5.0 BUILDING M0181 – TESLIN RCMP RESIDENCE

5.1 Description of Existing Water system

Building M0181, the Teslin RCMP Residence on Sawmill Road, is served by a truck delivered water supply that sources water from a community well operated by the Village of Teslin. The domestic system at M0181 is equipped with a 6,000 L cylindrical water storage tank. A schematic detailing the water system is provided as Figure M0181-B in Appendix A5. The coordinates of the water intake measured by a hand held GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6673483
- Easting: 627320

5.2 Water Quality Results

5.2.1 Water Quality Results from Previous Sampling

Regular bacteriological sampling carried out between September 2004 and March 2005 did not indicate any positive coliform or *E. coli* testing results. A summary of historical bacteriological results is presented in Table M0181-1 in Appendix A5.

Detailed potability analyses were performed on samples collected from the RCMP building M0181 on September 9, 2004. The results are given in Table M0181-2 in Appendix A5, and summarized in the following:

- The water supplied by delivery appears to be hard and highly mineralized;
- The hardness concentration was observed to be 263 mg/L, which exceeds the CDWQG aesthetic objective of 200 mg/L;
- The total and dissolved arsenic concentrations were below the current CDWQG MAC of 0.025 mg/L, but were greater than the proposed MAC of 0.005 mg/L; and,
- All other parameters analyzed were below the applicable CDWQG criteria for the sample submitted.

5.2.2 Identification of Additional Analytical Required

Additional parameters requiring analysis were identified prior to and/or during the site inspection and included UV absorbance, silicate, phosphate, vanadium and

confirmation of arsenic concentrations. These parameters were chosen to confirm previous results and to assist in treatment system selection. Results from additional analytical sampling are presented in Table M0181-2 in Appendix A5, and laboratory results are provided in Appendix B. The analytical results are summarized below:

- At 0.0211 mg/L, the arsenic concentration was reported to be greater than the proposed guideline of 0.005 mg/L, but lower than the current MAC of 0.025 mg/L.
- Field chemistry reported that the residual chlorine concentration was only 0.05 mg/L, below the recommended 0.2 mg/L for all points of service for a water delivery system.

5.2.3 Indicators of Potential Contamination

No elevated concentrations of indicator parameters were observed in the sample results reviewed.

5.3 Conceptual Hydrogeology

The RCMP building M0181 is supplied by water delivery and there are no wells on the property included in this study, therefore, very limited subsurface information was readily available and an assessment of the hydrogeology in the vicinity of this building was not required.

Jacobsen (2003) examined water source, treatment, storage, pumping, and water distribution facilities as well as operations and maintenance procedures for the Village of Teslin Community well. The well is very deep, and has several confining low permeability units above it. As such, the aquifer from which this well obtains water is not likely under the direct influence of surface water, however, the well is approximately 60 m from Teslin Lake and may warrant further investigation.

5.4 Potential Contaminant Sources

Potential contaminant sources observed during the site investigation are compiled in field notes in Appendix A5. Photos of potential contaminant sources are also provided at the end of this appendix.

The sewer lift stations sporadically spill raw sewage as documented in spills reports and a previous study prepared for the Teslin Tlingit Council near the Village of Teslin community well. Lift Station #4, which is close to the Village of Teslin community well, is particularly disconcerting because the tank or eduction system have frequently spilled or leaked. Based on a conceptual understanding of the hydrogeological regime for the area, the Village of Teslin community well is 34 m cross-gradient to lift station #4. Government spills reports confirm that large spills routinely occur at Lift Station #4. The depth to the aquifer (84 m) and thick confining layers provide reasonable protection for the Village of Teslin community well from surficial sources of contamination.

5.5 Identified Water System Deficiencies and Associated Risk

5.5.1 High or Medium Risk Deficiencies

- Low free available chlorine concentration; and,
- Lack of regular water holding tank cleaning and residual chlorine monitoring.

5.5.2 Low Risk Deficiencies

- Piping is constructed of ABS and is not suitable for drinking water.

