Aquifer Name: Casino Overburden Aquifer

Aquifer Number: 0484

Date of Mapping: December 30, 2022

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A. AQUIFER DESCRIPTION FOR AQUIFER 0484

A.1 CONCEPTUAL UNDERSTANDING OF HYDROSTRATIGRAPHY

A.1.1 AQUIFER EXTENTS

Aquifer 0484 is located along the Columbia River with the southern extent delimited by the U.S. Border and is expected to extend across this boundary (see Figure 1; Lengyel et al. 2024). The rest of the aquifer was delineated based on surficial geological mapping of glaciofluvial sediments by Fulton et al. (1984). Aquifer 0484 is separated from aquifer 0483 and 1284 by inferred bedrock outcrops which interrupt the glaciofluvial sediments in the Columbia River and Beaver Creek valleys.

A.1.2 GEOLOGIC FORMATION (OVERLYING MATERIALS)

Based on surficial geological mapping (Fulton et al. 1984), there is no overlying sediment. Glaciofluvial sand and gravel occur at surface. Borehole logs are consistent with surficial mapping and show little to no material overlying the permeable sand and gravel layers, with some instances of fine sand and silt.

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

The aquifer is unconfined. The borehole logs indicate that the aquifer consists predominantly of sands and gravels. Some borehole logs indicate boulders intermittently throughout. Boreholes closer to the Columbia River report finer grained sands.

A.1.4 VULNERABILITY – HIGH

The depth to water varies from shallow to deep, with an average depth to water of 18.5 m. While the permeability of the aquifer has not been tested, it is expected to be high based on the type of aquifer material (sand and gravel), and proximity to the surface (at or near surface). The overall vulnerability of the aquifer has been qualitatively assessed as high.

A.2 CONCEPTUAL UNDERSTANDING OF FLOW DYNAMICS

A.2.1 GROUNDWATER LEVELS AND FLOW DIRECTION

Static water levels recorded in the provincial groundwater wells database (GWELLS) range from artesian to deep (73.2 m). One artesian well was recorded within the aquifer extents.

No provincial observation wells are within the aquifer extents.

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 flow primarily towards the Columbia River with a southerly component influenced by the regional slope of the river valley.

A.2.2 RECHARGE

Recharge to the aquifer could occur via direct infiltration of precipitation and snowmelt as the aquifer is exposed at surface. Much of the recharge is expected to occur in the spring associated with snowmelt. The aquifer may also be recharged by the Columbia River, as well as deep groundwater flow associated with mountain block recharge in adjacent mountain ranges via the underlying bedrock aquifers (0486, 1281, and 1282). However, spatial and temporal understanding of recharge mechanisms is uncertain and further investigation is required to confirm hydraulic connections.

A.2.3 POTENTIAL FOR HYDRAULIC CONNECTION

Groundwater is inferred to be hydraulically connected to the Columbia River. The aquifer may also be connected to the underlying bedrock aquifers (0486, 1281, and 1282). 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 17 of 36 wells (excluding 19 wells that had no reported well yield) within the aquifer range between 0.3 L/s and 47.3 L/s with a geometric mean of 5.7 L/s, indicating an aquifer with high productivity with localized zones of moderate productivity. No water quality or quantity concerns were noted in the GWELLS database.

The intended use of groundwater, where recorded, was for domestic and commercial purposes 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.

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.

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

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
20020227	1	Major	Initial mapping of aquifer	N/A
20221230	2	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