Aquifer Name: Paterson Overburden Aquifer

Aquifer Number: 1277

Date of Mapping: December 30, 2022

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A. AQUIFER DESCRIPTION FOR AQUIFER 1277

A.1 CONCEPTUAL UNDERSTANDING OF HYDROSTRATIGRAPHY

A.1.1 AQUIFER EXTENTS

The boundary of the aquifer near Paterson was delineated based on surficial geological mapping by Fulton et al. (1984) in the area and coincides with the extent of the alluvial fans (see Figure 1, Lengyel et al. 2024). Aquifer 1277 is interpreted to be bound primarily in the west, north, and east with bedrock outcrops with some loamy sand/till veneers in the southwest and northeast. In the south, the aquifer is bound by the U.S. border; however, the aquifer is expected to be continuous in this direction. The aquifer has limited extent in Canada but may be more extensive on the U.S. side.

A.1.2 GEOLOGIC FORMATION (OVERLYING MATERIALS)

Borehole logs indicate that that the coarse-grained materials may be covered by clay and till like material (0.6 to 7.0 m). Based on surficial geological mapping (Fulton et al. 1984), alluvial sediments (sand and gravel), comprising the aquifer, occur at surface with no overlying sediment.

A.1.3 GEOLOGIC FORMATION (AQUIFER) – SUBTYPE: 3 – ALLUVIAL

The borehole logs indicate that the aquifer consists of alluvial sands and gravels. While only a single aquifer is interpreted, the shallower and deeper coarser grained units at places are locally interspersed with finer-grained (clay and silt) lenses.

A.1.4 VULNERABILITY – HIGH

Depth to groundwater is shallow. While the permeability of the aquifer has not been tested, it is expected to be high based on the type of aquifer material (alluvial sand and gravel). The alluvial sands and gravels are at surface or near surface. The aquifer varies between unconfined and confined depending on the local presence of clay lenses. 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) are shallow (1.5 m to 7.9 m). No provincial observation wells and no wells with artesian conditions exist 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 toward Little Sheep Creek at the valley bottom, with a southerly component toward the U.S. border influenced by the slope of the 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 is inferred to be hydraulically connected to Little Sheep Creek and its tributaries and therefore may be recharged by these surface water features. The aquifer may also be recharged by deep groundwater flow associated with mountain block recharge in adjacent mountain ranges via the underlying bedrock aquifer (1281). However, spatial and temporal understanding of the 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 Little Sheep Creek. The aquifer may also be connected to the underlying bedrock aquifer (1281).

A.3 WATER MANAGEMENT

A.3.1 ADDITIONAL INFORMATION ON WATER USE AND MANAGEMENT

Four of the five wells produced water with yields ranging from 0.6 to 1.5 L/s (excluding one well that no yield data recorded), with a geometric mean of 0.92 L/s, indicating an aquifer with moderate productivity. There were no water quality concerns reported in the water quality comments of the GWELLS database.

The intended use of groundwater, where recorded, was for domestic 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
20221230	1	Major	Initial Mapping of Aquifer	Tibor Lengyel, M.Sc., P.Geo., Simrat Verma, M.Sc., and Andrew Hinnell, Ph.D., P.Geo.