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September 29, 2017

SIMCorp File #SW2017-128

Ms. Lee Swanson Project Manager Environmental Assessment Section PO Box 6000 Fredericton, NB E5B 5H1

Dear Ms. Swanson,

Reference: <u>Water Supply Source Assessment (WSSA) Initial Application and Abbreviated</u>
<u>EIA Submission: Bayside Post-Smolt Production Facility.</u>

Please find attached for your review and consideration a WSSA Application and an Abbreviated EIA submission. Only a brief project description is provided on the attached submissions and further information and assessment related to the post-smolt production facility will follow pending satisfactory WSSA results.

If you have any questions or comments on the above noted submissions, please do not hesitate to contact our office at (506) 467-9014.

Sincerely,

David Hyslop Project Manager BSc., P.Eng. Sweeney International Marine Corp. dhyslop@simcorp.ca



## **WSSA Initial Application**

Source: Appendix B of Water Supply Source Assessment Guidelines (NBDELG 2017)

Water Supply Source Assessment Initial Application (WSSA) requirements:

### 1) Name of proponent.

Kelly Cove Salmon Ltd. a Division of Cooke Aquaculture Inc.

# 2) Location of drill targets (including property PID) and purpose of the proposed water supply.

The proposed project location lies solely on PID 15166184 which is located in the Champlain Industrial Park, Bayside, NB (Figure 1). The 5 drill target locations proposed for PID 15166184 are shown in Figure 2.

The purpose of the proposed water supply is for the development of a post-smolt production facility which would involve the development of a recirculation aquaculture system for grow-out of 80 gram smolt up to 1kg before being transported to cage sites.

#### 3) Required water quantity (in m3/day) and/or required pumping rate.

Kelly Cove Salmon Limited is looking for a water quantity of approximately 1500 m3/day.

# 4) List alternate water supply sources in area (including municipal systems).

Champlain Industrial Park uses water from Chamcook Lake and makes water available for users of the Champlain Industrial Park. It is Kelly Cove Salmon Ltd.'s intentions at this time to establish their own water source, independent from any other sources that may be available to them.



#### 5) Discuss area hydrogeology as it relates to the project requirements.

The overburden in the general area is a brown clay till. According to the well logs in the area the till ranges from 1.2 to 19.8 meters (4 to 65 feet) in thickness. The overburden is not used as a water source in the local area and it is the bedrock that forms the local aquifer. The bedrock in the area is mapped as Late Silurian age sedimentary and intrusive rocks which form a complex geology. Beneath the site and to the south, the bedrock is comprised of sandstones, siltstones, and minor conglomerate with associated volcanic tuff of the Eastport Formation. To the north of the site the bedrock is composed of intrusive granodiorite and diorite of the Bocabec Gabbro.

In the general area of the site the bedrock aquifer has safe yields in the range of 5 to 62.5 igpm. In the bedrock the principal conduits for the flow of groundwater are the fractures or bedding planes. Based on common knowledge of the area, the bedrock aquifer has been successfully developed for private residential wells by several individuals over the general area. Local well drillers with knowledge of the area confirmed the potential for water supply development in terms of private wells.

Surface drainage and inferred groundwater flow is towards the west, in the general direction of the St. Croix River. There are no defined surface water streams on the site. Chamcook lake is located approximately 3 km east of the site and the western boundary of the site is the bank of the St. Croix River.

<u>MB Environment Well Log Database</u>: A search of the NBDELG well log database for a 2100-meter radius around PID 15166184 yielded a total of seven well logs. These well logs provide the following information relating to the bedrock aquifer (Table 1). This search was carried out in September 2017.



Table 1: Summary of hydrogeologic information derived from 2100-meter radius around PID 15166184 search of NBDELG well log database which yielded seven well logs.

Well Depth (feet)	Estimated Yield (igpm)	Depth to Bedrock (feet)	Casing Length (feet)
Average:	Average:	Average:	Average:
166.4	20.2	32.9	36.3
Median: 145	Median: 18	Median: 26	Median: 20
Minimum: 125	Minimum: 5.0	Minimum: 4	Minimum: 20
Maximum:	Maximum:	Maximum:	Maximum:
250	62.5	65	70

All the well logs summarized in Table 1 above appear to be private wells and are developed in the bedrock aquifer. The average estimated yield, 20.2 igpm and the maximum observed yield, 62.5 igpm suggest that adequate ground water resources may be present in the area to supply the project. As stated above in 3) the project will require approximately 1500 m³/ day, or 229 igpm, which, based on the well log information, would have to be made up from a number of wells.

