20.0 BUILDING 6511: TANTALUS SCHOOL

20.1 Description of Existing Water Supply System

Building 6511, the Tantalus School, currently has water supplied from a 16.5 m deep well located in a small underground vault off of the basement mechanical room. A site plan showing the location of the wellhead and other details about the surrounding property is provided as Figure 6511-A located in Appendix A20. The coordinates of the wellhead, as measured by a hand held GPS device, were recorded as:

- UTM ZONE 8
- Northing: 6884714
- Easting: 432684

The water is filtered through an automatic backwash filter. Disinfection treatment is not provided for this system. A system schematic is provided as Figure 6511-B in Appendix A20.

20.2 Description of Existing Wastewater Systems

Tantalus School is serviced by a piped sewer collection system provided by the Village of Carmacks. It is likely that there are sewage main lines or service lines that are within 30 m the well.

20.3 Water Quality Results

20.3.1 Water Quality Results from Previous Sampling

Bacteriological

Bacteriological sampling of water from the Tantalus School water system has previously been completed on a number of occasions by EBA Engineering 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. Eight 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 6511-1 located in Appendix A20.

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

Detailed Potability Analyses

A water sample was previously collected from the Tantalus School water system for detailed potability analysis on October 5, 2004. The sample was submitted to ETL EnviroTest in Surrey BC for detailed potability analyses. The results from this analysis are summarized in Table 6511-2 and are included in Appendix A20. 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.

- The water quality for the sample obtained on October 5, 2004 indicated that the groundwater source was calcium bicarbonate type water with high hardness and a pH of 7.9.
- The water quality results indicated that all health based and aesthetic objectives were met for the parameters analyzed. The hardness (as $CaCO_3$) was reported to be 208 mg/L, which is generally poor for aesthetic purposes.

20.3.2 Identification of Additional Analytical Testing Required

Additional analytical for Tantalus School that was included in the water system assessment is detailed below:

- UV absorbance, to determine potential for UV treatment as a disinfection option.
- Measurements in the field for total dissolved solids, conductivity, pH, and temperature were completed during the assessment.

Reportedly, an AST that is approximately 1 m from the well had previously been over-filled causing a spill of heating fuel relatively close to the wellhead. EBA is unaware of the cleanup measures that were employed, and whether all hydrocarbon impacted soils have been removed from the area. As such, Extractable Petroleum Hydrocarbons (EPH) and Polycyclic Aromatic Hydrocarbons (PAH) were included in the additional analytical to determine whether this release of hydrocarbon may have resulted in contamination of the water supply.

Additional Analytical Results

A water sample was obtained during the water system assessment on May 13, 2005, and was submitted for analysis to ALS Environmental in Vancouver BC for UV absorbance, EPH and PAH. Results are summarized in Table 6511-2, located in Appendix A20, and the laboratory reports are included in Appendix B.

All health based and aesthetic objectives at the Tantalus School were met for the parameters analyzed. EPH and PAH were found to be below the analytical detection limits, and below CDWQG for benzo(a)pyrene. There is no evidence at present to suggest that the water system has been contaminated by hydrocarbons from the reported spill.

20.3.3 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 from this sample were also reported to be low and within the normal background ranges for the Carmacks area.

20.4 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 in the vicinity of Village core is northeast towards the Yukon River. The static water level is likely approximately 6 m below grade.

20.5 Potential Contaminant Sources

Potential contaminant sources from observations during the site investigation are compiled in Table 6511-4 in Appendix A20. Photos of potential contaminant sources are provided in Appendix A20.

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

- Sewer service lines are likely located within 30 m,
- An above ground fuel storage tank is located 1 m away.

20.5.1 Spills Records and Contaminated Sites Search Results

The Government of Yukon Environment Branch did not identify any recorded spill events or contaminated sites this site or for neibouring sites.

20.6 Identified Water System Deficiencies and Associated Risk

20.6.1 High and Medium Risk Deficiencies

The following deficiencies were identified as being high-risk for the Tantalus School water system:

- Poor surface completion of the wellhead below ground (in concrete enclosure adjacent to the basement maintenance room). 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;
- The wellhead is located within 30 m of potential sources of contamination including an above ground fuel storage tank located 1 m from the well.
- The hydrogeology of the area indicates that there are no protective low permeability layers between the surface and the water table. The well is considered to be shallow with a relatively high static water level making it susceptible to surface sources of contamination;
- There is no disinfection/treatment system for de-activation or removal of potential bacteria, virus and protozoa.

