

## 5.2 Beaver Creek - Nelnah Bessie John School Water Supply System

Nelnah Bessie John (NBJS) School is located in the community of Beaver Creek in northwestern Yukon. NBJS School is served by a potable water supply system served by a groundwater well, Well 3100-C, located near the school building. The well was drilled in 2006 to replace wells 3100-A and 3100-B drilled in the 1950s and 1960s. The NBJS School water 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.

### 5.2.1 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.

### 5.2.2 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 NBJS School water supply system provides potable water to the school. The water well was completed in an unconfined sand and gravel aquifer. Sand and gravel extends from about 3.7 m bgs to the final depth of well completion (28.9 m bgs) and consists of water bearing sands and gravels with intermittent silty sand units. 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.

### 5.2.3 Well Summary

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

Table 5-7: Nelnah Bessie John School, Well 3100-C Summary		
Well Construction Parameters	Details	Source
Date of construction	The well was completed by Double D Drilling Ltd. in October 2006	Tetra Tech 2007
Total well depth	28.9 m bgs	

Table 5-7: Nelna Bessie John School, Well 3100-C Summary		
Well Construction Parameters	Details	Source
Casing	6" (152 mm) ID Steel Well Casing	
Casing depth	27.7 m bgs	
Well screen	1.2 m 60 slot (1.52 mm) stainless steel well screen from 27.7 m bgs to 28.9 m bgs	
Static water level	12.1 m bgs (October 2006)	
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); except rather than a pitless unit it has a pitless adapter.	Anecdotal Information from YG PMA circa 2008.
Wellhead stickup	Unknown	
Well rated capacity	6.9 L/s (90 IGPM)	Tetra Tech 2007
Well GUDI status	Non-GUDI	
Well Construction Comments:	Well was constructed to meet the Canadian Groundwater Association Well Construction Guidelines.	

### 5.2.4 Source Water Quality

As part of the well completion, Tetra Tech collected a water sample in October 2006 and reviewed the water chemistry results. Following are the key observations noted by Tetra Tech:

- Water quality met the GCDWQ for all the health-based and aesthetic parameters analyzed on the date sampled; and
- The water was characterized as calcium-bicarbonate type and considered hard with a measured hardness of 163 mg/L (as CaCO<sub>3</sub>).

## 5.2.5 Water Treatment and Distribution

Item	Details	Source
Owner/Operator	Government of Yukon	Tetra Tech 2007 p.c. Nick Barnett 2017 p.c. Martin Eckervogt 2017
Water source	Groundwater	
Wells serving the system (s)	Well 3100-C	
Treatment type	Charcoal filtration and water softening	
Water users	Nelnah Bessie John School	
Delivery method	Directly connected to school	
Age of system/last known update	New well was completed in 2006.	

## 5.2.6 Source Water Protection Planning

There is no source water protection planning in place for the NBJ School Well 3100-C in Beaver Creek. The interbedded nature of the fine sediments which persist in the area, and the thick unsaturated zone provides some limited aquifer protection from surficial sources of contamination (moderate vulnerability as indicated previously). 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 the NBJ School well have not been identified since completion of the well in 2006. Potential sources of contamination that were identified previously in the vicinity of the old wells 3100-A and 3100-B during the site review in 2005, included: an UST, a septic field and an abandoned uncapped well. The new well was located to ensure adequate distance from these potential sources of contamination.

## 5.2.7 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:

- There is no source water protection planning for this groundwater resource. The SWPP for the new school well could be tied in with the planning completed for the WRFN source water wells to increase the security of the entire Beaver Creek Aquifer; and
- Tetra Tech has not received documentation or confirmation of the decommissioning of wells 3100-A and 3100.