western water
ASSOCIATES LTD
Consultants in Hydrogeology and Environmental Science

Nodding Hill Residential Development
Phase 2 Groundwater Assessment

Prepared for:

Nodding Hill Developments Ltd.
7601 McLennan Road
Vernon, BC,
V1B 3S7

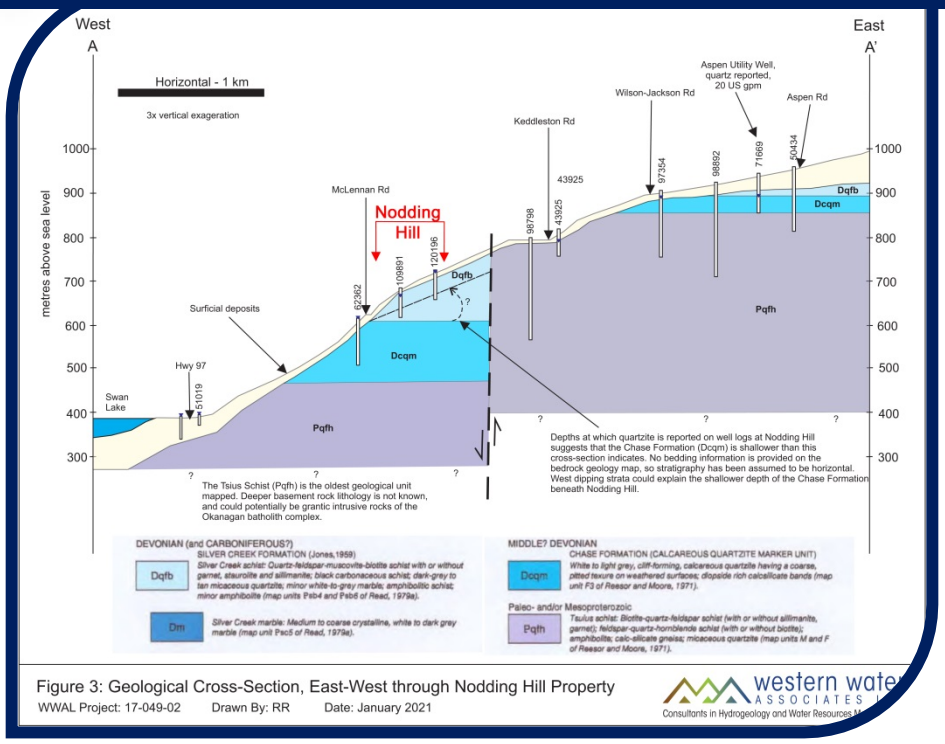


Figure 3: Geological Cross-Section, East-West through Nodding Hill Property
WWAL Project: 17-049-02 Drawn By: RR Date: January 2021
western water ASSOCIATES LTD
Consultants in Hydrogeology and Water Resources

October 2021
Project: 17-049-02VR

western water ASSOCIATES LTD
Consultants in Hydrogeology and Environmental Science

October 25, 2021 Project: 17-049-02VR

Nodding Hill Developments Ltd.
7601 McLennan Road
Vernon, BC,
V1B 3S7

Re: Nodding Hill Residential Development Phase 2 Groundwater Assessment, Regional District of North Okanagan, near Vernon, B.C.

This report presents the results of the Phase 2 hydrogeological assessment completed by Western Water Associates Ltd. (WWAL) of groundwater resources in the Nodding Hill area. The Nodding Hill area (the "site") is comprised of three properties located at 7505, 7601 and 7605 McLennan Road, Vernon, B.C., and is situated within the Regional District of North Okanagan (RDNO), Electoral Area "C". These properties form an area of approximately 30.74 hectares. The site is currently zoned a mixture of Country Residential (CR) and Non-Urban (NU) and is subject to an in-stream Rezoning and OCP amendment application to amend land use designation to Small Holdings (SH) in order to facilitate a proposed +/- 17 Lot development with lot sizes of 1.0 – 2.0 hectares, each serviced by a private drilled well and private on-site septic.