**NB Environment Well Water Chemistry Database:** A 2500-meter radius location search around PID 15166184 of the NBDELG well chemistry database provided results from a total of eight wells located in the area for which groundwater chemistry data was available. The precise locations of the wells from which the ground water chemistry data was obtained are not available due to right to privacy considerations of the property owners. The analytical results for the samples are provided in Table 2 (attached). In Table 2 any result that exceeds the Canadian Drinking Water Quality Guidelines (CDWQG) is bolded and colour shaded for ease of recognition. The groundwater chemistry data in Table 2 was collected and analyzed using the water analysis certificate provided to the homeowner by the well driller when the well is new. The water samples are usually collected by the homeowner shortly thereafter to provide confidence that they can use the water. Because of the well just being drilled, the well from which the water sample was collected typically has not had enough time or use for the water to clear sufficiently prior to the water sample being collected. The result of this is that the chemistry data



in Table 2 may overestimate the long-term turbidity and some trace metal concentrations as most wells will clear naturally with use and time.

Out of the eight analytical chemistry records available, one well had an elevated concentration of chloride with a measured concentration of 376 mg/L compared to the Canadian Drinking Water Quality Guideline of 250 mg/L. The same well also had an elevated Total Dissolved Solids of 778 mg/L compared to the guideline concentration of 500 mg/L. This groundwater chemistry may indicate impact by salt water in that well.

A total of five out of the eight chemistry records available had elevated turbidity present in the samples. The elevated levels of turbidity may be related to the relative newness of the wells and they may not have had sufficient time, or use, to clear naturally. The water samples in the database are provided from the water well testing certificates which are provided by the well drilled immediately after the well has been drilled. As a result, the clear majority of the analytical results come from new wells. Most new wells clear naturally with time and use. At levels more than 5 NTUs turbidity may become noticeable to consumers and therefore, objectionable. The turbidity may be the result of elevated concentrations of iron and or manganese or the presence of particulate in the water. In either case, turbidity can be treated by water softeners and/or particulate filters.

There were no detections of E. coli or Total Coliforms in any of the eight sample results available. All other measured parameters were of acceptable water quality related to the Canadian Drinking Water Quality Guidelines.

### 6) Outline the proposed hydrogeological testing and work schedule.

It is proposed that up to five test wells be drilled at the locations shown in Figure 2. The test wells will be drilled in the following location order: #1, #3, #5, #4, and #2. After each well is drilled, the results obtained from that test well will be evaluated relative to the overall goal of achieving sufficient yield (1500 m3/day) on this site for the proposed project. The drilling would commence as soon as possible following approval to proceed. In the event that sufficient yield is developed on the site the potential production wells would be simultaneously pump tested for 72 hours. The target pump test rate would be determined following step testing of each well. It is recognized that whatever the combination of production wells



developed, there will have to be two observation wells available on the site for the pump test. The locations of the observation wells will be determined as the drilling program progresses.

7) Identify any existing pollution or contamination hazards within a minimum radius of 500 m from the proposed drill targets. Historical land use that might pose a contamination hazard (i.e. tannery, industrial, waste disposal, etc.) should also be discussed.

The proposed site is located just within the southern boundary of the Bayside Industrial Park as shown in Figure 1 and Figure 3. Figure 3 is an air photo of the area with a 500-meter radius shown around the proposed site drill targets. Location A on the property lot immediately north of the site shows a fan shaped deposit. Direct inspection showed this to be comprised of rock rubble. Location B, located north west of the site is a pad constructed of what appears to be out of spec. crushing from the quarry operation. Both of these are not potential contamination hazards. There is a stockpile of salt at the marine terminal; however, this has an impermeable membrane beneath and covering over it. Although the site is located within an industrial park, the existing uses do not appear to pose undue pollution or contamination hazards. The land use to the south of the site is residential and woodland.

8) Identify any groundwater use problems (quantity or quality) that have occurred in the area.

There have been no systematic groundwater use problems in the immediate area of the site. Salt water may represent a potential concern given the proximity of the site to the St. Croix River; however, that is not a concern for this specific proposed project.

9) Identify any watercourse(s) (stream, brook, river, wetland, etc.) within 60 m of the proposed drill targets.

Based on the current WAWA online mapping, there are no regulated WAWA features on the property in question; therefore, a WAWA permit is not required (pers. comm. Cassandra Colwell, DELG, Sept. 20, 2017). Note: WAWA features include watercourses and wetlands



10)Identify any site supervisory personnel involved in the source development (municipal officials, consultants, and driller).

E.R. Steeves Ltd. - Well Drillers

Mitchell Dickie and /or Derek Hatt - Cooke Aquaculture Inc.

Marc Sorensen P.Eng. and/or Lionel Hayter B.Sc., M.Sc. - Sorensen Engineering Ltd.

Doug Craig M.Sc., P. Geo. - Craig Hydrogeologic Inc.

11)Attach a 1:10000 map and/or recent air photo clearly identifying the following: - proposed location of drill targets and property PID - domestic or production wells within a 500 m radius from the drill target(s) - any potential hazards identified in question 7.