5.6 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).

5.6.1 Priority 1

- Undertake immediate cleaning of holding tank including superchlorination of the tank and piping.
- Institute a regular FAC monitoring program and if residual chlorine concentrations continue to be low, consult with the Village of Teslin to ensure that concentrations upon delivery are above 4 mg/L as required by regulation.
- Implement a regular water storage tank cleaning program every 6 months.

5.6.2 Priority 2

- There were no Priority 2 mitigative options identified.

5.6.3 Priority 3

- Replace ABS piping with PVC piping.

5.7 Cost Estimates for Mitigative Options

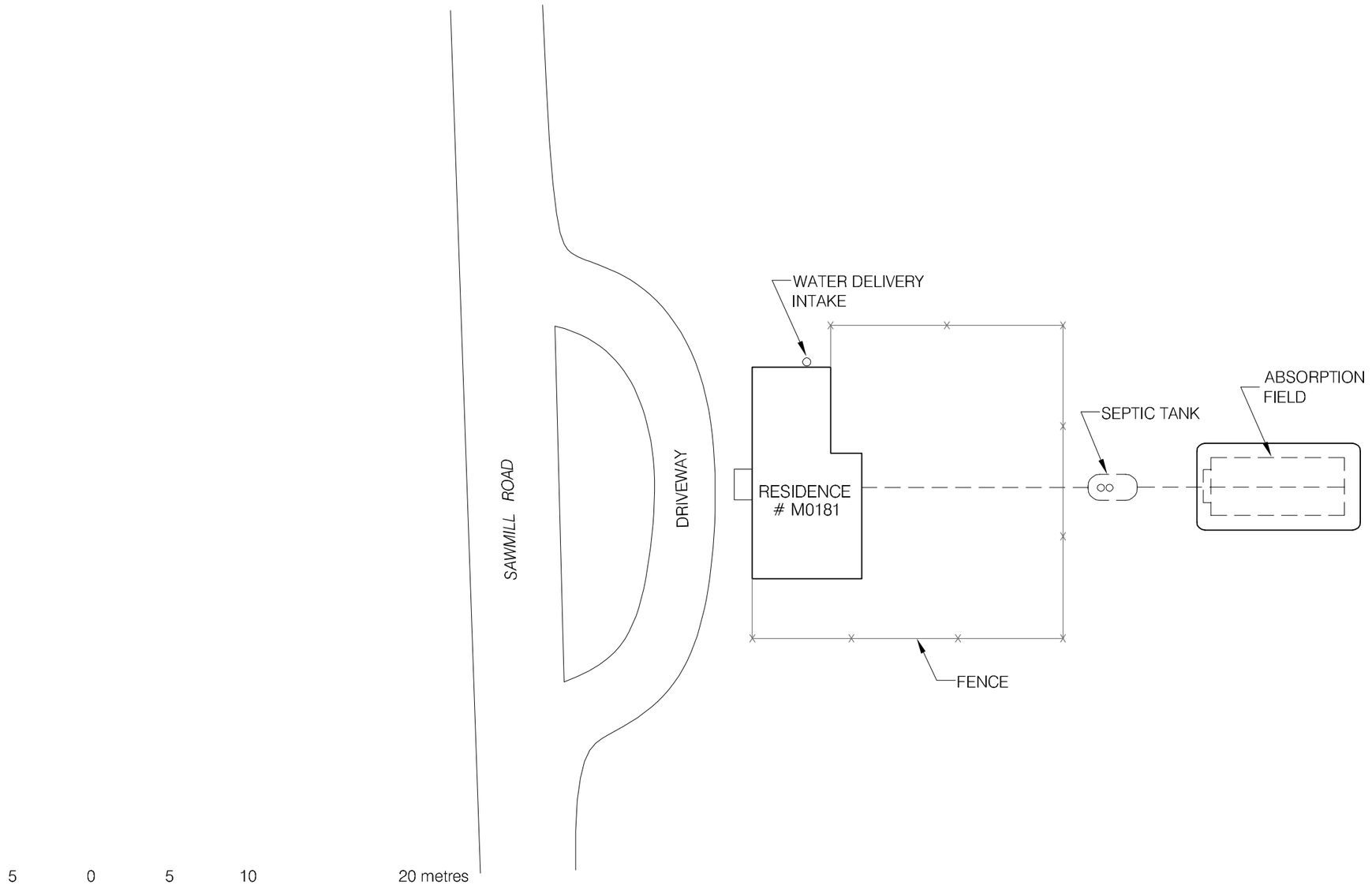
Engineering costs for mitigative options are estimated to be 20% of construction costs, and would include inspection and completion reporting. The costs for materials and labour (not including engineering) are provided in the sections below. An additional contingency allowance of 20% is suggested for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