20.6.2 Low Risk Deficiencies

- The existing pump was identified as being inadequate for this water system.

20.7 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).

20.7.1 Priority 1

We understand that construction of a new school to replace the existing Tantalus school will be underway within the next year. The existing water system should be given particularly high priority because it provides untreated water on a regular basis to a high number of people, most of which are children. Therefore, even if the school is likely to be replaced in the near future, it should still be ensured that risks to the existing system are mitigated as much as possible. To mitigate the existing high risk, three options are provided below. All options require a proper disinfection treatment system for the school water supply system including an NSF approved commercial duplex filtration system to replace the existing filtration and a chlorination system with suitable retention. These are conceptual design recommendation based on the information available for planning and budgeting purposes. Engineering input will be required for final system specifications.

Option 1:

This option proposes that the current well would be kept in use, but interim upgrades to the wellhead construction should be completed:

- The concrete floor of the wellhead enclosure should be raised by at least 300 mm so that it can be an adequate height above floor level of the adjacent maintenance room (where there is a back-up generator);
- The well should be equipped with a surface seal as deep as possible, equipped with a pitless adapter, and the casing should be extended at least 500 mm above the level of the floor in the wellhead enclosure;
- The above ground fuel storage tank that is located 1 m from the well should be removed to another location at least 30 m from the wellhead.

Option 2:

This option would involve drilling a replacement well that is located with respect to potential contaminant sources, and is a minimum of 30 m away from any potential sources of contamination:

- The well should be equipped with a surface seal to at least 6 m and the casing should be extended above grade (500 mm) and inaccessible to animals and unauthorized persons;
- The water from the new well must meet all CDWQG health based parameters. If there are any exceedences in the CDWQG health-based parameters additional treatment may be required in addition to the disinfection treatment described previously;
- If the new well is successful, the old well should be properly decommissioned in accordance with the Guidelines for Water Well Construction.

Option 3:

A well has already been drilled near Tantalus School that has been constructed for use by the new school once it is constructed. This well can be used as an interim water source for Tantalus School until the new school is built. For this option:

- A pitless unit would be installed on the new well casing, and the well equipped to prevent access by animals and unauthorized persons;
- A water distribution line would need to be installed underneath the existing parking lot, with proper freeze protection;
- Plumbing modifications would be required;
- The water from this well must meet all CDWQG health based parameters. If there are any exceedences in the CDWQG health-based parameters additional treatment may be required in addition to the treatment described previously. Further testing and analysis should be done to determine this;
- The old well should be properly decommissioned in accordance with the Guidelines for Water Well Construction.

20.7.2 Priority 3

- The current jet pump should be replaced with a submersible pump of adequate capacity.

20.8 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.

20.8.1 Priority 1

It is estimated that a suitable filtration system, and a proportional feed digital dosing chlorine injection pump with injection piping, spill containment deck and appurtenances, and adequate retention tank capacity would cost in the order of **$10,000**.

The estimated costs for each option are as follows:

Option 1:

- Upgrading the current wellhead construction would cost approximately **$3,000** for all materials and labour.

Option 2:

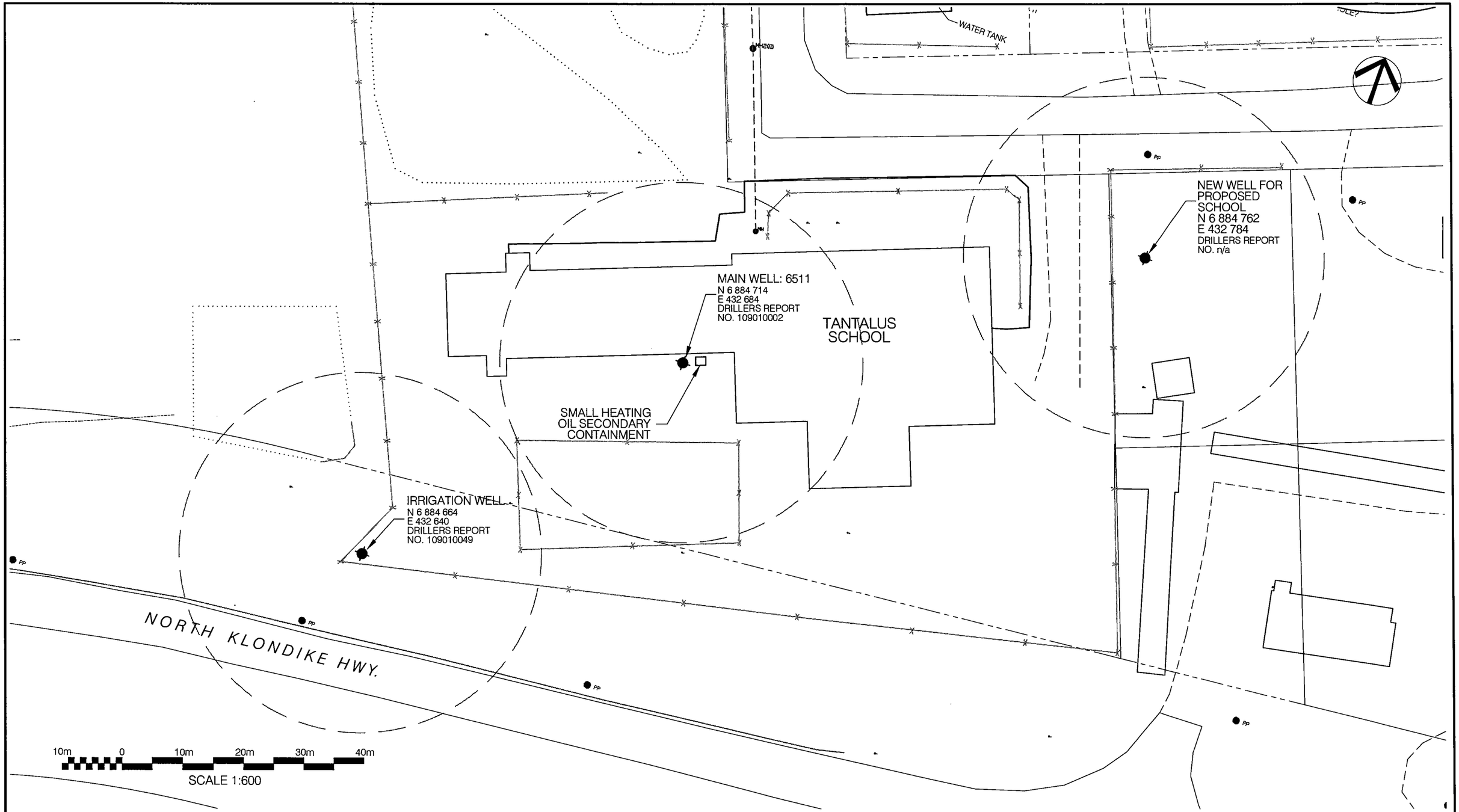
- The estimated cost for a new well installed with a proper surface seal, assuming overburden to a depth of approximately 20 m, would be approximately **$25,000** for materials and labour.
- It would cost approximately **$1,000** to decommission the existing water well and wellhead enclosure.

Option 3:

- The cost for wellhead upgrades, including installing a pitless unit with a locking cap, is estimated to be approximately **$3,000**.
- The estimated cost to install a 20 m long water distribution line from the new school well to Tantalus School, considering that is must be installed under the existing parking lot, would be approximately **$10,000**.
- Re-plumbing the water system within the school would likely cost **$2,000**.

20.8.2 Priority 3

- A submersible pump with new pump controls to replace the existing jet pump would cost in the order of **$3,000**.