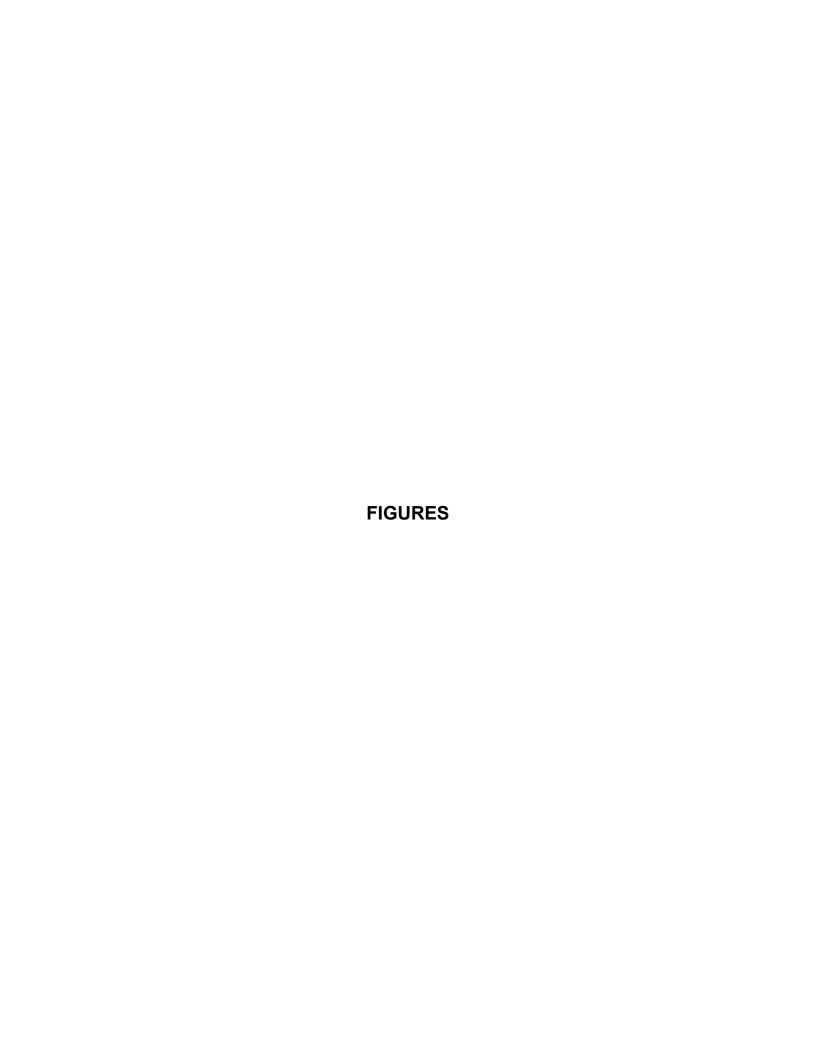
Figure 4 identifies domestic production wells and production wells while Figure 3 identifies the potential hazards as discussed in Question 7.

12) Attach a land use/ zoning map of the area (if any). Superimpose drill targets on this map.

See Figure 4 and Bayside Planning Area Map (Figure 1)