5.7.1 Priority 1

- Initiating a water storage tank cleaning schedule and monitoring regularly for residual chlorine should fall under normal operations and maintenance costs.

5.7.2 Priority 3

- Replacing the ABS fill pipe with PVC would cost in the order of **$200** for materials and labour.



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:	JULY 2005
SCALE:	AS SHOWN
PROJECT No.:	1260002.002
ACAD FILENAME:	002-EASTERN REGION

CLIENT: Yukon
Highways and Public Works
Property Management Branch

SMALL PUBLIC WATER SYSTEMS ASSESSMENT
EASTERN REGION

GOVERNMENT OF YUKON
HIGHWAYS & PUBLIC WORKS

TESLIN RCMP RESIDENCE
M0181
SITE LOCATION DIAGRAM
WELL ID: N/A

REVISION ISSUE: 0

FIGURE No.: FIGURE M0181-A

Z:\020\Drawings\1260002 Water Assessment YTG\002 - Eastern Region\teslin\1260002 M0181 Site Plan.dwg, 7/20/2005 3:01:22 PM, Adobe PDF

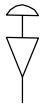
LEGEND


PUMP


PRESSURE GAUGE


GATE VALVE


CHECK VALVE

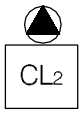

SOLENOID

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

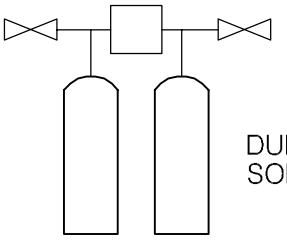
FLOW METER

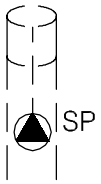
WATER FILTER
(CARTRIDGE TYPE)

