Aquifer Name: Groundbirch Buried Valley Aquifer

Aquifer Number: 0590

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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 0590

A.1 CONCEPTUAL UNDERSTANDING OF HYDROSTRATIGRAPHY

A.1.1 AQUIFER EXTENTS

The aquifer is in the Groundbirch area, between the Pine and Kiskatinaw rivers. The aquifer is bound to the north, south, and east by a combination of the Groundbirch paleovalley extent (Hickin and Best 2013) and the 15 m depth-to-bedrock contour line (Monahan et al. 2018). The western boundary follows the 640 m topographic elevation contour east of the Pine and Murray rivers where the glaciofluvial coarse sediments were inferred to pinch out (Lengyel et al. 2023, Figures 1 and 5F). The aquifer is not expected to be continuous through the valley of the Pine River. The boundary is uncertain in the northeast and southeast as the boundaries of the buried channel are uncertain here. The eastern boundary of the aquifer is uncertain due to lack of information on the hydraulic connection between aquifers 0590, 0594, and 0596. The coarse-grained sediments may not be continuous throughout the entire aquifer extent due to glacial erosion.

A.1.2 GEOLOGIC FORMATION (OVERLYING MATERIALS)

The aquifer is overlain by eolian, glaciolacustrine, alluvial, and glaciofluvial sediments in the west, and by glaciolacustrine deposits in the east. Eolian sediments consists of sand and silt, alluvial and glaciofluvial sediments consist of sand, silt, and gravel, and glaciolacustrine sediments consist of silt and clay. Twenty-seven of the 41 wells associated with the aquifer reported low-permeability, fine-grained material (clay, silt, till), four reported medium-permeability (sand with fines), and four reported high-permeability (coarse-grained sand, gravel) sediments at surface.

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

The aquifer consists of fine- to medium-grained sand and gravel interpreted to be of Late Wisconsinan glaciodeltaic origin.

The aquifer is interpreted to be a confined aquifer, with “windows” in the confining layer where sediments are relatively coarse-grained.

A.1.4 VULNERABILITY

Depth to groundwater varies from shallow to moderately deep. The permeability of the aquifer has not been tested, but it is expected to be high based on the type of the dominant aquifer material (sand and gravel). Permeability could be spatially variable. Surficial mapping by Reimchen (1980) and borehole logs

indicate that the glaciodeltaic aquifer is covered by fine-grained and medium- to coarse-grained materials of variable thickness. The overall vulnerability of the aquifer to surface contamination has been qualitatively assessed to be moderate, except where overlying materials are relatively coarse-grained and thus the aquifer vulnerability is interpreted to be 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 (2.4 m) to moderately deep (53.9 m). There is one active provincial observation well (OW-445, Well Tag Number [WTN] 106675) and one inactive provincial observation well (OW-110, WTN 22824).

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, Pine, and Murray 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 (i.e., eastern portion of the aquifer) and where coarse-grained materials occur at the surface. Baye et al. (2016) concluded that groundwater in the aquifer is recharged by precipitation (typically occurring in the spring and fall seasons). 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 may be hydraulically connected with minor tributaries of the Kiskatinaw and Pine rivers, as well as with wetlands located in the western portion of the aquifer extent, however, further investigation is required to confirm the magnitude and level hydraulic connectivity. Groundwater is also inferred to be hydraulically connected with the underlying bedrock aquifers (0591 and 0595), where these are fractured, and where they are not separated by layers of fine-grained sediment. The aquifer may also be hydraulically connected to overburden aquifer 0596.

A.3 WATER MANAGEMENT

A.3.1 ADDITIONAL INFORMATION ON WATER USE AND MANAGEMENT

Baye et al. (2016) reported exceedances for arsenic, iron, manganese, and hardness in some of the overburden wells within the extent of aquifer 0590. Stated yields in the well records range from 0.007 to 6.3 L/s, with a geometric mean of 0.5 L/s indicating moderate productivity with localized zones of both low and high productivity. Groundwater is used primarily for domestic purposes (28 of 41 wells), based on the GWELLS database.

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

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.