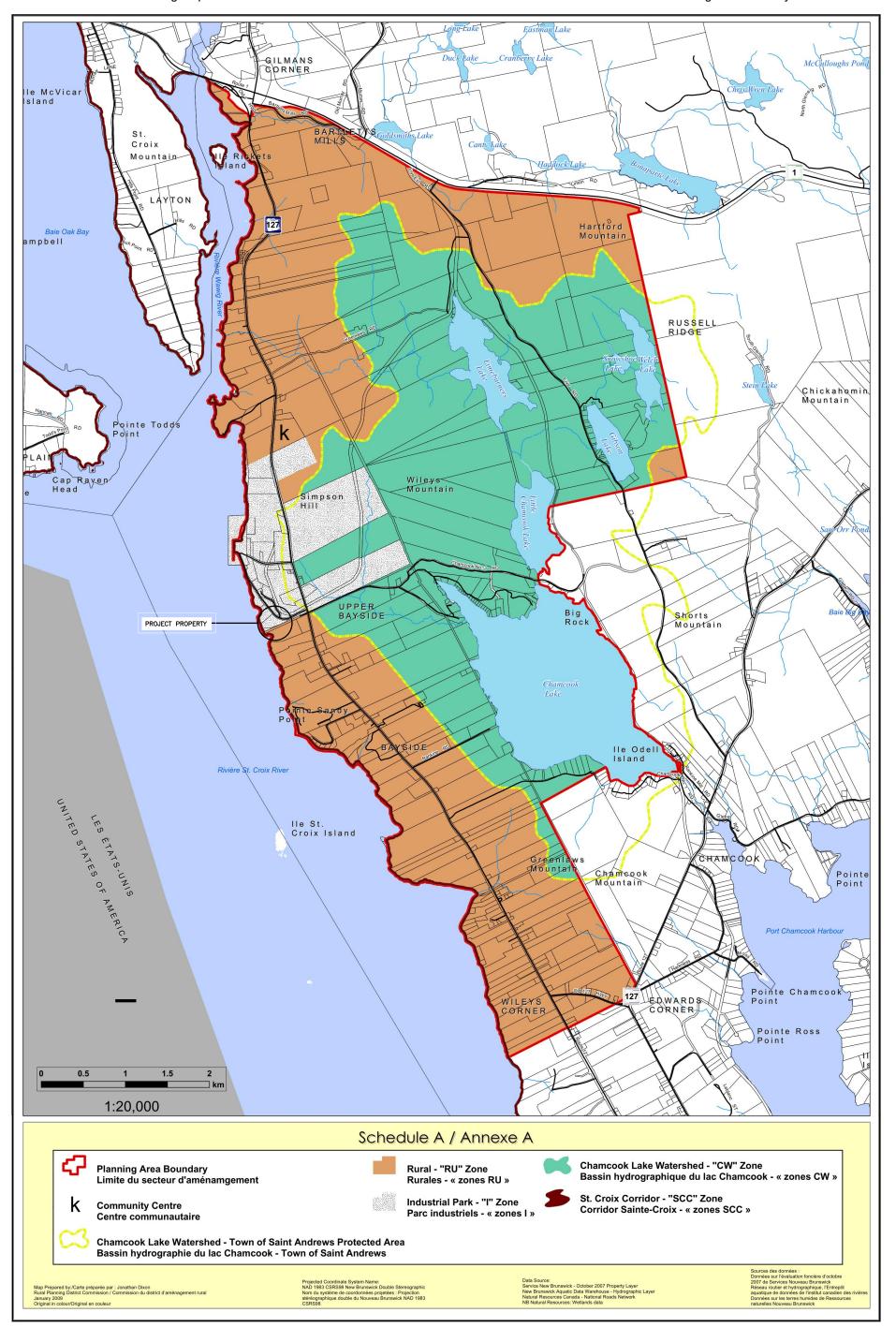
13) Contingency plan for open loop earth energy systems (see Section 2.3).