PRESSURE TANK

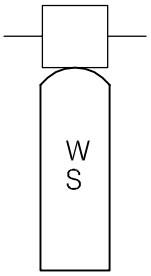


CHLORINE RESERVOIR AND
INJECTION PUMP


DUPLEX WATER
SOFTENER

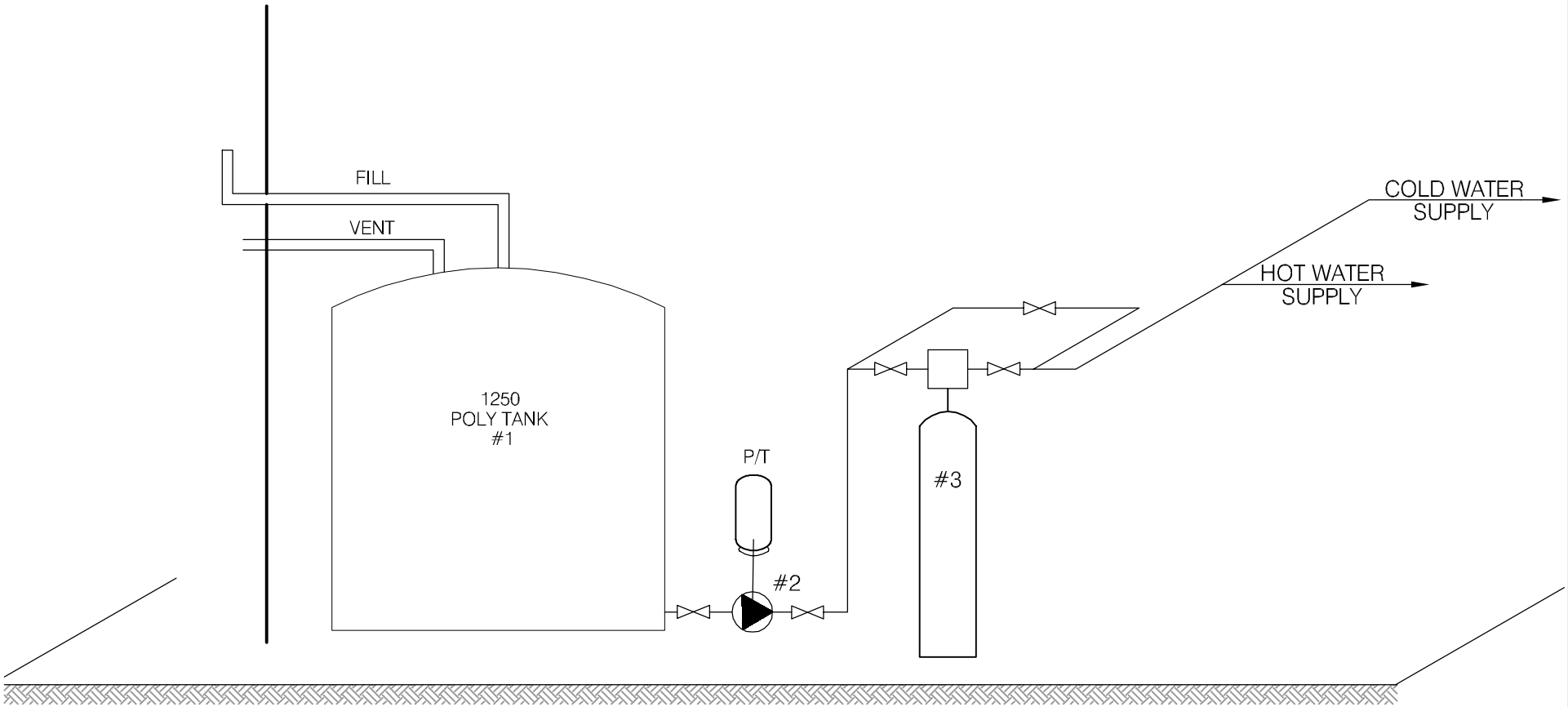


WELL WITH
SUBMERSIBLE PUMP



ACTIVATED
CARBON

EBA Engineering Consultants Ltd.			PROJECT	SMALL PUBLIC WATER SYSTEMS ASSESSMENT EASTERN 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 EASTERN REGION	
CLIENT Yukon Highways and Public Works Property Management Branch			TITLE	WATER SYSTEM DISTRIBUTION/TREATMENT SCHEMATIC SYSTEM ID.: M0181 TESLIN RCMP RESIDENCE	
DATE JULY 2005	DWN. JSB	CHKD. RMM	FILE NO. 1260002.002		DWG.: FIGURE M0181-B

Z:\0201Drawings\1260002 Water Assessment YTG\002 - Eastern Region\teslin\Schematics\1260002 RCMP Detach M0181 Schematic.dwg, 7/20/2005 2:33:48 PM, Adobe PDF

Eastern Region – R.C.M.P. Housing
Building # M0181

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	WATER TANK	N/A	1250 VERTICAL			1250 GALLON
2	JET PUMP	GRUNDFOS	JPF-3A			½ HP - 1"
3	WATER SOFTENER	AQUA TECH	L5600-30MI			30K
4						
5						
6						
7						
8						
9						
10						

TABLE M0181- 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?
M0181	R.C.M.P Housing	7	Sept-04 to Mar-05	no	0/7	no	1-Mar-05	no

