

Memorandum

RE: Summary of the Nicholson Area Groundwater Monitoring Program

TO: Hamish Kassa (CSRD)

DATE: November 6, 2014

FR: Bryer Manwell, M.Sc. P.Eng.

REFERENCE: 14-024-18 – M2

This memo provides a summary of the following:

- more detail on aquifer characterization, depth to ground water, directional flow of groundwater, the nature of the groundwater in the 3 specific subdivisions; and
- Provide details on in-home testing of water, what are the minimum parameters.

These excerpts are paraphrased from the 2013 annual report.

Nicholson Hydrogeology

There are two British Columbia Ministry of Environment (MoE) mapped aquifers over the Nicholson area, aquifer 454 and aquifer 450. Both are considered unconsolidated surficial aquifers comprised of sand and gravel. Aquifer 454 is part of the regional Columbia River Alluvial Aquifer system and is approximately 4 km² in area. It is classified by the MoE as having moderate demand, moderate productivity and high vulnerability. The Canyon Creek Subdivision is located atop Aquifer 454, and the depth to groundwater for wells in the Canyon Creek area averages approximately 7 m (23 ft) below ground surface (bgs). Two provincially registered well logs indicate the aquifer is about approximately 35 m (115 ft) thick. The regional groundwater flow direction in this aquifer is southeast to northwest, sub-parallel to the Columbia River. The estimated hydraulic gradient of the regional Columbia River Aquifer in the vicinity of Nicholson is very low, at approximately 0.08%.

Aquifer 450 is a local-scale alluvial fan aquifer approximately 3.3 km² in area and feeds into the regional Columbia River Aquifer System. The local groundwater flow direction in Aquifer 450 is inferred to be westerly before the flow joins the regional system. Well logs and a topographic map indicate that the calculated hydraulic gradient of Aquifer 450 is much steeper than the regional hydraulic gradient, and is estimated to be 5%, meaning groundwater will flow more quickly through aquifer 450 compared to the regional aquifer 454.

Aquifer 450 is classified as having a low demand, moderate productivity, and moderate vulnerability to contamination. Borehole logs for water wells screened in Aquifer 450 indicate that the aquifer is a semi-confined gravel aquifer. The Habart and Nicholson subdivisions are located atop Aquifer 450. Based on well logs available from the B.C. Water Resource Atlas, the average depth to water in wells in the Habart Subdivision is approximately 17 mbgs, and the average well depth is 26 mbgs (MOE 2014). The average depth to water in wells in the Nicholson Subdivision is approximately 10 mbgs, and the average well depth is 20 mbgs (MOE 2014). A study of aerial photographs for the Site (MOE 2012) suggests that the Habart Subdivision is located on the Stacy Creek fan, whereas the Nicholson Subdivision is located on the inside bend of a meander of the Columbia River and may be influenced by waters from both aquifers.

In-home Water Quality Testing

We recommend the following septic associated water quality parameters to be sampled from domestic wells on a regular basis to monitor the degree of impact at the domestic wells:

- anions (bromide, chloride, fluoride, and sulphate);
- nutrients: ammonia (as N), nitrate (as N), nitrite (as N), orthophosphate, dissolved phosphorus; and
- bacteriological: *Escherichia coli*, fecal coliforms, total coliforms.

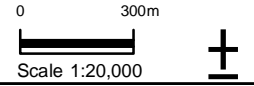
Town of Golden



NICHOLSON AQUIFER

Legend

- House Point
- Aquifer
- Service Area
- Parcel Boundary
- Municipality
- Parks



Columbia Shuswap Regional District
781 Marine Park Dr NE
Salmon Arm, BC V1E 4P1
Date: 11/7/2014
No representation or warranty is made as to the accuracy of the information.

