the water system should be upgraded by rehabilitating the wellhead construction to retrofit a surface seal to 3 m in depth (6 m would not be possible), and extend the casing to 500 mm above grade.
- The pressure tank should be relocated to a convenient location and easy access to the wellhead should be available.

Option 2:

- It is likely that within the next two to five years that the Village of Carmacks will be developing a municipal water distribution system that will service all of the central village, and will likely include these residences. To save the cost of redeveloping the wellhead construction on a well that may only be used for another two years, the treatment system alone may be adequate until the community system is installed. An opinion for Environmental Health and Social Service should be solicited to see if they are in agreement with this approach.
- Once the community system is installed, it is likely that the treatment system may no longer be needed and could be removed and re-installed at another YTG maintained system.

The options presented above are conceptual design recommendations based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.

19.7.3 Priority 3

- See Priority 1 mitigative options for recommendations to improve the water softening system.
- Replace submersible pump with new pump.

19.8 Cost Estimates for Mitigative Options

Engineering costs for pre-design and preparation of process diagrams and specifications for project tendering for water treatment systems are estimated to be 25% of construction costs.

Engineering costs for other mitigative options are estimated to be 20% of construction costs, and would include inspection and completion reporting. The costs for materials and labour (not including engineering) are provided in the sections below. An additional contingency allowance of 20% is suggested for budgetary purposes.

19.8.1 Priority 1

Class D cost estimates for mitigative options to address the well deficiencies for this site are as follows:

- The installed cost for the treatment system would be approximately **$5,000**, depending on the extent to which the pretreatment system needs to be repaired. The cost to add softening salt to the water softener would be minimal, and the cost would be higher if other repairs are needed. If the current water softening system is inadequate and needs to be replaced entirely, a duplex softener pretreatment would likely cost approximately **$3000**.
- Replacing the existing above ground fuel storage tanks double walled secondary containment tanks would likely cost approximately **$2,600** for each tank. Installing secondary containment would cost approximately **$1000** per tank.

19.8.2 Priority 2

Option 1:

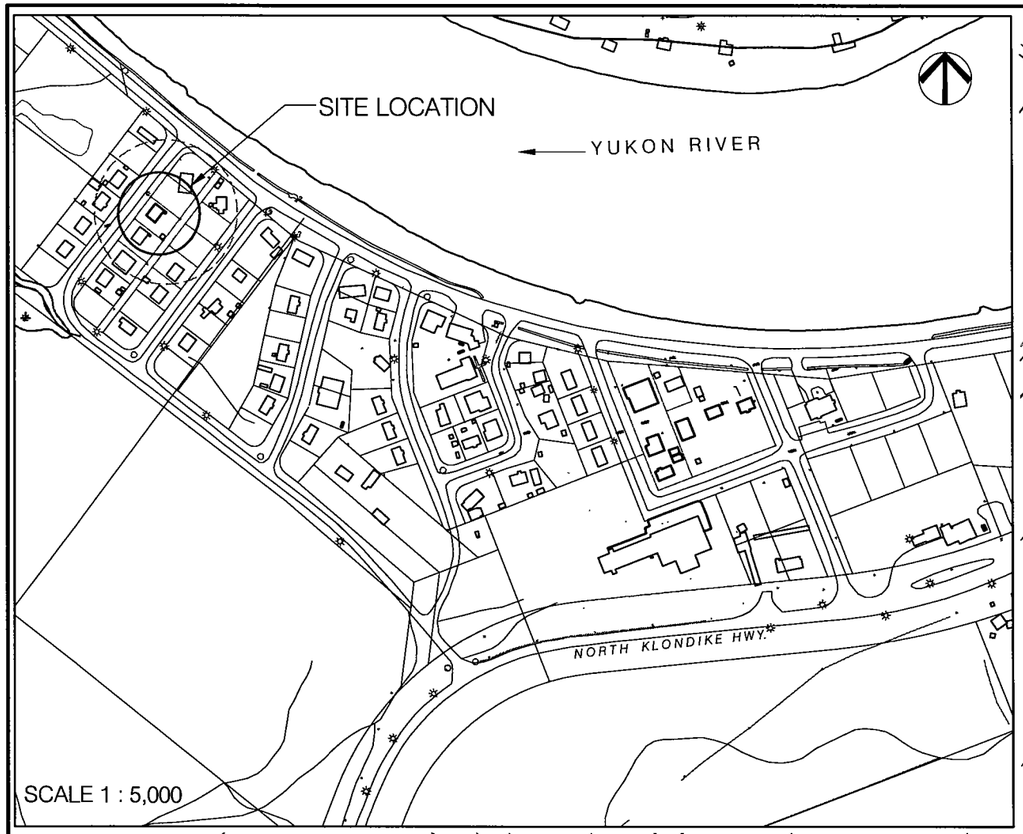
- The cost for the wellhead upgrades, including raising the wellhead, installing a pitless adapter, and installing a sanitary seal to 3 m in depth is estimated to be approximately **$5000**.
- The cost to relocate the pressure tank would be **$300** in materials and labour, and **$1500** if it is determined that the tank should be replaced.