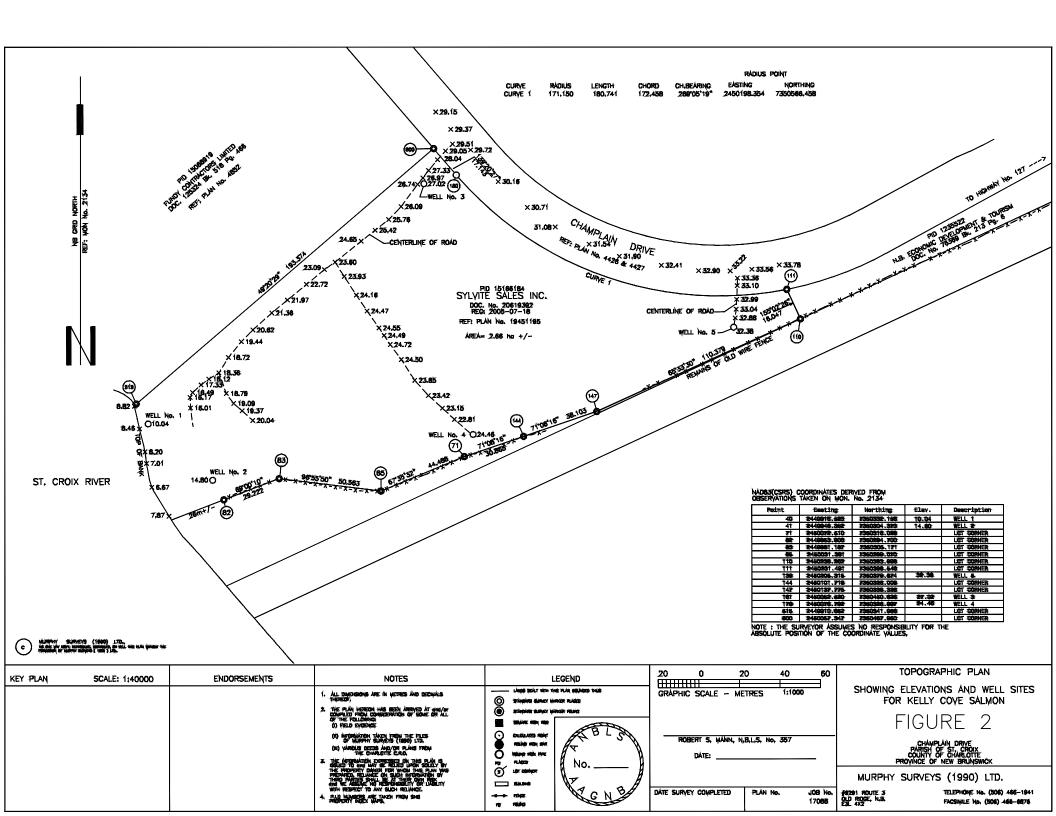
Not Applicable

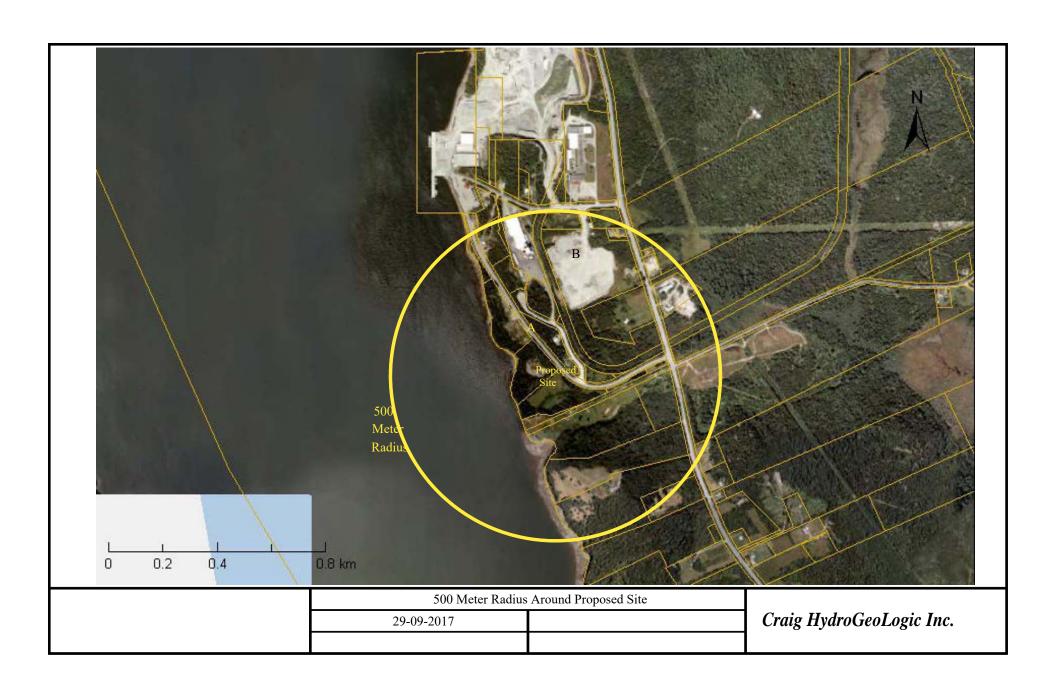


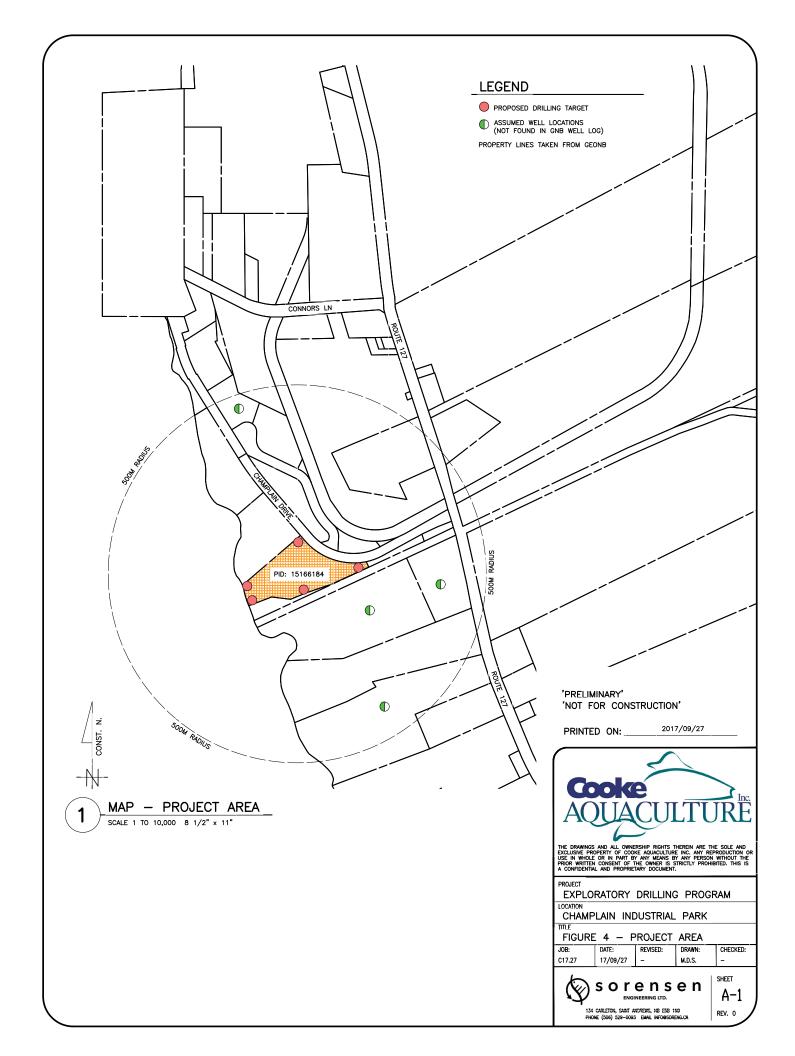
# Schedule A / Annexe A

Carte de zonage du plan rural du secteur d'aménagement de Bayside











Bayside 2017

CDWQG = Canadian Drinking Water Quality Guideline

Table 2
NBDOE Groundwater Chemistry Database

Parameter	ALK_T (mg/L)	Al (mg/L)	As (μg/L)	B (mg/L)	Ba (mg/L)	Br (mg/L)	COND (µSIE/cm)	Ca (mg/L)	Cd (µg/L)
	112	0.025	6	0.068	0.01	0.1	251	21.4	0.5
	120	0.025	1.5	0.01	0.01	0.1	272	47.8	0.5
	68.1	0.025	3.9	0.011	0.01	0.1	162	25.5	0.5
	98.8	0.025	1.6	0.023	0.01	3.24	1670	130	0.5
	102	0.077	1.5	0.016	0.01	0.1	236	26.8	0.5
	91.3	0.14	1.6	0.018	0.01	0.1	231	28.3	0.5
	56.8	0.025	3.9	0.013	0.01	0.1	145	19.6	0.5
	92	0.011	4	0.037	0.002		230	24.5	0.01
Mean	92.6	0.04	3.0	0.025	0.009	0.5	400	40.5	0.4
CDWQG			<10	<5.0	<1.0				<5.0

Parameter	CI (mg/L)	Cr (µg/L)	Cu (µg/L)	E_coli P/A (P/A)	F (mg/L)	Fe (mg/L)	HARD (mg/L)	K (mg/L)	Mg (mg/L)
	4.8	10	10	Ab	0.592	0.039	77.2	1.09	5.79
	1.83	10	24	Ab	0.1	0.278	130	0.5	2.67
	4.32	10	16	Ab	0.1	0.062	73.5	0.5	2.38
	376	10	10	Ab	0.1	0.081	463	1	33.6
	6.45	10	10	Ab	0.104	0.129	93.1	0.7	6.36
	8.82	10	10	Ab	0.1	0.321	101	0.2	7.47
	4.14	10	10	Ab	0.1	0.264	60.5	0.7	2.8
	8	1	1	Ab	0.26	0.14	82.4	0.72	5.15
Mean	51.8	9	11		0.18	0.164	135.1	0.68	8.28
