5.3 Beaver Creek - Health and Visitor Centre Water Supply System

The Beaver Creek Health Centre and Visitor Centre are supplied by a piped water system served by one groundwater well. Water from this system is used to provide potable domestic water to the two buildings and the system is governed under the Sections 12.1 (a) and (b) and 17 of the Public Health and Safety Act and Section 5 of the Public Health Regulations (C.O. 1958/079, O.I.C. 2009/194), which require safety measures and inspection for water and water sources for systems that provide for human consumption.

5.3.1 Data Compilation Methodology

Tetra Tech approached stakeholders including water system operators and owners to let them know the project was in progress and to request their assistance in compiling the most complete data set possible. Through the process of compiling the data, Tetra Tech has had communication with YG PMD regarding all water systems they operate and/or maintain. YG PMD has provided review comments review comments and data for the compilation.

5.3.2 Hydrogeology

Beaver Creek is located on a broad glaciofluvial plain with the nearest bedrock outcrops occurring approximately 4 km northeast and northwest of the community (Gordey and Markpeace 2003). The subsurface soils in Beaver Creek consist of sand and gravel units with veneers of organic soils (Gordey and Markpeace 2013).

The Beaver Creek aquifer is used for both community and domestic water supply. Most of the wells in the Beaver Creek area indicate coarse sand and gravel with cobbles and small boulders to depths of at least 30 m (Tetra Tech 2006). The well logs also indicate that discontinuous lenses of finer-grained sediments persist throughout the area, the sediments are generally dominated by coarse alluvium. Some discontinuous permafrost is also interpreted to persist throughout the Beaver Creek area. Due to the variability of sediments in the Beaver Creek area, some areas may have significantly higher vulnerability to surface source of contamination than others. Regional groundwater flow in the Beaver Creek area is driven by infiltration in the upland areas to the west and southwest of Beaver Creek coupled with discharge to the Beaver Creek drainage (Tetra Tech 2013). The direction of groundwater flow is determined to be north to northeasterly (Tetra Tech 2006).

Materials encountered during drilling consisted of sand and gravel to a depth of 23 m bgs underlain by a silt, sand and gravel unit to a depth of 27 m bgs. A sand and gravel unit was encountered from 27 m bgs to the maximum extent of drilling (59.5 m bgs). The materials encountered and the well completion depth in the aquifer, suggest the well is completed in the same unconfined to semiconfined Beaver Creek aquifer as wells completed elsewhere in the community.

5.3.3 Well Summary

A copy of the well log for this well is included in the associated GIS map and database. The following table summarizes available data for the water well.

Table 5-9: Beaver Creek Health/Visitor Centre, Well 3964/3121-B Summary		
Well Construction Parameters	**Details**	**Source**
Date of construction	The well was completed by Double D Drilling Ltd. in September 2007	Tetra Tech 2008
Total well depth	59.5 m bgs	

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Table 5-9: Beaver Creek Health/Visitor Centre, Well 3964/3121-B Summary

Well Construction Parameters	Details	Source
Casing	6" (152 mm) ID steel casing	
Casing depth	58.3 m bgs	
Well screen	1.2 m 80 slot (2.03 mm) stainless steel well screen from 58.3 m bgs to 59.5 m bgs	
Static water level	14.7 m bgs (September 24, 2007)	
Sanitary seal	Bentonite surface seal to 6 m bgs	
Wellhead completion	We understand that the well was connected in general accordance with the Well Connection Standards for Typical YG Small Public Drinking Water Systems (FSC, Tetra Tech, 2008); however it was connected by pitless adapter rather than pitless unit.	Anecdotal Information from YG PMA circa 2008.
Wellhead stickup	Unknown	
Well rated capacity	7.6 L/s (100 IGPM)	Tetra Tech 2008
Well GUDI status	Non-GUDI	
Well Construction Comments:	Well was constructed to meet the Canadian Groundwater Association Well Construction Guidelines.	

5.3.4   Source Water Quality

As part of the well completion in September 2007, the drilling contractor collected a water sample and Tetra Tech reviewed the water chemistry result and noted the following:

- Water from Well 3964/3121-B was calcium-bicarbonate type with a pH of 8.3 and was considered to be hard with hardness measured at 150 mg/L (as $CaCO_3$) during the initial sampling event; and

- Water collected during the initial sampling event from Well 3964/3121-B met the GCDWQ for all the health-based and aesthetic parameters analyzed.

5.3.5   Water Treatment and Distribution

Table 5-10: Water Treatment and Distribution Details

Item	Details	Source
Owner/Operator	Government of Yukon	Tetra Tech 2008

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Table 5-10: Water Treatment and Distribution Details

Item	Details	Source
Water source	Groundwater	p.c. Nick Barnett 2017
Wells serving the system	Well 3964/3121-B	p.c. Martin Eckervogt 2017
Treatment type	Sediment filtration and GE membrane treatment	
Water users	YG employees, patients and tourists	
Delivery method	Connected directly to buildings	
Age of system/last known update	New well was drilled in 2007 and connected in 2008.	

5.3.6   Source Water Protection Planning

There is no source water protection planning in place for the Beaver Creek Health and Visitor Centre's Well 3964/3121-B in Beaver Creek. The vulnerability of the overburden aquifer underlying the community of Beaver Creek is variable due to variation in the sedimentary sequence. Implementing a source water protection plan for the community of Beaver Creek would provide a comprehensive approach to protecting this groundwater resource.

Potential sources of contamination to for Well 3964/3121-B have not been identified. Potential sources of contamination that were identified in the vicinities of the previously used supply wells during the site review in 2005 included:

- An effluent discharge field 18 m from the old Health Centre well;

- An indoor fuel storage tank located 20 m from the old Health Centre well;

- Various fuel, oil and paint drums on the Grader Station property located approximately 20 m from the old Health Centre well;

- As asphalt mix pile located on the nearby Grader Station property;

- An AST located at 19 m from the old Visitor Centre well ASTs;

- An active parking lot and the active highway (Alaska Highway) with potential for fuel and sewage spills from automobiles and recreational vehicles near the old Visitor Centre well; and

- Septic fields within 30 m of the well.

The new Well 3964/3121-B was drilled in a location selected to ensure the above-mentioned potential sources of contamination were adequately distanced from the wellhead to achieve at least 30 m setback, and to avoid being downgradient of PCOCs.

5.3.7   Water Supply Information Data Gaps

YG PMD has reviewed this summary and provided comments. To our knowledge, this system summary includes all available data and is accurate and up to date as of March 2017. Tetra Tech identified the following data gaps:

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- There is no source water protection planning for this groundwater resource. SWPP could be tied in with the planning completed for the WRFN source water supply and integrated with planning in other areas of Beaver Creek to create a comprehensive source water protection plan for the Beaver Creek Aquifer;

- Tetra Tech had recommended that the wells that previously supplied water to the Health Centre and the Visitor Centre be decommissioned in accordance with CGWA guidelines for well decommissioning; however, YG PMD did not confirm the completion of this work.

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