Option 2:

- A service connection to a piped community system would likely cost in the order of **$3,000.**

19.8.3 Priority 3

- The cost to supply and install a new submersible pump is approximately **$3100**.



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 RCMP RESIDENCE
BUILDING M0201
LOCATION DIAGRAM
WELL ID: M0201

REVISION ISSUE: 0

DRAWING No.: FIGURE M0201-A

Z:\0201Drawings\1260002 Water Assessment YTG\001 - Whitehorse Region\carmacks\1260002 Carmacks Overall Plan.dwg, 6/13/2005 9:41:29 AM, \\whi-eb-dc001\WHI201COMMON

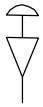
LEGEND


PUMP


PRESSURE GAUGE


GATE VALVE


CHECK VALVE

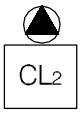

SOLENOID

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

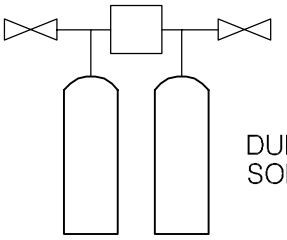
FLOW METER

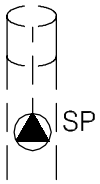
WATER FILTER
(CARTRIDGE TYPE)

PRESSURE TANK

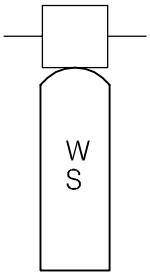


CHLORINE RESERVOIR AND
INJECTION PUMP


DUPLEX WATER
SOFTENER

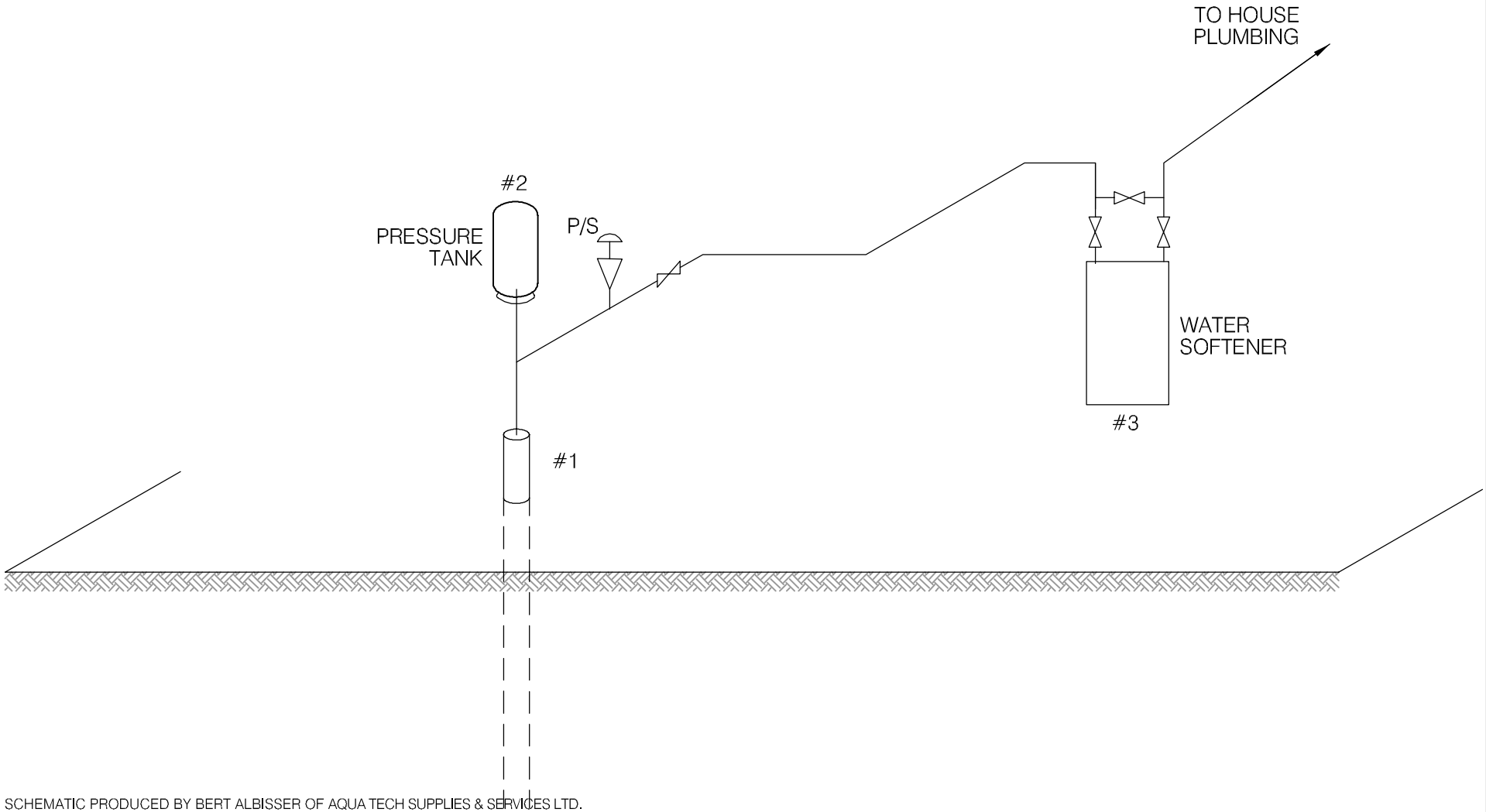


WELL WITH
SUBMERSIBLE PUMP