Table M0181-2: Water Quality Results

SOURCE:	Building M0181 - R.C.M.P. Housing		GCDWQ Criteria		
Location/ Resident	Teslin				
Address	Block 26				
Treatment	Water Softener				
Disinfection	No				
Source of Water	Water Delivery				
Purpose of Sampling	Baseline	Additional Sampling			
Sample Location	Kitchen Tap	Downstairs Laundry Tub Tap			
Date Sampled	9-Sep-04	16-Jun-05	**Lower**	**Upper Limit**	
Physical Tests *(ALS)*			**AO**	**MAC**	**AO**
Colour (CU)	5				15
Total Dissolved Solids	345				500
Hardness CaCO3	262		AO >200 = poor, > 500 unacceptable[A]		
pH	8.37		6.5		8.5
Turbidity (NTU)	0.4			1	5
UV Absorbance		0.030			
Dissolved Anions *(ALS)*					
Alkalinity-Total CaCO3	223				
Chloride Cl	4.0				250
Fluoride F	0.14			1.5	
Silicate SiO4		9.4			
Sulphate SO4	88.0				500
Nitrate Nitrogen N	<0.1			10	
Nitrite Nitrogen N	<0.05			1	
Total Phosphate PO4		0.0616			
Total Metals *(ALS)*					
Aluminum T-Al	<0.005			0.1	
Antimony T-Sb	<0.0002			0.006	
Arsenic T-As	***0.0193***	***0.0211***		0.025	
Barium T-Ba	0.03			1	
Boron T-B	0.033			5	
Cadmium T-Cd	<0.00001			0.005	
Chromium T-Cr	0.0006			0.05	
Copper T-Cu	0.017			1	
Iron T-Fe	0.17				0.3
Lead T-Pb	0.0002			0.01	
Manganese T-Mn	0.029				0.05
Sodium T-Na	37.3				200
Uranium T-U	<0.0005			0.02	
Vanadium T-V		<0.030			
Zinc T-Zn	0.008				5
Dissolved Metals					
Arsenic D-As		***0.0158***		0.025	
Organic Parameters					
Tannin and Lignin		0.14			
Total Organic Carbon C		2.14			
Field Chemistry (EBA)					
pH		8.45	6.5		8.5
TDS (ppm)		287			500
EC (uS/cm)		573			
Temperature (°C)		14			
Free Available Chlorine		0.05			

Notes:

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

Italics and underline indicates exceedence of proposed MAC (ie. arsenic)

Bold with Yellow highlighting indicates exceedence of CDWQG Aesthetic Objective (AO)

Bold Underline with Yellow highlighting 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)

eba

EBA Engineering Consultants Ltd.
Creating and Delivering Better Solutions

SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin, Luke Lebel Date June 16, 2005

WELL ID #	Owner	Location Description
M0181	RCMP	Teslin RCMP Residence

1. Well Location and Potential Contaminant Sources

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

b. Specific location: (Road or street, Building number, name of owner and/, legal description,
Sawmill Road

c. GPS location: N 6673493 E 627320 elev. 721m ± 12m

d Is there electric power? ☐ Yes ☐ No

e Is there outside water access? ☒ Yes ☐ No
Not accessable to Public

f. Does the well system have:
The system is for the residence only and is from delivery
☐ 15 or more service connections to a piped distribution system ? If so how many_____

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

g. Nearest building, specify N/A - Tank is located inside building

h. Distance from well to building N/A

i. If there is an effluent disposal field, is its location known? ☒ Yes ☐ No N 6673479

j. Distance from well to nearest point of known field: ~15m from residence E 627343

k. Well location relative to field: ☐ upslope ☐ downslope ☒ lateral
from residence

l. 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
No part of the property, however, is greater than 30m from a septic source

m. Is the well located within 300 m from a sewage lagoon or pit? ☐ Yes ☐ No N/A

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

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

Unauthorized access by humans? ☒ Yes ☐ No Entrance by animals? ☐ Yes ☐ No
located inside residence n/a

