Aquifer Name: Norns Creek Overburden Aquifer

Aquifer Number: 1276

Date of Mapping: December 30, 2022

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A. AQUIFER DESCRIPTION FOR AQUIFER 1276

A.1 CONCEPTUAL UNDERSTANDING OF HYDROSTRATIGRAPHY

A.1.1 AQUIFER EXTENTS

The aquifer is north of Castlegar along Norns Creek (see Figure 1; Lengyel et al. 2024). The aquifer boundary was delineated based on the extents of glaciofluvial sediments mapped using the Government of British Columbia (B.C.) provincial terrain inventory mapping file. The northwestern boundary near Norns Creek Falls and the southern boundary toward Castlegar are based on inferred bedrock outcrops and a steep decline in topographic elevations. Aquifer 1276 was delineated in the east, where two bedrock knolls and a topographic divide appear to separate the aquifer from Aquifer 1117.

A.1.2 GEOLOGIC FORMATION (OVERLYING MATERIALS)

Based on terrain inventory mapping, glaciofluvial sand and gravel is expected at surface with no overlying material. However, some borehole logs indicate variable thickness of till-like materials and/or clay at surface (3 to 8 m).

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

Based on boreholes, the aquifer consists of glaciofluvial sands and gravels. While only a single aquifer is interpreted, shallower and deeper coarser-grained units are observed in some borehole lithology logs, which are locally interspersed with finer-grained (clay and silt) lenses. Surficial mapping in the area (Fulton et al. 1984) indicates primarily sandy till at ground surface.

A.1.4 VULNERABILITY – HIGH

Depth to groundwater varies from shallow to moderately shallow. While the permeability of the aquifer has not been tested, it is expected to be high based on the type of aquifer material (glaciofluvial sand and gravel). The glaciofluvial sands and gravels are at surface or near surface. While the aquifer is unconfined, clay lenses are inferred to exist based on borehole logs. These clay lenses are expected to reduce aquifer vulnerability on a small local scale. 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 shallow (1.2 m) to moderately shallow (16.2 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. Locally groundwater is interpreted to flow toward Norns Creek, with a southerly component toward Castlegar influenced by the regional 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 Norns Creek and its tributaries and therefore may be recharged by these surface water features. However, spatial and temporal understanding of this recharge mechanism 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 Norns Creek and tributaries. The aquifer may also be connected to the underlying bedrock aquifer (0513).

A.3 WATER MANAGEMENT

A.3.1 ADDITIONAL INFORMATION ON WATER USE AND MANAGEMENT

Ten of the 12 wells (excluding two wells that were dry or had no data reported) produced water with yields ranging from 0.3 to 5.0 L/s, with a geometric mean of 0.9 L/s indicating an aquifer with moderate productivity with localized areas of high productivity. The dry wells were the easternmost wells towards the bedrock knolls supporting separation from Aquifer 1117. No water quality concerns were 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.