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

TANTALUS SCHOOL
BUILDING 6511
SITE LOCATION DIAGRAM
WELL ID: 6511

REVISION ISSUE: 0

DRAWING No.: FIGURE 6511A

Z:\02\Drawings\1260002 Water Assessment YTG\001 - Whitehorse Region\carmacks\1260002 Carmacks Overall Plan.dwg, 6/13/2005 10:00:17 AM, \\whl-eb-dc001\WHI201COMMON

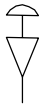
LEGEND


PUMP


PRESSURE GAUGE


GATE VALVE


CHECK VALVE

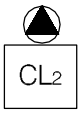

SOLENOID

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

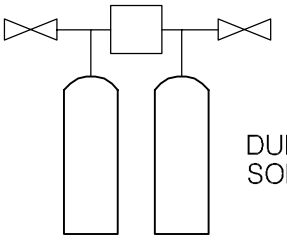
FLOW METER

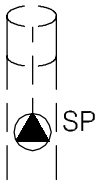
WATER FILTER
(CARTRIDGE TYPE)

PRESSURE TANK

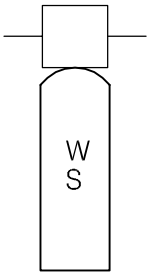


CHLORINE RESERVOIR AND
INJECTION PUMP


DUPLEX WATER
SOFTENER

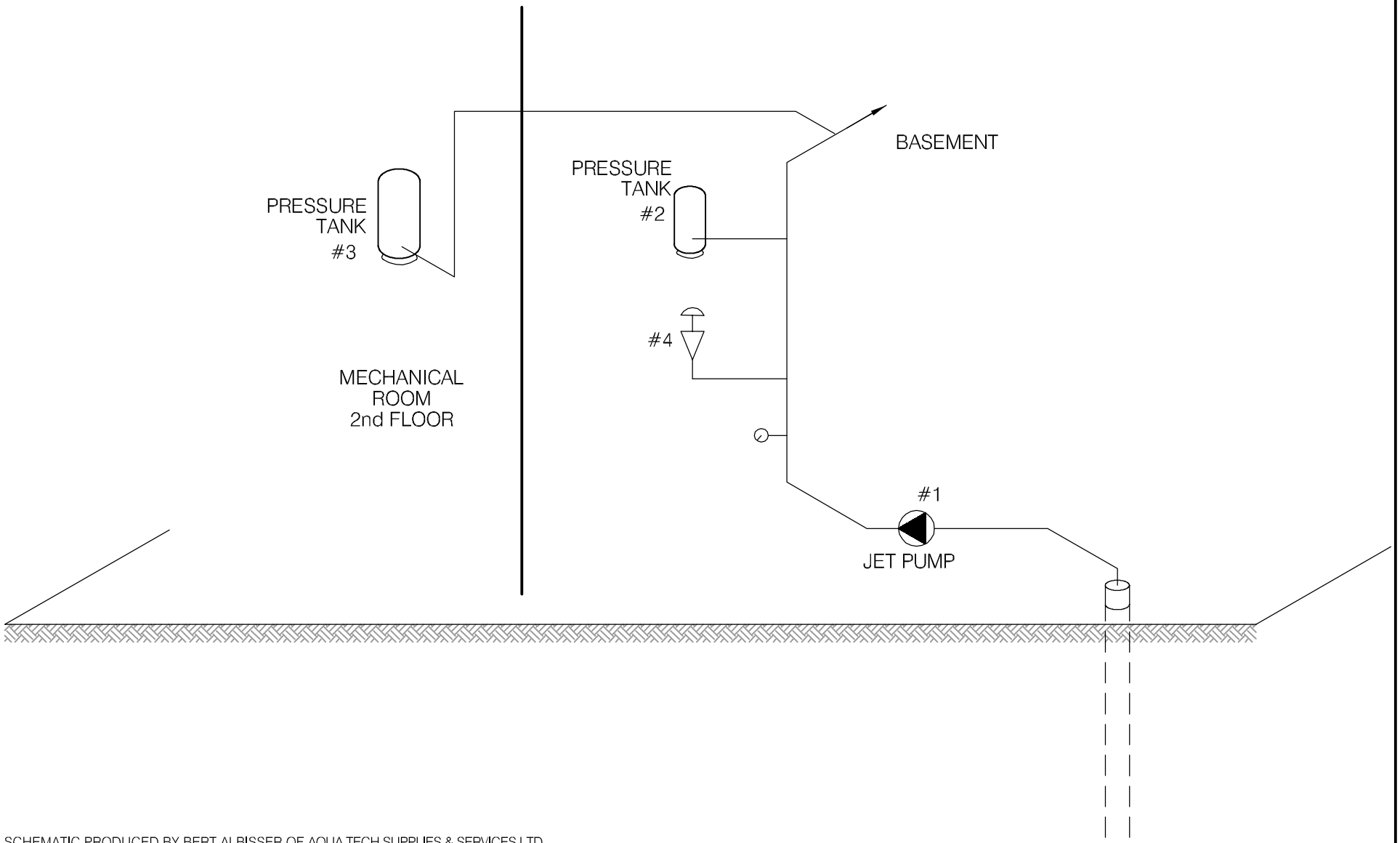


WELL WITH
SUBMERSIBLE PUMP



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.: 6511
TANTALUS SCHOOL - CARMACKS, YT.

