

Aquifer Name: Houston Bedrock

Date of Mapping: September 2020

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## **A. AQUIFER DESCRIPTION FOR AQUIFER 0658**

### **A.1 CONCEPTUAL UNDERSTANDING OF HYDROSTRATIGRAPHY**

#### **A.1.1 AQUIFER EXTENTS**

The aquifer is located around the town of Houston, south of the Upper Bulkley River and east of the Morice River. The bedrock aquifer is bounded to the north by the Upper Bulkley River, in the west by the Morice River and a fault, in the south by the 900 m topographic elevation line and faults, and in the east by topography and faults. The faults that bound the aquifer are inferred to be impermeable, however this should be confirmed.

#### **A.1.2 GEOLOGIC FORMATION (OVERLYING MATERIALS)**

Overlying materials consist of Quaternary unconsolidated sediment. Overlying sediments may be coarse grained (Fraser ice-advance glaciofluvial) or fine grained (pre-Fraser sediments, Fraser ice-advance glaciolacustrine or Fraser till, see Hinnell et al., 2020 Figure 7E). Much of the overlying material consists of finer-grained sediments. Well records also indicate that there are lenses of sand and gravel intermixed within the clay or till package. At the surface, there is a veneer of post-glacial sediment localized within the valley bottom, composed of clean sand and gravel.

#### **A.1.3 GEOLOGIC FORMATION (AQUIFER) – 6B FACTURED CRYSTALLINE ROCK**

The bedrock aquifer consists of blocks of Cretaceous andesitic volcanic rocks of the Kasalka Group, Jurassic calc-alkaline volcanic rocks of the Telkwa Formation of the Hazelton Group, and the Eocene basaltic volcanic rocks of the Goosly Lake Formation within the Endako Group (Massey et al. 2005). Permeability is inferred to be associated with fractures.

#### **A.1.4 VULNERABILITY - MEDIUM**

Surficial geological mapping by Tipper (1976) indicates that much of the bedrock aquifer is covered by Fraser Glaciation till or fine-grained glaciolacustrine sediment. Well records indicate that the thickness of the clay or till units is variable, ranging from a few metres to nearly 100 m in some wells. Stumpf (2008) described the till in the area to contain vertical jointing and sub-horizontal fissility, which facilitates downward seepage of surface water to the aquifer. The vulnerability of the aquifer is classified as medium, where the bedrock is covered by Quaternary sediments and high where the aquifer outcrops at surface. The overall vulnerability of the bedrock aquifer to surface contamination is assessed as medium. However, where the bedrock is potentially exposed at the surface or in localized areas around the Morice River where permeable sand and gravels dominate the overburden, the risk of contamination is high.

## **A.2 CONCEPTUAL UNDERSTANDING OF FLOW DYNAMICS**

### **A.2.1 GROUNDWATER LEVELS AND FLOW DIRECTION**

Static water levels range from shallow (1.5 m) to deep (91.4 m). No provincial observation wells exist within the aquifer extents. Two springs are interpreted to be associated with the bedrock aquifer (see Hinnell et al., 2020 Figure 8B).

Static water levels in the well records suggest that the groundwater is a subdued representation of bedrock topography. Based on the conceptual understanding of groundwater flow and the observed springs, groundwater is interpreted to flow towards the Upper Bulkley and Morice rivers with potential upward seepage near the rivers.

### **A.2.2 RECHARGE**

Overburden cover is not continuous over the aquifer. Where overburden is thin or absent, recharge of the aquifer could occur via distributed infiltration of precipitation. In the areas where overburden is present, the aquifer may be recharged by infiltration from various overlying units, including the overlying Bulkley Buried Channel (0660) or the shallow surficial aquifer (0659) near the Upper Bulkley River where the Bulkley Buried Channel (0660) appears to be absent.

### **A.2.3 POTENTIAL FOR HYDRAULIC CONNECTION**

Groundwater is inferred to be hydraulically connected to Upper Bulkley and Morice Rivers, and possibly the Buck Creek. Groundwater in the bedrock may be hydraulically connected to the overlying Bulkley Buried Channel (0660) or the shallow surficial aquifer (0659) if the intervening fine-grained glaciolacustrine sediment is not present or thin between them. The bedrock aquifer may be hydraulically connected to several unnamed lakes.

## **A.3 WATER MANAGEMENT**

### **A.3.1 ADDITIONAL INFORMATION ON WATER USE AND MANAGEMENT**

Well records indicate that the water is fresh, clear, with no color, gas, or odor concerns. There are no other comments of concern noted in the well records. Stated yields in the well records range from 0.03 L/s to 3.2 L/s, with geometric mean of 0.20 L/s indicating a poorly productive aquifer with localized regions of moderate and high productivity.

Groundwater is used primarily for domestic purposes based on well records.

### **A.3.2 ADDITIONAL ASSESSMENTS OR MANAGEMENT ACTIONS**

No water availability or water budget studies have been completed in the area.

#### **A.4 AQUIFER REFERENCES**

Geographic datasets from the BC Data Catalogue, accessed August 2020 <https://data.gov.bc.ca/>

HINNELL, A. C., LENGYEL, T., FUNK, S. P., CLAGUE, J. J. & HAMMOND, Z. M. 2020. Vanderhoof and Houston Aquifer Mapping and Hydrostratigraphic Characterization. Water Science Series. Victoria, B.C.

MASSEY, N.W.D., MACINYRE, D.G., DESJARDINS, P.J. & COONEY, R.T. 2005. Geology of British Columbia. Ministry of Energy and Mines, BC Geological Survey, Geoscience Map 2005-3.

STUMPF, A. J. 2008. Till Geochemistry and Clast Lithology Studies of the Bulkley River Valley, West-Central British Columbia (parts of NTS 093L). Geoscience BC Report.

TIPPER, H. W. 1976. Geology of Smithers Map Area, British Columbia, 1:250000. Geological Survey of Canada, Open File 351.

#### **A.5 REVISION HISTORY**

Date	Version	Revision Class	Comments	Author
20031122	1	Major	Initial Mapping of Aquifer	W.S. Hodge
20061210	2	N/A	N/A	A.P. Kohut
20200909	3	Major	Remapping of Aquifer	Andrew Hinnell, P.Geo., Sean Funk, and Tibor Lengyel

Mapping by W.S. Hodge assumed to be initial mapping of aquifer. N/A – The extent of revisions implemented by A.P. Kohut not documented.