CDWQG	<250	<50	<1000		<1.5	<0.3			

Table 2
CDWQG = Canadian Drinking Water Quality Guideline

NBDOE Groundwater Chemistry Database

Parameter	Mn (mg/L)	NO2 (mg/L)	NO3 (mg/L)	NOX (mg/L)	Na (mg/L)	PH (pH)	Pb (μg/L)	SO4 (mg/L)	Sb (µg/L)
	0.101	0.05	0.05	0.05	26.4	8.06	1	12.3	1
	0.017	0.05	0.47	0.52	5.85	7.37	1.9	6.28	1
	0.006	0.05	0.05	0.05	4.69	7.98	1	7.38	1
	0.039	0.05	0.09	0.09	125	8.05	1	49	1
	0.005	0.05	0.52	0.52	15.8	8.29	1	7.73	1
	0.01	0.05	0.05	0.05	11.5	8.31	1	10.6	1
	0.006	0.05	0.05	0.06	7.79	8.07	1	9.02	1
	0.023			0.05	14.2	8.2	0.2	12	0.1
Mean	0.026	0.05	0.18	0.17	26.40	8.04	1.0	14.29	0.9
CDWQG	<0.05	<10	<10	<10	<200	6.5-8.5	<10	<500	6

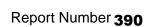
Parameter	Se (µg/L)	TC-P/A (P/A)	TURB (NTU)	TI (μg/L)	U (μg/L)	Zn (μg/L)	TDS (mg/L)
	1.5	Ab	0.12	1	1.3	5	140
	1.5	Ab	3.2	1	0.5	23	140
	1.5	Ab	0.28	1	0.5	5	86
	2.7	Ab	0.5	1	4.8	5	778
	1.5	Ab	2	1	2.3	5	128
	1.5	Ab	2.7	1	3	5	123
	1.5	Ab	2.5	1	0.5	6	79
	0.001	Ab	1.6	0.1	1.8	20	121
Mean	1.5		1.6	1	1.8	9	199
CDWQG			<1.0		<20	<5000	<500



2100 meter radius around PID 15166184

Well	Estimated	-	_
Depth	Yield	Bedrock	Length
(Feet)	(igpm)	(Feet)	(Feet)
145	20	60	66
125	18	5	20
210	20	4	20
250	62.5	58	20
145	5	26	38
145	8	12	20
145	8	65	70
Well	Estimated	Depth to	Casing
Depth	Yield	Bedrock	Length
(Feet)	(igpm)	(Feet)	(Feet)
(1 000)	(15)111)	(1 000)	(1 000)

