Aquifer Name: Castlegar Overburden Aquifer

Aquifer Number: 0501

Date of Mapping: February 2nd, 2023

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A. AQUIFER DESCRIPTION FOR AQUIFER 0501

A.1 CONCEPTUAL UNDERSTANDING OF HYDROSTRATIGRAPHY

A.1.1 AQUIFER EXTENTS

Aquifer 0501 is located along the Columbia River in the vicinity of Castlegar, British Columbia (see Figure 1; Lengyel et al. 2024). The east and west extents of the aquifer were delineated based on surficial geological mapping in the area and they coincide with the extent of mapped alluvial and glaciofluvial sediments (Fulton et al. 1984). To the south, aquifer 0501 is separated from aquifer 0483 by inferred bedrock outcrops which interrupt the glaciofluvial sediments in the Columbia River valley. Similarly, the northern boundary is separated from aquifer 1117 (located on the Kootenay River) by bedrock outcrop.

A.1.2 GEOLOGIC FORMATION (OVERLYING MATERIALS)

Borehole records indicate deposits overlying the aquifer are comprised of interlayered sands and gravels with clay, hardpan (interpreted as till), and fines (described as silt and clay). Permeable sands and gravels exist at ground surface in some regions. Silt, gravelly silt, boulders, till and clay zones exist in 89 well records with an average thickness of 19.6 m.

Most wells are deep (>30 m) and have been completed within glaciofluvial deposits.

A.1.3 GEOLOGIC FORMATION (AQUIFER) – SUBTYPE: 4B – CONFINED GLACIOFLUVIAL

Surficial mapping (Fulton et al. 1984) indicates that aquifer 0501 is comprised primarily of medium to coarse glaciofluvial deposits.

A.1.4 VULNERABILITY - MODERATE

While the permeability of the aquifer has not been tested, it is expected to be high based on the type of aquifer material (alluvial and glaciofluvial sand and gravel). Depth to groundwater is shallow to deep with an average depth to water of 25.0 m. Well records indicate that the aquifer is generally confined by thick sequences of till, silt, and/or clay. However, there are some regions of the aquifer (e.g., in the southwest, and in the Castlegar region in the north) that have permeable material (sand and gravel) present from the ground surface resulting in local areas of high vulnerability. The aquifer has been classified as a mixed aquifer (i.e., confined and unconfined), and the overall vulnerability of the aquifer has been assessed as moderate.

A.2 CONCEPTUAL UNDERSTANDING OF FLOW DYNAMICS

A.2.1 GROUNDWATER LEVELS AND FLOW DIRECTION

Static groundwater levels recorded in the provincial groundwater wells database (GWELLS) range from shallow (2.7 m) to deep (78.6 m). There is one provincial observation well (OW-074) within the aquifer. There are no artesian wells within the aquifer extents.

The Province has managed observation well 074 located in this aquifer since 1966. A maximum groundwater level of 26.3 m below ground level and a minimum groundwater level of 28.7 m below ground level was recorded in 2021.

The groundwater surface is interpreted to be a subdued representation of the topography, based on regional interpolation of groundwater surface elevations. Groundwater is interpreted to follow the topographic gradient and flow from high elevations near the edges of the aquifer to low elevations near the Columbia River with a southerly component influenced by the regional slope of the river valley.

A.2.2 RECHARGE

Recharge to the aquifer is likely from distributed infiltration of precipitation, snowmelt, slow downward leakage, and/or surface water features including the Columbia River and its tributaries. The infiltration of precipitation and snowmelt is expected to focus on areas where the overlying materials are thinner or coarse-grained. The aquifer may also be recharged by deep groundwater flow associated with mountain block recharge in adjacent mountain ranges via the underlying bedrock aquifers (0500, 0513, and 1283).

A.2.3 POTENTIAL FOR HYDRAULIC CONNECTION

Groundwater is inferred to be hydraulically connected to the Columbia and Kootenay rivers. The aquifer may also be hydraulically connected to the underlying bedrock aquifers (0500, 0513, and 1283). While inferred bedrock outcrops separate them, aquifers 0483, 0484, 0501, and 1117 are part of the same group of overburden aquifers along the Columbia and Kootenay Rivers.

A.3 WATER MANAGEMENT

A.3.1 ADDITIONAL INFORMATION ON WATER USE AND MANAGEMENT

Reported well yields for 113 of 163 (excluding 50 wells that were dry or had no reported well yield) wells within the aquifer range between 0.006 L/s and 139 L/s with a geometric mean of 2.1 L/s, indicating an aquifer with moderate productivity with localized zones of low and high productivity. No water quality or quantity concerns were noted in the water quality comments of the GWELLS database.

There is a mix of domestic and commercial/industrial, and production wells (Golf Course, Ootischenia Improvement District, and Village of Kinnard) based on land use and 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

Berardinucci J. and K. Ronneseth, 2002. Guide to Using the BC Aquifer Classification Maps for the Protection and Management of Groundwater. BC Ministry of Water, Land and Air Protection, Water Air and Climate Change Branch, Water Protection Section.

Geographic datasets from the BC Data Catalogue, accessed December 2022 https://data.gov.bc.ca/.

Groundwater Level datasets for Provincial Groundwater Observation Well Network from the Government of BC, accessed February 2023, https://governmentofbc.maps.arcgis.com/apps/webappviewer/index.html?id=b53cb0bf3f6848e79d66ffd09b74f00d

Fulton, R.J., Shetsen, I., and Rutter, N.W., 1984. Surficial geology, Kootenay Lake, British Columbia-Alberta. Geological Survey of Canada, Open File 1084, 1:1,000,000 scale.

Lengyel, T., Verma, S., Deri-Takacs, J., and Hinnell, A. 2024. Aquifer Mapping in the Kootenay/Boundary Region of British Columbia: Creston, Rossland, Castlegar, and Salmo. Water Science Series, WSS2024-05. Prov. B.C., Victoria B.C.

A.5 REVISION HISTORY

Date	Version	Revision Class	Comments	Author
20020308	1	Major	Initial mapping of aquifer	N/A
20221230	1	Major	Remapping and consolidation of aquifers	Tibor Lengyel, M.Sc., P.Geo., Simrat Verma, M.Sc., and Andrew Hinnell, Ph.D., P.Geo.

Note: Author of first mapping not available