DATE	DWN.	CHKD.	FILE NO.	DWG.:
APRIL 2006	JSB	RMM	1260002.001	FIGURE 6511B

Z:\0201Drawings\1260002 Water Assessment YTG\001 - Whitehorse Region\carmacks\Schematics\1260002 Tantalus School 6511 Schematic.dwg, 4/6/2006 10:34:27 AM, Adobe PDF, jbuyck

Whitehorse Region – Tantalus School
Building # 6511

DISTRIBUTION & TREATMENT SYSTEM DATA

Item	Description	Manufacturer	Model	Part No.	Serial No.	Size
1	JET PUMP	GRUNDFOS	JPF-4A.			1" X 1 HP.
2	PRESSURE TANK #1	WELLXTROL	WX-102			3/4" 4.5GAL.
3	PRESSURE TANK #2	WELLXTROL	WX-600-1			
4	PRESSURE CONTROL	HONEYWELL				1/4 FIPT.
5	WATER FILTER	CUNO	NO INFORMATION ON PIPING SCHEMATIC			
6						
7						
8						
9						
10						

TABLE 6511 - 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?
6511	Tantalus School	8	Sept-04 to Mar-05	no	0/8	no	2-Mar-05	no

Table 6511-2: Water Quality Results

SOURCE:	Building 6511 - Tantalus School		GCDWQ Criteria		
Location/ Resident	Carmacks				
Address	Lot 12-6 Group 903				
Treatment	Filtration				
Source of Water	On-Site Well				
Purpose of Sampling	Baseline	Additional Sampling			
Sample Location	Home Ec. Room				
Date Sampled	5-Oct-04	13-May-05	**Lower Limit**	**Upper Limit**	
Physical Tests *(ALS)*			**AO**	**MAC**	**AO**
Colour (CU)	5				15
Conductivity (uS/cm)	333				
Total Dissolved Solids	223				500
Hardness CaCO3	208		AO >200 = poor, > 500 unacceptable [A]		
pH	7.9		6.5		8.5
Turbidity (NTU)	0.3			1	5
UV Absorbance		<0.0010			
Dissolved Anions *(ALS)*					
Alkalinity-Total CaCO3	197				
Chloride Cl	2				250
Fluoride F	0.21			1.5	
Sulphate SO4	20.6				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	<0.0004			0.025	
Barium T-Ba	0.0634			1	
Boron T-B	<0.02			5	
Cadmium T-Cd	<0.0002			0.005	
Calcium T-Ca	60.1				
Chromium T-Cr	<0.0008			0.05	
Copper T-Cu	0.052			1	
Iron T-Fe	0.022				0.3
Lead T-Pb	0.0004			0.01	
Magnesium T-Mg	13.2				
Manganese T-Mn	0.013				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	0.0012			0.02	
Zinc T-Zn	<0.004				5
Polycyclic Aromatic Hydrocarbons					
Acenaphthene		<0.000050			
Acenaphthylene		<0.000050			
Acridine		<0.000050			
Anthracene		<0.000050			
Benz(a)anthracene		<0.000050			
Benzo(a)pyrene		<0.000010			
Benzo(b)fluoranthene		<0.000050			
Benzo(g,h,i)perylene		<0.000050			
Benzo(k)fluoranthene		<0.000050			
Chrysene		<0.000050			
Dibenz(a,h)anthracene		<0.000050			
Fluoranthene		<0.000050			
Fluorene		<0.000050			
Indeno(1,2,3-c,d)pyrene		<0.000050			
Naphthalene		<0.000050			
Phenanthrene		<0.000050			
Pyrene		<0.000050			
Quinoline		<0.000050			
Extractable Hydrocarbons					
EPH10-19		<0.30			
EPH19-32		<1.0			
LEPH		<0.30			
HEPH		<1.0			
Field Chemistry (EBA)					
pH		7.83	6.5		8.5
TDS		191			500
EC (uS/cm)		375			
Temperature		11.0			

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 6511-3: 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)**
6511	**Tantalus School**	**Carmacks**	6884714	432684	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	16.470	No	?	1hp jet pump Size of pump meets needs	?