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



SCHEMATIC PRODUCED BY BERT ALBISSER OF AQUA TECH SUPPLIES & SERVICES LTD.

EBA Engineering Consultants Ltd.			PROJECT	SMALL PUBLIC WATER SYSTEMS ASSESSMENT WHITEHORSE REGION	
CLIENT Yukon Highways and Public Works Property Management Branch			TITLE	WATER SYSTEM DISTRIBUTION/TREATMENT SCHEMATIC SYSTEM ID.: M0201 RCMP HOUSING	
DATE APRIL 2006	DWN. JSB	CHKD. RMM	FILE NO. 1260002.001		DWG.: FIGURE M0201B

Z:\0201Drawings\1260002 Water Assessment YTG\001 - Whitehorse Region\carmacks\Schematics\1260002 RCMP M0201 Schematic.dwg, 4/6/2006 10:23:47 AM, Adobe PDF, jbuyck

Whitehorse Region – R.C.M.P. Housing
Building # MO201

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	SUB PUMP 4"		ZWIRE			4" - ½ HP.
2	P/TANK	CHALLENGER	JR25			3/4" 8.5 GAL.
3	SOFTENER	PETWA	C460MP-30MI			30K GRAIN
4	PRESSURE SWITCH	SQ. D	FSG-2			1/4" FIPT
5						
6						
7						
8						
9						
10						

TABLE M0201 - 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?
M0201	R.C.M.P Housing	7	Sept-04 to Mar-05	no	0/7	no	4-Mar-05	no