p. Is well site subject to flooding? ☐ Yes ☐ No N/A

q. Is the well site well drained? ☐ Yes ☐ No N/A

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

If yes, is it ☐ in use ☐ abandoned

Is the location known? ☐ Yes ☐ No

Distance from the well to known buried tank _____

s. 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:_____; Distance from well to Potential Source 1:_____
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:_____

t. 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 N/A Month _____

b. Type: ☐ drilled ☐ dug ☐ sand point ☐ other N/A

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

d. Is there a surface seal to 6 m ☐ Yes ☐ No ☐ unknown ☐ unlikely N/A

e. Surface casing: ☐ Yes Diameter N/A ☐ No

f. Well casing: Diameter N/A Material: ☐ steel ☐ plastic ☐ concrete

g. Depth of well: N/A ☐ measured (if possible) ☐ reported ☐ from log

h. Static water level below ground: N/A

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

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

☐ with slotted pipe ☐ unknown other N/A

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

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

l. Is there a sump below the screen? ☐ Yes ☐ No N/A

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

☐ 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 N/A

ii. Are there signs of ponding on the enclosure(e.g. water stains, etc.)? ☐ Yes ☐ No
N/A

iii. Is the wellhead enclosed by fiberglass insulations? ☐ Yes ☐ No
N/A

iv. Any evidence of rodents? Specify N/A

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

If no, describe condition N/A

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.
N/A

If yes is there treatment ☐ Yes ☒ No

Explain (filtration, disinfection etc…)

---

4. Aquifer Supplying This Well:

a. The aquifer is: ☐ bedrock ☐ granular sediment ☐ unknown
N/A

b. Does water level and/or well capacity show seasonal fluctuation? ☐ Yes ☐ No
N/A

5. Pump Installation:

a. Is the well equipped with a pump? ☐ yes ☐ No N/A

b. Type of pump: ☐ hand ☐ electric submersible ☐ jet N/A

☐ shallow well centrifugal ☐ other, _____

c. Description: Manufacturer _____ Model _____

horsepower _____ capacity _____ voltage _____

d. Date installed: N/A By: _____

e. For submersible pump, depth of setting below surface N/A

f. Drop pipe for submersible pump: ☐ steel ☐ plastic
N/A

g. Pump delivers water to: ☐ pressure tank ☐ elevated tank ☐ other
N/A

h. Are there automatic pump controls: ☐ Yes ☐ No
N/A

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

j. Is there a water meter on the system? ☐ Yes ☐ No
N/A

k. Is the pump and piping protected from freezing? ☐ Yes ☐ No
N/A

If yes, describe: _____

l. Comments on pump installation: _____

_____

6. Conclusions

a. Comments on overall installation:

_____

_____

_____

_____

_____

_____

_____

b.Recommendations: _____

_____

_____

_____

_____

_____

_____

PART B: EBA Site Inspection

Inspector: BERT HARRISON Date JUNE 16/05

WELL ID #	Owner	Location Description
M0181	YG.	TCHP RES TESLIN SAWMILL ROAD.

6. Water Treatment

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

☐ 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: 1250 VERTICAL PE TANK

Where is it located?
Comments: BASEMENT

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?
87" Ø x 65" H

What material is the tank constructed of? POLYETHYLENE

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 IS A TYPICAL WATER DELIVERY WATER SYSTEM.
PIPING SHOWN TO BE [illegible] GRADED WITH PROPER SUPPORTS

b. Recommendations:

CLEAN TANK, SUPERCHLORINATE SYSTEM.
TEST CHLORINE RESIDUAL [illegible].

REARRANGE PIPING WITH PROPER SUPPORT
CLEAN TANK AT REGULAR INTERVALS.

Photo 0215: M0181 delivery water fill

Photo 0022: M0181 5000 L water storage tank

Photo 0023: M0181 Pressure tank

Photo 0025: M0181 Water softening system