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

Table 6511-4: Potential Contaminant Sources
Building 6511 – Tantalus School

Potential Contaminant Source	Potential Contaminants	Distance from Water Source	Northing	Easting
Dump or Landfill	***Organic*** and inorganic chemicals.	1200 m		
Cemetery	***Biological***[1]***,*** inorganic[2] and organic parameters.	275 m		
Sewage lagoon	***Biological,*** inorganic and organic parameters.	>300 m		
New Well	***Biological and Inorganic*** parameters.	175	6884762	432784
Irrigation Well	***Biological and Inorganic*** parameters.	61 m	6884664	432640
Sewage lines, tanks and lift stations	***Biological,*** inorganic and organic parameters.	<30 m to service lines		
Septic fields	***Biological and Inorganic*** parameters.	>150 m		
Gas stations	***Organic and Inorganic*** parameters.	225 m		
Undergrounds Fuel Storage Tanks (USTs)	***Organic*** parameters.	>>30 m		
Above ground storage tanks (ASTs)	***Organic*** *parameters.*	**1 m**	6884714	432685
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

EBA Engineering Consultants Ltd. * No well Log

Creating and Delivering Better Solutions

SMALL PUBLIC WATER SYSTEM ASSESSMENT

PART A: EBA Site Inspection

Inspector: Ryan Martin / Luke Lebel Date May 13, 2005

WELL ID #	Owner	Location Description
6511	YTG	Tantalus School

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,
Tantalus School

c. GPS location: 432684 Easting 6884714 Northing 530m elevation ± 9m

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 Tantalus School in Carmacks

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

f. Nearest building, specify Located within Tantalus school off of one of the mechanical rooms. Is underground outside, however.

g. Distance from well to building ~1 km

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

39 61 Generator

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

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 Well is located off of a mechanical room in the basement of the school. Entrance by animals? ☒ Yes ☐ No There are no signs of animals

o. Is well site subject to flooding? ☐ Yes ☒ No No evidence of water around well. It is within a concrete encasement

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

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

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: ~1m

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? 2 ☐ in use ☐ abandoned ☐ require proper sealing

1 in use for irrigation (6m), 1 new not yet in use

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 18cm Material: ☒ steel ☐ plastic ☐ concrete

g. Depth of well: 14.770 ☑ measured (if possible) ☐ reported ☐ from log

h. Static water level below ground: Not possible - pump on - check others on property
☐ 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
well head is located off from a basement mechanical room inside the school
☐ 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 The well head is 1.6m below grade

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

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

iv. Any evidence of rodents? Specify no apparent evidence

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

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…) _____

---

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 unlikely

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
Although these raw sample are filthy. Deep brown coloration to the water due to sagnant pipe

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

k. Is the pump and piping protected from freezing? ☐ Yes ☐ No
No Heat Trace. The well is off of a heated mechanical room. No Insulation. The pump is in the mech. rooms. Concrete walls
If yes, describe: _____

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
6511	YTG	TANTALUS SCHOOL

6. Water Treatment

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

☐ chlorination ☐ iron and or manganese removal ☑ other AUTOMATIC BACKWASH FILTER TYPE: ?

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: PRESSURE TANK

Where is it located?
Comments: NEXT TO PUMP / ADDITIONAL IN MECH ROOM

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:

THE INSTALLATION MUST BE UPGRADED.
THE WELL HEAD MUST BE SEALED BETTER.
A DUPLEX PUMP SYSTEM FOR CONTINOUS
WATER SUPPLY MUST BE PROVIDED.

b. Recommendations:

INSTALL A NEW DUPLEX WATER SUPPLY.
INSTALL FILTRATION AND PROPORTIONAL
CHLORINATION SYSTEM. CHECK THE
FILTER SYSTEM AND UP GRADE
AS NECESSARY.

