Aquifer Name: Upper Bulkley Alluvial Aquifer

Date of Mapping: September 2020

Authors: Andrew Hinnell, Ph.D., P.Geo., Tibor Lengyel, M.Sc. and Sean Funk, Ph.D.

A. AQUIFER DESCRIPTION FOR AQUIFER 0659

A.1 CONCEPTUAL UNDERSTANDING OF HYDROSTRATIGRAPHY

A.1.1 AQUIFER EXTENTS

The aquifer is located along the Upper Bulkley River, extending from the town of Topley towards the town of Houston. The aquifer is bounded in the west by topography along the western banks of the Morice River, the northern boundary is bounded in parts by the Upper Bulkley River or topography, and by borehole logs, the eastern boundary is bounded by a watershed boundary, and the southern boundary is bounded in parts by the Upper Bulkley River, topography, and borehole logs. Around Buck Creek and near the confluence of the Upper Bulkley and the Morice rivers, the interpreted alluvial fans of the Morice River and the Buck Creek expand the aquifer to the south.

A.1.2 GEOLOGIC FORMATION (OVERLYING MATERIALS)

The Upper Bulkley Alluvial Aquifer is a surficial alluvial aquifer, and thus no overlying materials are present.

A.1.3 GEOLOGIC FORMATION (AQUIFER) – 1A UNCONFINED FLUVIAL

Aquifer 0659 consists of recent Holocene alluvial sediments occurring at surface. Borehole descriptions indicate that the material is typically clean sands and gravels.

A.1.4 VULNERABILITY-HIGH

The alluvial sands of the aquifer are exposed at the surface, and thus are deemed to have high vulnerability to surface contamination.

A.2 CONCEPTUAL UNDERSTANDING OF FLOW DYNAMICS

A.2.1 GROUNDWATER LEVELS AND FLOW DIRECTION

Static water levels in the aquifer range from relatively shallow (0.6 m) to moderately deep (22.6 m). One active provincial observation well (OW 386) exists within the aquifer extents. Artesian conditions were not reported for any of the wells in the aquifer.

Calculated groundwater surface elevations appear to correspond to topography, suggesting that the groundwater surface may be a subdued replica of the topography. Accordingly, groundwater is expected to flow towards the Upper Bulkley River.

A.2.2 RECHARGE

Recharge of the aquifer could occur via distributed infiltration of precipitation. It is also possible that the aquifer may be recharged by surface water features, like the Upper Bulkley River; however, further investigation is required.

A.2.3 POTENTIAL FOR HYDRAULIC CONNECTION

Groundwater may be connected to the surface water features such as the Upper Bulkley River. Furthermore, where not separated by fine grained (low permeability) sediments, it may also be hydraulically connected with the underlying aquifers (Houston Bedrock Aquifer [0658] and Bulkley Buried Channel [0660], see Hinnell et al. 2020, Figure 7A).

A.3 WATER MANAGEMENT

A.3.1 ADDITIONAL INFORMATION ON WATER USE AND MANAGEMENT

There were no water quality concerns recorded in the well records. Driller's well yield estimates range from between approximately 0.2 L/s to 37.9 L/s with a geometric mean of 2.3 L/s suggesting a moderately productive aquifer with localized pockets of both poorly and highly productive intervals. There were wells noted to be dry within the aquifer.

Where groundwater use records were available, the water wells were dominantly used for domestic water supply purposes.

A.3.2 ADDITIONAL ASSESSMENTS OR MANAGEMENT ACTIONS

Brown (1967) undertook a preliminary groundwater survey for the proposed pulp mill to review the feasibility of using groundwater at the mill. They concluded that there was a good likelihood of developing a well field capable of supporting the needs of the mill from the Upper Bulkley Alluvial Aquifer near either the Morice or the Upper Bulkley Rivers.

Brown and Erdman (1970) undertook an intrusive groundwater exploration for the proposed pulp mill. They identified an upper aquifer (equivalent to the Upper Bulkley Alluvial Aquifer [0659]) and a lower aquifer (equivalent to the Bulkley Buried Channel Aquifer [0660]). Both aquifers were found to be capable of meeting the required demand for the pulp mill.

A.4 AQUIFER REFERENCES

BROWN, W.L. 1967 Preliminary Groundwater Survey for Bulkley Valley Pulp & Timber Ltd., Proposed Pulp Mill at Houston B.C. Sandwell & Company Project No. 1676, November 1967.

BROWN, W. L., ERDMAN, R.B. 1970. Bulkley Valley Forest Industries Ltd. Groundwater Exploration for Proposed Pulp Mill at Houston, British Columbia. Sandwell and Company Ltd. December 1970.

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.

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
20200922	3	Major	Remapping Aquifer extents to match with surficial mapping	Andrew Hinnell, P.Geo., Tibor Lengyel and Sean Funk

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.