Median	145	18	26	20 Median
average	166.4	20.2	32.9	36.3 AVERAG
max	250	62.5	65	70 max
min	125	5	4	20 min
count	7			





Date printed 9/25/2017

Drilled by

Well Use Work Type Drill Method Work Completed Drinking Water, Domestic New Well 06/28/2002

Casing	Information	Casing above ground 2ft Drive Shoe Used			Drive Shoe Used? Yes
Well Log	Casing Type	Diameter	From	End	Slotted?
390	Steel	6 inch	0ft	66ft	

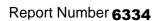
Aquifer Test/Y	ield				Estimated		
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Safe Yield	Flowing Well?	Rate
Air	Oft	20 igpm	0hr	30ft	20 igpm	No	0 igpm
	(BTC - Below to	o of casing)					

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible Intake Setting (BTC)
		Qty 0 ig	140ft

Driller's Log Overall Well Depth Well Log From End Colour Rock Type 145ft 390 0ft 60ft Till Brown Bedrock Level 145ft 390 60ft Grey Slate Oft

Water Be	earing Frac	ture Zone	
Well Log	Depth	Rate	
390	78ft	3 igpm	
390	100ft	3 igpm	
390	125ft	14 igpm	

Setbacks	}		
Well Log	Distance	Setback From	
390	55ft	Septic Tank	
390	75ft	Leach Field	





Date printed 9/25/2017

Drilled by

Well Use Work Type Drill Method Work Completed Drinking Water, Domestic New Well Cable Tool 10/19/2002

6334	Steel	6 inch	Oft	20ft	
Well Log	Casing Type	Diameter	From	End	Slotted?
Casing	Information	Casing above ground 2ft			Drive Shoe Used? Yes

Aquifer Tes	t/Yield				Estimated		
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Safe Yield	Flowing Well?	Rate
Air	Oft	18 igpm	0hr	12ft	18 igpm	No	0 igpm
	(BTC - Below to	p of casina)					

Well Grouting

There is no Grout information.

Drilling Fluids Used
None

Disinfectant
Bleach (Javex)
Submersible
Intake Setting (BTC)

Qty 0 ig 60ft

6334	0ft	5ft	Brown	Till	
6334	5ft	125ft	Grev	Slate	

Overall Well Depth
125ft
Bedrock Level
Oft

Water Bearing Fracture Zone							
Well Log	Depth	Rate					
6334	40ft	2 igpm					
6334	80ft	2 igpm					
6334	105ft	8 igpm					

Setbacks		
Well Log	Distance	Setback From
6334	55ft	Septic Tank
6334	75ft	Leach Field





### Report Number 12109

## Well Driller's Report

Date printed 9/25/2017

Drilled by

Well Use Work Type **Drill Method** Work Completed New Well 07/11/2005 Drinking Water, Domestic Rotary

12109	Steel	6 inch	Oft	20ft	
Well Log	Casing Type	Diameter	From	End	Slotted?
Casing	Information	Casing above ground 2ft			Drive Shoe Used? Yes

Aquifer Tes	t/Yield				Estimated		
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Safe Yield	Flowing Well?	Rate
Air	20ft	20 igpm	1hr	20ft	20 igpm	No	0 igpm
	(BTC - Below to	o of casina)					

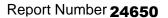
Well Grouting Disinfectant Pump Installed Drilling Fluids Used Submersible None Bleach (Javex) There is no Grout information. Intake Setting (BTC) Qty

0 ig 180ft

Driller's	Log				Overall Well Depth
Well Log	From	End	Colour	Rock Type	210ft
12109	Oft	4ft	Brown	Till	Bedrock Level
12109	4ft	210ft	Grey	Slate	Oft
					Oit

Setbacks There is no Setback information.

Water Bearing Fracture Zone						
Well Log	Depth	Rate				
12109	198ft	20 igpm				





Date printed 9/25/2017

Drilled by

Well Use Work Type Drill Method Work Completed Drinking Water, Domestic New Well Rotary 08/04/2010

Casing Information	Casing abo	ve ground 2ft		Drive Shoe Used? Yes
Well Log Casing Type	Diameter	From	End	Slotted?
24650 Steel	6 inch	Oft	20ft	

Aquifer Tes	t/Yield				Estimated		
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Safe Yield	Flowing Well?	Rate
Air	25ft	62.5 igpm	1hr	25ft	62.5 igpm	No	0 igpm
	(BTC - Below to	op of casing)					

Well Grouting

Drilling Fluids Used

None

Disinfectant

Pump Installed

Submersible

Intake Setting (BTC)

