

## 5.5 Beaver Creek - Pool Centre Water Supply System

The Beaver Creek Pool Centre and the nearby the Community Club Building have their water supplied from a 40.5 m well (Well 3122-B), which was drilled in 2007 as part of the system upgrade work completed at the site. These facilities were previously supplied by a 19.2 m deep well (Well 3122-A), which, during the SPDWSA work completed by Tetra Tech in 2005, was found to have several deficiencies, including no surface sanitary seal, and poor surface completion of the wellhead (located in a pit below ground) (Tetra Tech 2006 and 2008). Well 3122 B was subsequently drilled to replace 3122 A. 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.

### 5.5.1 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 and data for the compilation.

### 5.5.2 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).

The lithology encountered at Well 3122-B indicates that the near surface soils consisted of sand and gravel to a depth of 18 m bgs, a silt and sand unit from 18 m to 25 m bgs, and a water-bearing sand and gravel unit from 25 to 45 m bgs (the maximum extent of the borehole). This is generally consistent with the lithology for the old Well 3122-A; however, the limited presence of fine-grained materials encountered at both Well 3122-A and 3122-B indicates that these two wells are most likely completed within a unconfined or semi-confined aquifer with limited protection from surficial sources of contamination (Tetra Tech 2006 and 2008). Results of the 24-hour constant rate pumping test conducted on Well 3122-B in September 2007 indicate an aquifer transmissivity of  $6.2 \times 10^3 \text{ m}^2/\text{day}$  and a hydraulic conductivity of  $3 \times 10^{-3} \text{ m/s}$ , respectively (Tetra Tech 2008).

The nearest up-gradient surface waterbody is approximately 1,100 m from Well 3122-B (Tetra Tech 2008).

### 5.5.3 Well Summary

The well log for the new well (Well 3122-B) serving the Beaver Creek Pool Centre Building (Building #3122) and the Community Club Building, Beaver Creek is provided in the GIS map and database portion of this project. The following table summarizes the completion characteristics of the well.

**Table 5-13: Beaver Creek Pool Centre, Well 3122-B Summary**

Well Construction Parameters	Details	Source
Date of construction	Well was completed by Double D Drilling Ltd. in August 2007	Well log
Total well depth	40.5 m bgs	
Casing	6" (152 mm) OD Steel Well Casing	
Casing depth	39.3 m bgs	
Well screen	1.2 m 120 slot (3.05 mm) stainless steel well screen from 39.3 m to 40.5 m bgs	
Static water level	12.2 m bgs (September 18, 2007)	
Sanitary seal	Bentonite sanitary seal to 6 m bgs	Tetra Tech 2008
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); except rather than a pitless unit it has a pitless adapter.	Anecdotal Information from YG PMD circa 2008.
Wellhead stickup	Unknown	Tetra Tech 2008
Well rated capacity	8.5 L/s (113 IGPM)	
Well GUDI status	Non-GUDI	
Well Construction Comments:	Well was constructed to meet Canadian Groundwater Association Well Construction Guidelines.	

#### 5.5.4 Source Water Quality

The key observations regarding the groundwater analysis of Well 3122-B on September 18, 2007 are summarized as follows (Tetra Tech 2008):

- Water from Well 3122-B was a calcium-bicarbonate type with a pH of 8.1;
- Water from this well was hard, with a hardness of 171 mg/L (as CaCO<sub>3</sub>);
- Water from Well 3122-B met all GCDWQ for health-based and aesthetic parameters on the date sampled and for the parameters tested; and
- The total copper concentration (<0.005 mg/L) was much less than the concentration (0.432 mg/L, sampled on June 15, 2005) from Well 3122-A. Both reported copper concentrations were below the GCDWQ AO of 1 mg/L.

## 5.5.5 Water Treatment and Distribution

**Table 5-14: Beaver Creek Pool Centre Water Treatment and Distribution Details**

Item	Details	Source
Owner/Operator	Government of Yukon	Tetra Tech 2006 p.c. Nick Barnett 2017 p.c. Martin Eckervogt 2017
Water source	Groundwater	
Well serving the system	Beaver Creek Pool Centre well (Well 3122-B)	
Treatment type	None	
Water users	YG employees and users of the swimming pool	
Delivery method	Piped (to the Pool Centre Building and the Community Club Building)	
Age of system/last known update	Unknown	

## 5.5.6 Source Water Protection Planning

There is no source water protection planning in place for the Pool Centre Well 3122-B in Beaver Creek. The limited presence of fine-grained materials indicates that Well 3122-B is most likely completed within an unconfined or semi-confined aquifer with some protection from surficial sources of contamination. 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.

## 5.5.7 Water Supply Information Data Gaps

Tetra Tech was involved in the system upgrade work at the Beaver Creek Pool Centre 2007 and 2008. 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:

- No SWPP is in place for this groundwater resource, Source water protection planning here could be incorporated into a greater Beaver Creek SWPP and provide comprehensive planning to protect the moderately vulnerable groundwater resource.
- Several upgrades on the water system including installation of a disinfection system, were recommended by Tetra Tech in 2006; however, it is our understanding that no updates have been completed to the system since 2006.