Table M0201-2: Water Quality Results

SOURCE:	Building M0201 - R.C.M.P. Housing			GCDWQ Criteria		
Location/ Resident	Carmacks					
Address	528 Rawlinson St					
Treatment	No					
Source of Water	On-Site Well					
Purpose of Sampling	Baseline	Additional Sampling	Baseline			
Sample Location	Kitchen Tap	Downstairs Laundry Tub Tap				
Date Sampled	5-Oct-04	13-May-05	6-Jul-06	**Lower Limit**	**Upper Limit**	
Physical Tests *(ALS)*				**AO**	**MAC**	**AO**
Colour (CU)	10		<5			15
Conductivity (uS/cm)	309		326			
Total Dissolved Solids	190		200			500
Hardness CaCO3	174		157	AO >200 = poor, > 500 unacceptable[A]		
pH	7.9		8.25	6.5		8.5
Turbidity (NTU)	**1.5**		**2.30**		1	5
UV Absorbance		<0.0010				
Dissolved Anions *(ALS)*						
Alkalinity-Total CaCO3	171		178			
Chloride Cl	1		0.57			250
Fluoride F	0.21		0.173		1.5	
Sulphate SO4	14.8		14.3			500
Nitrate Nitrogen N	<0.1		<0.10		10	
Nitrite Nitrogen N	<0.05		<0.10		1	
Ammonia Nitrogen N						
Total Metals *(ALS)*						
Aluminum T-Al	<0.02		<0.010			
Antimony T-Sb	0.0007		<0.0005		0.006	
Arsenic T-As	0.0017		0.00198		0.025	
Barium T-Ba	0.0779		0.079		1	
Boron T-B	<0.02		<0.10		5	
Cadmium T-Cd	<0.0002		<0.0002		0.005	
Calcium T-Ca	52.5		47.4			
Chromium T-Cr	0.001		<0.0020		0.05	
Copper T-Cu	<0.001		0.0011		1	
Iron T-Fe	**0.371**		**0.324**			0.3
Lead T-Pb	<0.0001		<0.0010		0.01	
Magnesium T-Mg	10.9		9.29			
Manganese T-Mn	**0.077**		**0.0643**			0.05
Mercury T-Hg	<0.0002		<0.00020		0.001	
Potassium T-K	2.3		2.16			
Selenium T-Se	<0.0004		<0.0010		0.01	
Sodium T-Na	6		6.2			200
Uranium T-U	0.0009		0.00075		0.02	
Zinc T-Zn	0.026		0.054			5
Dissolved Metals						
Aluminum D-Al					0.1	
Antimony D-Sb					0.006	
Arsenic D-As					0.025	
Barium D-Ba					1.0	
Boron D-B					5	
Cadmium D-Cd					0.005	
Calcium D-Ca						
Chromium D-Cr					0.05	
Cobalt D-Co						
Copper D-Cu						1.0
Iron D-Fe		<0.030				0.3
Lead D-Pb					0.01	
Lithium D-Li						
Magnesium D-Mg						
Manganese D-Mn		**0.0680**				0.05
Mercury D-Hg					0.001	
Molybdenum D-Mo						
Nickel D-Ni						
Selenium D-Se					0.01	
Silver D-Ag						
Sodium D-Na						200
Uranium D-U					0.02	
Zinc D-Zn						5.0
Field Chemistry (EBA)						
pH		7.79		6.5		8.5
TDS		162				500
EC (uS/cm)		317				
Temperature		12.4				
Free Available Chlorine						

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(C) and Turbidity (NTU)

< = Less than the detection limit indicated.

AO = Aesthetic Objective

MAC = Maximum Acceptable Concentration (Health Based)

Table M0201-3: 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)**
MO2O1	**R.C.MP. Housing**	**Carmacks**	6884996	432277	530

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)**
150	?	No	?	No, shallow well	?	1/2hp submersible pump Size of pump meets needs	?

