

5.9 Burwash Landing - KFN Administration and Jacquot Hall 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 area is gently but irregularly sloping to the northeast down towards Kluane Lake.

The KFN Administration Building and Jacquot Hall in Burwash are served by a groundwater well (KFN-J) located near the buildings. The 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.

5.9.1 Hydrogeology

Burwash Landing is underlain by glaciofluvial sediments with a thin overlying veneer of silt (Rampton 1977). Water wells in the area are typically completed at depths ranging from 45 m bgs to 60 m bgs in a sub-permafrost aquifer.

The groundwater well currently serving the Burwash KFN administration building, Well KFN-J, is completed in a confined sand and gravel overburden aquifer below a permanently frozen (permafrost) silt and clay unit. Groundwater flow direction in the area is north-northeast toward Kluane Lake.

None of the wells in Burwash Landing encountered bedrock; thus, depth to bedrock in the area is unknown. It is anticipated that the depth to bedrock may be up to several hundreds of metres based on the completion depth of KFN-L, a deep geothermal exploration well completed in a sand aquifer approximately 385 m bgs.

The groundwater flow direction is northeast from the topographic highs of the Kluane Range to the topographic low of Kluane Lake (Tetra Tech 2006).

Tetra Tech completed a semi-quantitative analysis of the aquifer vulnerability at KFN-J based on the methodology presented in the Technical Terms of Reference for Groundwater Studies (Ontario Ministry of Environment 2001). The ISI value for the aquifer at well KFN-J was 257 for the deep sub-permafrost aquifer. Aquifers with ISI values greater than 80 are considered to have low intrinsic susceptibility to surface sources of contamination (Ontario Ministry of Environment 2001), and the value of 257 calculated here indicates that the aquifer underlying the site has a low to very low vulnerability to potential surface-based contamination due to a highly impermeable layer of frozen, fine-grained materials overlying a deep confined aquifer.

5.9.2 Well Summary

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

Well Construction Parameters	Details	Source
Date of construction	Well was completed by Impact Drilling Ltd. in November 2009	Tetra Tech 2010
Total well depth	51.6 m bgs	
Casing	6" (152 mm) ID Steel Well Casing	

Table 5-24: KFN Burwash Landing Administration Building and Jacquot Hall, Well KFN-J Summary		
Well Construction Parameters	Details	Source
Casing depth	49.0 m bgs	
Well screen	2.6 m 80 slot (2.03 mm) well screen from 49.0 m bgs to 51.6 m bgs	
Static water level	9.3 m bgs (November 5, 2009)	
Sanitary seal	Bentonite grout surface seal to 6 m bgs	
Wellhead completion	Pitless Adapter	p.c. Keith Dickson 2017
Wellhead stickup	0.76 m ags	p.c. Keith Dickson 2017
Well rated capacity	2.82 L/s (37.2 IGPM)	Tetra Tech 2010
Well GUDI status	Non-GUDI	
Well Construction Comments:	Well was constructed to meet Canadian Groundwater Association Well Construction Guidelines.	

5.9.3 Source Water Quality

Upon completion of KFN-J in 2009, Tetra Tech collected a sample of the water to test for general water chemistry and potability. From the 2009 initial sampling results, the following key observations were noted:

- Groundwater from KFN-J was characterized as sodium-bicarbonate-sulphate type, with a pH of approximately 8.24 and was considered to be hard with a measured hardness of 132 mg/L (as CaCO₃);
- The manganese concentration, measured at 0.057 mg/L, slightly exceeded the GCDWQ AO of 0.05 mg/L; and,
- The water met all other GCDWQ health-based criteria and aesthetic objectives for all parameters measured.

5.9.4 Water Treatment and Distribution

Table 5-25: KFN Burwash Landing Administration Building and Jacquot Hall Water Treatment and Distribution Details

Item	Details	Source
Owner/Operator	Kluane First Nation	p.c. Keith Dickson 2017
Water source	Groundwater	
Wells serving the system	KFN-J	
Treatment type	Filtration and UV disinfection	
Water users	Users of the Administration Building and Jacquot Hall	
Delivery method	Well is connected directly to the building	
Age of system/last known update	Well was completed in 2009	

5.9.5 Source Water Protection Planning

KFN-J was drilled after the completion of the KFN Burwash Aquifer and Wellhead Protection Plan. The well is not included in the existing plan, but is located in the vicinity of KFN-C, which was replaced by KFN-J. KFN-J is likely completed in the same aerially extensive confined aquifer as other KNF wells, KFN-F, KFN-K, KFN M and KFN-N. The aquifer is highly confined and artesian pressure is observed in some of the wells. The well protection area would be very similar in shape and size to KFN-C as it replaces this well and is in the similar geological setting with similar demand. When the Aquifer and wellhead protection plan for the community is updated, this should be considered and included.

5.9.6 Water Supply Information Data Gaps

Tetra Tech has reviewed available data from YG Community Services and Kluane First Nation and noted the following data gaps or areas where the protection of the water source could be improved:

- KFN-J was drilled after the completion of the KFN Burwash Aquifer and Wellhead Protection Plan. The 2007 AWHPP should be updated to include this well.
- Tetra Tech recommended decommissioning of KFN-C and KFN-I in the vicinity of Jacquot Hall to protect the deep groundwater resource from surface sources of contamination. Tetra Tech has is not aware if this work has been completed or not.