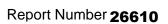
Qty 0 ig 200ft

Driller's Log							
Well Log	From	End	Colour	Rock Type			
24650	0ft	58ft	Brown	Till			
24650	58ft	90ft	Black	Granite			
24650	90ft	140ft	Red	Sandstone			
24650	140ft	200ft	Black	Granite			
24650	200ft	240ft	Red	Sandstone			
24650	240ft	250ft	Black	Granite			

Overall Well Depth 250ft Bedrock Level 0ft

Water Be	earing Fra	cture Zone
Well Log	Depth	Rate
24650	90ft	2.5 igpm
24650	104ft	60 igpm

Setbacks	3		
Well Log	Distance	Setback From	
24650	250ft	Septic Tank	
24650	300ft	Leach Field	
24650	400ft	Right of any Public Way Road	





Date printed 9/25/2017

Drilled by

Well Use Work Type Drill Method Work Completed Drinking Water, Domestic New Well Rotary 12/16/2010

Casing Information	Casing ab	ove ground 1ft	8in	Drive Shoe Used? Yes
Well Log Casing Type	Diameter	From	End	Slotted?
26610 Steel	6 inch	Oft	38ft	

Aquifer Test	/Yield				Estimated		
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Safe Yield	Flowing Well?	Rate
Air	22ft (BTC - Below tor	5 igpm	1hr	20ft	5 igpm	No	0 igpm
	12.0 20.0	, o. oaoa,					

Well Grouting	Drilling Fluids Used	Disinfectant	Pump Installed
There is no Grout information.	None	Bleach (Javex)	Submersible Intake Setting (BTC)
		Ot. 0:-	

Qty 0 ig 120ft

Driller's	g From	End	Colour	Rock Type
AAGII FO	4 110111	LIIU	Coloui	тоск туре
26610	0ft	26ft	Brown	Till

Overall Well Depth
145ft
Bedrock Level
26ft

Water Be	earing Frac	ture Zone	
Well Log	Depth	Rate	
26610	100ft	2 igpm	
26610	140ft	3 igpm	

Setbacks		
Well Log	Distance	Setback From
26610	65ft	Septic Tank
26610	85ft	Leach Field
26610	330ft	Right of any Public Way Road





Date printed 9/25/2017

Drilled by

Well Use Work Type **Drill Method** Work Completed New Well 11/09/2011 Drinking Water, Domestic Rotary

Casing Information	Casing abo	ve ground 2ft		Drive Shoe Used? Yes
Well Log Casing Type	Diameter	From	End	Slotted?
28970 Steel	6 inch	Oft	20ft	

Aquifer Tes	t/Yield				Estimated		
Method	Initial Water Level (BTC)	Pumping Rate	Duration	Final Water Level (BTC)	Safe Yield	Flowing Well?	Rate
Air	18ft (BTC - Below tor	8 igpm	1hr	18ft	8 igpm	No	0 igpm

Well Grouting Disinfectant Pump Installed Drilling Fluids Used Submersible None Bleach (Javex) There is no Grout information. Intake Setting (BTC) Qty

0 ig 130ft

Driller'	s Log				
Well Lo	g From	End	Colour	Rock Type	
28970	0ft	12ft	Brown	Clay	
28970	12ft	145ft	Black	Hard Rock	

Overall Well Depth 145ft Bedrock Level 12ft

Water Be	earing Frac	ture ∠one	
Well Log	Depth	Rate	
28970	42ft	4 igpm	
28970	110ft	3 igpm	
28970	122ft	1 igpm	

Setbacks			
Well Log	Distance	Setback From	
28970	65ft	Septic Tank	
28970	80ft	Leach Field	
28970	180ft	Center of road	





### Report Number 90645400

# Well Driller's Report

9/25/2017 Date printed

Drilled by

Well Use Work Type **Drill Method** Work Completed New Well (NEW 08/07/1996 Rotary (ROTARY) Drinking Water, Domestic

WELL)

Casing Information	Casing above ground 2ft		Drive Shoe Used? Ye	
Well Log Casing Type	Diameter	From	End	Slotted?
90645400 Steel	6 inch	Oft	70ft	

Aquifer Test/Yield				Estimated			
	Initial Water	Pumping		Final Water	Safe Yield	Flowing	
Method	Level (BTC)	Rate	Duration	Level (BTC)		Well?	Rate
Air	Oft	8 igpm	1hr	35ft	8 igpm	No	0 igpm
	(BTC - Below to	o of casing)			-		·

Well Grouting Disinfectant Pump Installed Drilling Fluids Used Submersible None Bleach (Javex) There is no Grout information. Intake Setting (BTC) Qty 1.0 ig

130ft

Driller's	Log				Overall Well Depth
Well Log	From	End	Colour	Rock Type	145ft
90645400	Oft	65ft	Brown	Till	Bedrock Level
90645400	65ft	145ft	Red	Sandstone	Oft
					OI C

Water Bearing	
Well Log Depth	Rate
90645400 125ft	3 igpm
90645400 130ft	5 igpm

Setbacks	
	There is no Setback information.