Well Construction Details				
Wellhead Above ground (m)	**Well Cap**	**Well Screen**	**Surface Seal**	**Apron Grading**
0.5 below grade	Split Cap Gasket	?	Unlikely	Inside building

Table M0201-4: Potential Contaminant Sources
Building M0201 – RCMP Housing

Potential Contaminant Source	Potential Contaminants	Distance from Water Source	Northing	Easting
Dump or Landfill	***Organic*** and inorganic chemicals.	1800 m		
Cemetery	***Biological[1],*** inorganic[2] and organic parameters.	400 m		
Sewage lagoon	***Biological,*** inorganic and organic parameters.	>300 m		
Sewage lines, tanks and lift stations	***Biological,*** inorganic and organic parameters.	**<15 m to service lines and <30 m to main**		
Septic fields	***Biological and Inorganic*** parameters.	>150 m		
Gas stations	***Organic and Inorganic*** parameters.	600 m		
Undergrounds Fuel Storage Tanks (USTs)	***Organic*** parameters.	>>30 m		
Above ground storage tanks (ASTs)	***Organic*** *parameters.*	**3 m and 24 m**	6884995 6885001	432274 432251
Naturally occurring sources of contamination	***Radionuclides, Bacteria and Viruses from surfacewater sources.***	75 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

SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lobel Date May 13, 2005

WELL ID #	Owner	Location Description
M0207	RCMP	RCMP Housing Rawlinson st

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,
528 Rawlinson st

c. GPS location: 432277 Easting 6884996 Northing

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_____
Services 1 RCMP residence

☐ 5 or more delivery sites on a trucked distribution system? If so how many_____

f. Nearest building, specify Located directly beside residence with access from basement

g. Distance from well to building _____

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

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

j. Well location relative to field: ☐ upslope ☐ downslope ☐ lateral

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

---

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
There is a cemetary up gradient ~500m on a nearby hill

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 Can only be accessed through residence

Entrance by animals? ☐ Yes ☒ No There are cobwebs and traces of mice present

o. Is well site subject to flooding? ☒ Yes ☐ No There is some dampness and staining in the plywood

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 1 ; Distance from well to Potential Source 1: ~3m

Potential Source 2: AST 2 ; Distance from well to Potential Source 2: ~24m

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
There is an adjacent well ~22m away

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

2. Well and Wellhead information:

a. When was well installed? Year _____ Month _____

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

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

g. Depth of well: ~40ft ☐ measured (if possible) ☐ reported ☐ from log

h. Static water level below ground: ~20ft educated guess from based upon geology of the area and characteristics of surrounding wells

☐ 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

m. Is the well head: ☐ in pumphouse ☐ in pit ☐ pitless adaptor ☒ in a building
Attached to basement of residence, enclosed w/ purt and non-purt and a thn casing on the top
☒ in a wooden enclosure other, describe _____

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

i. Is the well head below grade? describe in detail Yes, ~0.5m below grade

ii. Are there signs of ponding on the enclosure(e.g. water stains, etc.)? ☒ Yes ☐ No
There is some wetness and water stains near and on the ground. Rusting on wellhead

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

iv. Any evidence of rodents? Specify There is some evidence of mouse droppings and cobwebs

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

If no, describe condition _____

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…)_____

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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

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

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

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

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

k. Is the pump and piping protected from freezing? ☒ Yes ☐ No

If yes, describe: Heat trace and is located within an insulated compartment off from a heated house

l. Comments on pump installation: _____

6. Conclusions

a. Comments on overall installation:

b.Recommendations: _____

PART B: EBA Site Inspection

Inspector: _____ Date _____

WELL ID #	Owner	Location Description
M0201	YTG.	RCMP CARMACKS FORMER YUKON HOUSING.

6. Water Treatment

a. Is well water treated? ☐ Yes ☑ No; Type of treatment: SOFTNER - NO SALT

☐ chlorination ☐ iron and or manganese removal ☐ other _____

b. Is water entering plumbing or piped distribution system treated with chlorine or another treatment that is as effective as chlorine used to achieve disinfection throughout the system?

☐ Yes ☑ No If so how _____

c. If treated with chlorine, is the free residual chlorine concentration less than 0.2 mg/L

☐ Yes ☐ No _____ reading.

