Aquifer Name: Topley Bedrock

Date of Mapping: September 2020

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A. AQUIFER DESCRIPTION FOR AQUIFER 0654

A.1 CONCEPTUAL UNDERSTANDING OF HYDROSTRATIGRAPHY

A.1.1 AQUIFER EXTENTS

The aquifer is located around the town of Topley, north of the Upper Bulkley River. The bedrock aquifer is bounded to the north by the 900 m topographic elevation line, in the west by a watershed boundary, in the south by the Upper Bulkley River, and in the east by Watson Creek.

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 Jurassic calc-alkaline volcanic rocks of the Telkwa Formation of the Hazelton Group, Jurassic aged granodioritic intrusive rocks of Topley Plutonic Suite, and the Eocene aged coarse-grained volcaniclastic rocks of the Endako Formation of the Nechako Plateau Group, alkaline volcanic rocks of the Goosly Lake Formation of the Endako Group, and andesitic volcanic rocks of the Kasalka Group. Permeability is inferred to be associated with fractures.

A.1.4 VULNERABILITY - HIGH

Surficial geological mapping by Tipper (1976) indicates that parts of the bedrock aquifer are covered by Fraser Glaciation till or fine-grained glaciolacustrine sediment, typically confined to around the valley floor. Well records indicate that the thickness of the clay or till units is somewhat variable, with thickness averaging 50 m. However, 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. Thus, the overall vulnerability of the aquifer to surface contamination is defined as high.

A.2 CONCEPTUAL UNDERSTANDING OF FLOW DYNAMICS

A.2.1 GROUNDWATER LEVELS AND FLOW DIRECTION

Static water levels range from moderate (15.2 m) to deep (82.3 m). No provincial observation wells exist within the aquifer extents. Several springs located along river terraces and one artesian well 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 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 River with upward seepage potential near the river.

A.2.2 RECHARGE

Overburden cover is not continuous over the aquifer (see Tipper 1976). 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 aquifer (0659).

A.2.3 POTENTIAL FOR HYDRAULIC CONNECTION

Groundwater is inferred to be hydraulically connected to Upper Bulkley River, and possibly Watson Creek. Groundwater in the bedrock may be hydraulically connected to the overlying Bulkley Buried Channel (0660) where the intervening fine-grained glaciolacustrine sediment is not present or thin. 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

There are no water quality concerns documented within this aquifer in well records. There were wells noted to be dry within the aquifer. Stated yields in the well records range from 0.03 L/s to 0.95 L/s, with geometric mean of 0.22 L/s indicating a poorly productive aquifer, with localized regions of moderate 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
20031116	1	Major	Initial Mapping of Aquifer	D.A. Lowen, P.Geo.
20200909	2	Major	Remapping of Aquifer	Andrew Hinnell, P.Geo., Sean Funk, and Tibor Lengyel

Mapping by D.A. Lower is assumed to be initial mapping.