5.11 Burwash Landing - Firehall Water Supply System

The community of Burwash Landing is located on the Alaska Highway at km 1700, approximately 285 km northwest of Whitehorse, in an area known as the Shakwak trench between Kluane Lake and the steep slopes of the Kluane Range mountains. The Burwash Landing Firehall is currently served by a water supply system that delivers water from a 39.2 m deep well. The water system serves both the Firehall domestic water system and the fire truck fill and 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 water for human consumption.

5.11.1 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.

5.11.2 Hydrogeology

There was no log available for review for this well. Burwash Landing is underlain mostly by glaciofluvial sediments with a thin overlying veneer of silt (Rampton 1977). Water wells in the area are typically completed at depths ranging from 39 m bgs to 60 m bgs in sub permafrost aquifers.

Well logs for the nearby community wells (approx.. 500 m away) indicate that the wells are drawing water from a deep confined aquifer overlain by 42 m to 47 m of frozen clay and silt. Recharge to this aquifer is likely melting snow and glaciers, and precipitation on the eastern flank of the Kluane Range. At a depth of 39 m, the Firehall well is most likely completed within the same aquifer. The inferred presence of a significant confining layer provides protection of the aquifer from surface sources of contamination.

Groundwater flow direction in this area is inferred from topography and the proximity to surface water to be north to northeast towards Kluane Lake.

5.11.3 Well Summary

There is no well log available for Well 3204. The following table summarizes the known details of the well.

Table 5-28: Burwash Landing Firehall, Well 3204 Summary

Well Construction Parameters	Details	Source
Date of construction	Unknown	Tetra Tech 2006 p.c. Martin Eckervogt 2017 p.c. Nick Barnett 2017
Total well depth	39.2 m bgs (may be depth to the pump)	
Casing	Unknown	
Casing depth	Unknown	
Well screen	Unknown	
Static water level	Approximately 6.1 m bgs (measured on July 28, 2005)	

Table 5-28: Burwash Landing Firehall, Well 3204 Summary		
Well Construction Parameters	**Details**	**Source**
Sanitary seal	No record of sanitary seal installation	
Wellhead completion	The well is located in an enclosure off from the Firehall building	
Wellhead stickup	Below grade	
Well rated capacity	Unknown	
Well GUDI status	Potentially GUDI	Based on well construction
Well Construction Comments:	Well was not constructed to meet Canadian Groundwater Association Well Construction Guidelines.	

5.11.4 Source Water Quality

As part of the SPDWSA review conducted in 2005, Tetra Tech reviewed available groundwater chemistry data and collected an additional sample to test for identified parameters of concern (Tetra Tech 2006):

- The water quality results indicated that the water from Well 3204 was a sodium-bicarbonate type water with a pH of approximately 8.3 on the dates sampled;
- The water had a hardness of about 115 mg/L;
- The turbidity of the water from Well 3204 was high and ranged from 4.01 NTU to 11.1 NTU on the dates sampled. Health Canada recommends that groundwater sources provide water with turbidity less than 1.0 NTU and that water from GUDI sources have appropriate filtration and disinfection. Filtration is expected to achieve a turbidity level of 1.0 NTU for slow sand or diatomaceous earth filtration, 0.3 NTU for conventional direct filtration and 0.1 NTU for membrane filtration in 95% of samples between filter changes or per month with no measurements exceeding 3.0 NTU;
- On September 21, 2004, total iron concentration (0.45 mg/L) exceeded the GCDWQ AO of 0.3 mg/L, but from the subsequent sample collected on June 15, 2005 the total iron concentration decreased to 0.154 mg/L;
- On September 21, 2004, total manganese concentration (0.059 mg/L) exceeded the GCDWQ AO of 0.05 mg/L; but from the subsequent sample collected on June 15, 2005 the total manganese concentration decreased to 0.0467 mg/L;
- The water quality results indicated that the water from Well 3204 met all other GCDWQ health-based criteria and aesthetic objectives for the parameters analyzed;
- Chloride concentrations were reported to be low and are considered to be within the normal background ranges for groundwater in the area, suggesting that the aquifer from which the groundwater is obtained for the Burwash Landing Firehall is not under the influence of surface water sources or septic wastes; and
- At the time of the SPDWSA in 2005, the water was very turbid and a strong odour was noticed due to sulphide off-gassing.

5.11.5 Water Treatment and Distribution

Table 5-29: Burwash Landing Firehall 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	
Number of wells serving the system	Burwash Landing Firehall well (Well 3204)	
Treatment type	None	
Water users	Firehall	
Delivery method	Direct connection to Firehall	
Age of system/last known update	Unknown	

5.11.6 Source Water Protection Planning

There is no source water protection planning in place for the Burwash Landing Firehall water system. There is no record of GUDI assessment for the well.

During the 2005 SPDWSA, Tetra Tech identified one AST and one sewage eduction tank located within 30 m of the wellhead (Tetra Tech 2006). In addition, it was reported that a spill occurred on November 10, 1998 at a gas station in Burwash Landing near this site (Tetra Tech 2006). Approximately 3,800 L of diesel fuel spilled from Burwash Fuels when a valve was left on and the fuel ran down approximately 400 m towards Kluane Lake, which was likely within 100 m of the Firehall well (Tetra Tech 2006). Due to the proximity of the spill to the site, and the inferred confined and protected nature of the aquifer (based on an understanding of the lithology from other well logs for the area), it was not anticipated that the spill was a cause of concern to the water quality delivered from this well (Tetra Tech 2006).

Although the vulnerability of the aquifer in which this well is completed is considered to be low, a SWPP would provide a valuable tool for identifying, monitoring and managing risks to the wells and aquifer.

5.11.7 Water Supply Information Data Gaps

Tetra Tech has reviewed available data from YG Community Services and Kluane First Nation 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:

- 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; and
- No SWPP or GUDI assessment has been completed for Well 3204. Source water protection planning here could be incorporated with planning completed by KFN to create a comprehensive Burwash SWPP.