Aquifer Name: Nelson Overburden Aquifer

Aquifer Number: 1278

Date of Mapping: December 30, 2022

Authors: Tibor Lengyel, M.Sc., P.Geo., Simrat Verma, M.Sc., and Andrew Hinnell, Ph.D., P.Geo.

A. AQUIFER DESCRIPTION FOR AQUIFER 1278

A.1 CONCEPTUAL UNDERSTANDING OF HYDROSTRATIGRAPHY

A.1.1 AQUIFER EXTENTS

The aquifer is in the vicinity of Nelson, British Columbia (see Figure 1; Lengyel et al. 2024). The aquifer boundary was delineated based on surficial geological mapping by Fulton et al. (1984). The mapped boundaries were adjusted based on topography (800 metres above sea level elevation line) in the east, south, and west coinciding with the extent of well development in the area. The West Arm of the Kootenay Lake forms the northern aquifer boundary. The aquifer was delimited in the south by an inferred bedrock outcrop.

A.1.2 GEOLOGIC FORMATION (OVERLYING MATERIALS)

Based on surficial geological mapping (Fulton et al. 1984), sandy loam, loamy till, and sandy till occurs at the surface. Borehole logs indicate that in some areas the sands and gravels comprising the aquifer may be covered by between 0.3 and 42.9 m of clay, hardpan, boulders, or till-like material, which is consistent with the surficial units mapped by Fulton et al. (1984).

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

The borehole logs indicate that the aquifer consists predominantly of sands and gravels.

A.1.4 VULNERABILITY – HIGH

Depth to groundwater varies from shallow to moderately deep, with an average depth to water of 10.6 m. 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) range from artesian to moderately deep (53 m). No provincial observation exists within the aquifer extents. One well indicated artesian conditions.

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 toward Kootenay Lake in the north.

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. Overlying minor tributaries of Kootenay Lake may also recharge the aquifer. The aquifer may also be recharged by deep groundwater flow associated with mountain block recharge in adjacent mountain ranges via the underlying bedrock aquifer (0511). 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 Kootenay Lake and tributaries. The aquifer may also be connected to the underlying bedrock aquifer (0511).

A.3 WATER MANAGEMENT

A.3.1 ADDITIONAL INFORMATION ON WATER USE AND MANAGEMENT

Twenty-six of the 29 wells (excluding three that had no reported well yield) produced water with yields ranging from 0.04 to 15.1 L/s, with a geometric mean of 0.97 L/s indicating an aquifer with moderate productivity. No water quality or quantity concerns were noted 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.