TANTALUS. IRRIGATION WELL

Yukon Government

Driller's Report 109010049

Location: Carmacks School Well Lot 12-6 CRMK

NAD 83 **Zone** 8 **Easting** 432650 **Northing** 6884726 **Elevation ASL** 1762 ft.

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

Purpose of well: Municipal - residences and other grouped structures

Permafrost encountered? No

LOG OF OVERBURDEN AND BEDROCK MATERIALS

Layer	From	To		General Colour	Most Common Material	Secondary Material	General Description
1	0	26	ft.		GRAVEL	Sand, Silt and Cobbles	
2	26	49	ft.		SILT	Gravel and Sand	
3	49	53	ft.		SILT		
4	53	59	ft.		SAND	Gravel with some Silt	
5	59	61	ft.		GRAVEL	Sand	

WELL CONSTRUCTION

Well No. 1090100491 **Completion date** 8/9/1991 **Drilling method** Air Rotary (conventional) **Well type** Overburden

Casing: **OS Diameter** 6 in. **Material** Steel **Wall thickness** **Depth to** 58 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
		Continuous Wire Wrap	

Screen Sections

Section	From	to		Slot size/ perforation diameter	
1	58	61	ft.	30	Thou.

WELL DEVELOPMENT AND STATUS

Well ID	Developed by	Wellhead completion	Adapter depth	Static water level	Yield Estimate	Estimate method
1090100491	Air lifting	None		13.5 ft.	30 gpm	Air lifting

Final Status New, in use for intended purpose

No

Photo 0162: 6511-A Main School Wellhead (underneath panel at center) and Above Ground Fuel Storage Tank (right)

Photo 0160: 6511-A Wellhead

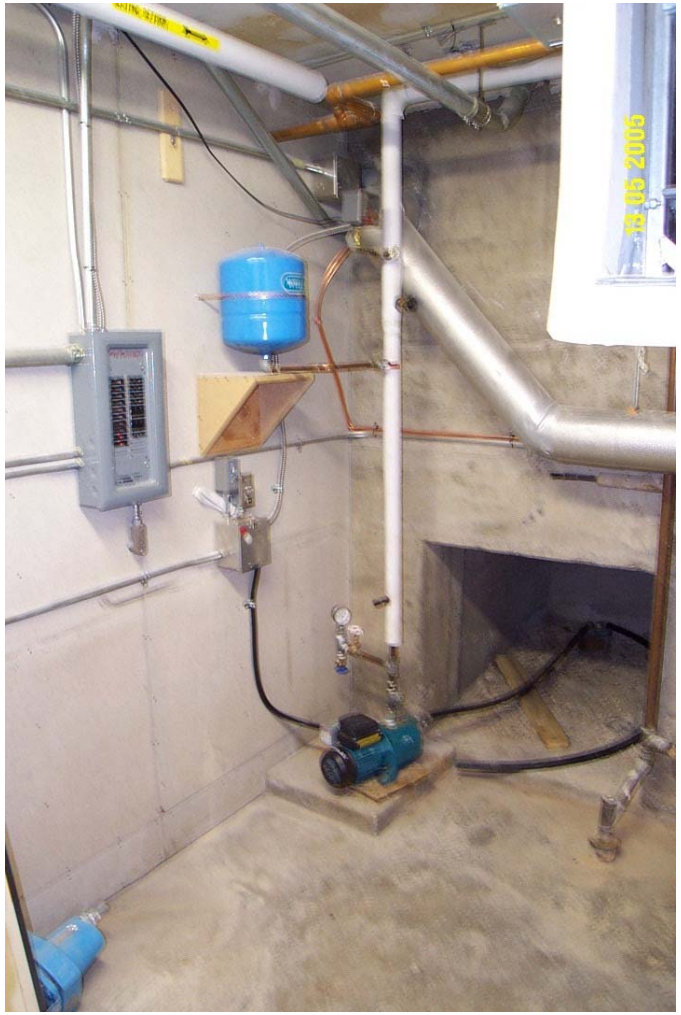


Photo 0161: 6511-A Jet Pump and Pressure Tank

Photo 0158: 6511-C Irrigation Well Wellhead

Photo 0159: 6511-C New Well Wellhead