Tested at _____ (location)

d. Is testing for chlorine residual concentration done at the tap (eg. Kitchen faucet) or from representative points in a piped distribution system, including a point from tap at the end line

☐ Yes ☐ No If yes how often? _____

e. If the drinking water is being transported by water delivery truck does it have a minimum chlorine free residual of 0.4 mg/L at the time of fill. ☐ Yes ☐ No

7. Water Quality (observations):

a. Does the water stain plumbing? ☐ yes ☐ No ☐ slight ☑ severe

Type of stain: ☐ brown ☑ red ☐ black

b. Does the water contain sediment? ☐ Yes ☐ No ☑ occasional ☐ constant

c. Is there an unpleasant odour? ☐ Yes ☑ No ☐ H_2S ☐ Other _____

d. Is there an unpleasant taste? ☐ Yes ☑ No ☐ brackish ☐ Other _____

e. Is there a history of bad bacterial analyses? ☐ Yes ☐ No

f. Is there a chemical analysis? ☐ Yes ☐ No ☐ adequate ☐ incomplete

g. Is there analysis of trihalomethanes (THMs) where the water source is a surface water supply or a well under the direct influence of surface water? ☐ Yes ☑ No

h. Is the drinking water tested daily with an accurate reading chlorine test kit capable of reading in the range 0 to 3.5 mg/L of free chlorine residual in increments of 0.1mg/L? ☐ Yes ☐ No ☐ unknown

i. If yes is the test performed in accordance with manufactures directions? ☐ Yes ☐ No ☐ unknown

j. Is a record of the date, time,name of person performing the test and results of the drinking water sample kept? ☐ Yes ☐ No

TANK AND PIPING DETAILS

Tank Room

Is there a water tank? (Yes) No Details:

Where is it located?
Comments: JR25 PRESSURE TANK.

Is the room in which the water tank is located heated to maintain an optimum temperature of 4°C for stored water?
(YES) NO
Comments: _____

Are there windows in the add-on that may allow direct sunlight onto the water holding tank? YES (NO)
Comments: _____

Are there other heat sources near the tank? YES (NO)
Comments: _____

Is there waterproof flooring with a sealed base to contain spills? YES (NO)
Comments: _____

Overall Tank

What are the tank size and dimensions?

_____

What material is the tank constructed of? _____

Is tank and associated piping constructed of safe materials (i.e. CSA approved and material that does not affect the taste of the water)? YES NO

Comments: _____

Tank Inlet, Outlet and Lid

Is there adequate access on the tank for cleaning (i.e. min 15" access lid)? YES NO

Does the lid have a tight seal and is it watertight when closed? YES NO

Does the tank have an overflow or high level whistle? YES NO

Is the water tank drain accessible? YES NO

WATER TANK AND WATER QUALITY CONDITION

Are there signs of staining or biofouling? YES NO
Comments: _____

Is there any sediment or scum in bottom of tank? YES NO
Comments: _____

Is there any odour associated with the water or tank? YES NO

Have there been any bacteriological analyses conducted previously? YES NO

Does the tank appear that it has been cleaned recently? YES NO

Are the tanks easily assessed for the purpose of cleaning and disinfection? YES NO

8. Conclusions

a. Comments on overall installation:

THIS SYSTEM IS A BARELY ADEQUATE SETUP. THE SOFTNER APPEARS TO BE NEGLECTED AS THERE IS NO SALT IN THE BRINE TANK. NO FILTRATION OR BACTERIAL TREATMENT IS IN PLACE. THE PUMP IS VERY NOISEY AND MAY FAIL SOON

b. Recommendations:

SYSTEM SHOULD BE UPGRADED WITH PROPER PUMP & PRESSURE TANK INSTALLATION. THE SOFTNER SHOULD BE PUT BACK IN SERVICE AND A UV SYSTEM SHOULD BE INSTALLED. THE WELL HEAD SHOULD BE UPGRADED TO THE NEW REGS UP COMING.

Photo 0166: M0201 Wellhead (front below paneling), R.C.M.P. Residence (behind) and Above Ground Storage Tank (center)

Photo 0167: M0201 Wellhead and Pressure Tank