Aquifer Name: Sunset Creek Overburden Aquifer

Aquifer Number: 0592

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Authors: Tibor Lengyel, M.Sc., P.Geo., Judit Deri-Takacs, Ph.D., and Andrew Hinnell, Ph.D., P.Geo.

A. AQUIFER DESCRIPTION FOR AQUIFER 0592

A.1 CONCEPTUAL UNDERSTANDING OF HYDROSTRATIGRAPHY

A.1.1 AQUIFER EXTENTS

The aquifer is in the Sunset Creek area, north of Groundbirch, between the Pine and Kiskatinaw rivers. The aquifer is bound to the north by a combination of the extent of the Sunset paleovalley (Hickin and Best 2013) and the 15 m depth-to-bedrock contour line (Monahan et al. 2018). The western boundary follows the Pine River, while the southern boundary was based on the 15 m depth-to-bedrock contour (Monahan et al. 2018) (Lengyel et al. 2023, Figure 1). The eastern boundary of the aquifer is uncertain due to lack of information on the hydraulic connection between aquifers 0592, 0594, and 0596.

A.1.2 GEOLOGIC FORMATION (OVERLYING MATERIALS)

The aquifer is overlain by glaciolacustrine sediments and till. Fourteen of the 18 wells associated with the aquifer reported low-permeability, fine-grained material (clay, silt) on the surface, and three reported high-permeability, coarse-grained (sand, gravel) sediments. The thickness of the overlying material is generally more than 15 meters.

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

The aquifer consists of fine- to medium-grained sand and gravel interpreted to be Late Wisconsinan glaciodeltaic origin. The aquifer is interpreted to be a confined aquifer based on the overlying material thickness. The coarse-grained sediments may not be continuous throughout the entire aquifer extent due to glacial erosion.

A.1.4 VULNERABILITY

Depth to groundwater varies from shallow to moderately shallow. Hydraulic conductivity was estimated to range between 60 and 130 m/d at well EERI-1 (Goetz 2021). Surficial mapping by Reimchen (1980) and borehole logs indicate that the glaciodeltaic aquifer is covered by fine-grained sediments in the east and medium- to coarse-grained materials of variable thickness in the west. The overall vulnerability of the aquifer to surface contamination has been qualitatively assessed to be 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 (1.2 m) to moderately shallow (21.3 m). Artesian conditions were encountered at research well EERI-1 (Goetz 2021). 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 toward the Kiskatinaw and Pine rivers.

A.2.2 RECHARGE

Recharge to the aquifer could occur via distributed infiltration of precipitation and snowmelt particularly where the aquifer is in a topographically elevated position and/or where coarse-grained materials associated with the aquifer occur at the surface. Groundwater in the aquifer is recharged by precipitation (mainly occurring in the spring and fall seasons) within the aquifer area (Baye et al. 2016). Goetz (2021) delineated recharge and discharge areas and concluded that these are consistent with the hypothesis that topographically elevated areas are recharge areas, whereas valleys are discharge areas. The aquifer may also be recharged by the overlying minor tributaries of the Kiskatinaw and Pine rivers; however, the spatial and temporal understanding of these recharge pathways are uncertain and further investigation is required to evaluate these hydraulic connections.

A.2.3 POTENTIAL FOR HYDRAULIC CONNECTION

Groundwater is inferred to be hydraulically connected with the underlying bedrock aquifers (0589 and 0595) where they are not separated by layers of fine-grained sediment. The aquifer may also be hydraulically connected to overburden aquifer 0596, which is located east of 0592.

A.3 WATER MANAGEMENT

A.3.1 ADDITIONAL INFORMATION ON WATER USE AND MANAGEMENT

Baye et al. (2016) reported exceedances for arsenic, iron, manganese, sulphate, and hardness in some of the overburden wells within the extent of aquifer 0592. Stated yields in the well records range from 0.3 to 2.5 L/s, with a geometric mean of 0.7 L/s indicating moderate productivity. Groundwater is used primarily for domestic purposes (12 of 18 wells), based on the GWELLS database.

A.3.2 ADDITIONAL ASSESSMENTS OR MANAGEMENT ACTIONS

Goetz (2021) concluded that the buried-valley aquifer receives 99% of its inflow from the weathered bedrock, and that groundwater in the aquifer exits through the Kiskatinaw River.

A.4 AQUIFER REFERENCES

Baye, A., Rathfelder, K., Wei, M., and Yin, J., 2016. Hydrostratigraphic, hydraulic and hydrogeochemical descriptions of Dawson Creek-Groundbirch areas, Northeast BC. Victoria, Prov of B.C. Water Science Series 2016-04.

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A.5 REVISION HISTORY

Date	Version	Revision Class	Comments	Author
2011	1	Major	Initial mapping of aquifer	Lowen Hydrogeology Consulting Ltd. 2011.
02/10/2023	2	Minor	Aquifer boundaries updated to reflect aquifer extent based on updated conceptual model	Tibor Lengyel, M.SC., P.Geo., Judit Deri-Takacs, Ph.D., Andrew Hinnell, Ph.D., P.Geo.