Expanding on our Phase 1 study conducted in 2017, the objective of this assessment was to identify individual existing drilled wells that satisfy the RDNO Subdivision Servicing Bylaw 2600 regarding water quality, quantity and year-round availability of groundwater for subdivision servicing purposes, and to assess the effect of proposed development on the underlying Aquifer 351. At present there are 18 wells on the site, all of which are completed in Aquifer 351.

This Phase 2 assessment involved site inspection, contacting adjacent land owners, review of well logs and water licenses in the area, review of adjacent land and water uses, review of Ministry of Environment aquifer mapping, bedrock geology mapping, climate data, review of historic engineering assessments including the 2007 Associated Engineering and 2020 Golder reports, review of the proposed development plan, design and implementation of an extensive well test pumping program, and the collection of onsite groundwater levels for nearly one year.

Our assessment indicates that there are geological and hydrogeological differences between the Nodding Hill site and properties to the east in the Keddleston Road area and beyond. The trace of a mapped bedrock fault is present between the two areas, with different geological units juxtaposed on either side of the fault zone. The hydrogeological significance of this is that the bedrock under the Nodding Hill site forms a more productive aquifer, and although well yields are still variable owing to the complexities of fractured bedrock aquifer systems, the factures appear well-connected and extensive throughout the area.

The 2020 pumping test program was conducted in October of 2020 and entailed 72-hour constant rate pump tests on five onsite wells. Four of these wells were pumped at 1.25 US gpm to determine if each well could individually meet RDNO Bylaw yield requirements, and one centrally located well was pumped at a higher rate of 30 US gpm to simulate an aquifer withdrawal equivalent to 25 domestic wells being

operated at the RDNO Bylaw requirement at the same time. Water level monitoring was conducted in 11 onsite and offsite wells, and laboratory analysis conducted on four water samples. Multiple water level transducers were installed in wells onsite to monitor water levels prior to, during, and after the testing program; these transducers remain in onsite wells and continue to collect water level data.

In summary, 15 of the 18 existing wells satisfy RDNO Bylaw water quantity requirements for drilled wells providing a source of domestic potable water. Sampled wells meet, or in one case can be readily treated to meet, RDNO Bylaw requirements for potable water standards.

The results of our assessment indicate that sufficient ground water resources exist on the site to support the rezoning application for development to be serviced by private wells without negatively impacting existing wells in the neighbourhood. Full recovery was not observed in some of the onsite wells monitored following the extended (72-hour) high-rate (30 US gpm) pumping test. This result is not unexpected as the test was completed during a time of year when minimal aquifer recharge is occurring, and the fact that 2021 (at least through August), has been an abnormally dry year.

We recommend development proceed with an initial phase of 10 lots at the north end of the property (Figure 4) while groundwater levels in multiple wells onsite continue to be monitored. Longer-term monitoring data would be used to develop a better understanding of seasonal groundwater level fluctuations, groundwater recharge and inform an assessment of sustainable water usage for future phases of development to the south. We believe this is an evidence and science-based approach to development involving longer-term water level data to support decision making for future phases of development.

We trust that the professional opinions and advice presented in this document are sufficient for your current requirements. Should you have any questions, or if we can be of further assistance in this matter, please contact the undersigned.

WESTERN WATER ASSOCIATES LTD.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
R. M. RHODES
#32839
GEOSCIENTIST
27-Oct-2021

Ryan Rhodes, P.Geo.
Senior Hydrogeologist

Reviewed by:

Douglas Geller, M.Sc., P.Geo
Principal Hydrogeologist

TABLE OF CONTENTS

List of Figures

Within Text

List of Tables

List of Appendices

1. INTRODUCTION

Western Water Associates Ltd. (WWAL) is pleased to provide this hydrogeological assessment of groundwater resources to support a rezoning application, in the Regional District of North Okanagan, Electoral Area "C". The purpose of this study is to evaluate the availability of groundwater supplies for future subdivision should rezoning be approved, and to identify existing onsite wells that satisfy RDNO bylaw requirement for subdivision servicing purposes. Groundwater supplies were evaluated against the requirements of Regional District of North Okanagan (RDNO) Bylaw 2600 regarding water quality, quantity and year-round availability of groundwater. The civic addresses and zonings of the Subject Property follow, and legal descriptions are provided on site plans attached to this report:

- 7505 McLennan Road; Country Residential
- 7601 McLennan Road; Non-Urban
- 7605 McLennan Road; Non-Urban

1.1 Project Description and Background

The area being considered in this report consists of three properties forming an overall area of approximately 30.74 hectares (the "subject property" or the "site"). The southern boundary of the site approaches City of Vernon boundary at the Foothills Neighbourhood. A development of +/- 17 Lots with lot sizes of 1.0 – 2.0 hectares with each serviced by private drilled well and private on-site septic is proposed for the site.

In 2017, WWAL completed an initial hydrogeological assessment in support of a rezoning application for the subject property (WWAL 2017). At that time, five wells were present on the property, and in June/July of that year, WWAL oversaw a pumping test program on two of the wells and monitored water levels in additional wells to assess well interference. Water quality samples were collected at the end of each test and submitted for laboratory analysis. Based on our assessment we concluded that there were sufficient groundwater resources present to support development of +/- 15 lots using individual wells. Subsequent to this report, the RDNO held a public meeting on the proposed rezoning and determined that additional information on groundwater supplies was needed in order to inform their decision on the rezoning application.

Late in 2019, the RDNO retained Golder Associates to complete an assessment of Groundwater Availability in the Keddleston area (Golder 2020), and specifically, of groundwater availability from provincially mapped Aquifers 349, 350 and 351. A similar assessment was completed by Associated Engineering/Golder in 2007 (Associated Engineering 2007). The 2020 study was based on information obtained from reported well logs, aquifer maps, climate data and a previous water budget study for Aquifer 349 (Smerdon et. al 2009). Golder developed an analytical water budget for the three aquifers based on an assumed number of existing wells, estimates of residential water use, an estimate of aquifer recharge, and an assumption that agricultural lands not serviced by Greater Vernon Water used groundwater for irrigation. The Nodding Hill subject properties are located above Aquifer 351, and the results of the water balance for that aquifer resulted in either a net surplus or deficit of water in the aquifer depending on the assumptions regarding groundwater use. When it was assumed that residential groundwater use was approximately 1.65 m^3/day/household and that half of agricultural properties irrigated with groundwater,

the water balance indicated that recharge exceeded extraction by 40 – 51%. When upper bound estimates of groundwater extraction were used in the balance (residential use equal to the RDNO Bylaw proof of water requirement of 6.55 m^3/day/household and all agricultural lands irrigated with groundwater), groundwater extraction was found to exceed recharge by 147 – 188%. The upper bound assumptions for groundwater extraction are likely unreasonably high, and as discussed later in this report, do not align with the deemed private domestic groundwater right in the *Water Sustainability Act*, and further the assumption about irrigation likely over-stated the actual groundwater usage for this purpose Golder did note that while their assessment was broad based and intended to address the study area on a regional scale, there was potential that the lower western part of Aquifer 351 (where the subject property is located) may have sufficient groundwater resources to support additional development.

In 2020, the RDNO paused all in-stream rezoning and subdivision applications on properties in the area following the results of the above-summarized Golder Study. As part of their study, Golder proposed subsequent phases of work aimed at refining the estimates used in their water balance. That additional scope of work began late in 2020 and is not expected to be complete until late 2021 or early 2022. It is our understanding that all in-stream and new rezoning or subdivision applications in the Keddleston Study area remain on hold pending the results of Golder's work.

Between 2017 and 2020, Nodding Hill Developments drilled 13 more wells on the subject property, such that there are a total of 18 drilled water wells on the site. In 2020, WWAL was retained to design and oversee a pumping test program to further assess groundwater availability, which is documented in this report.

2. REGULATORY REQUIREMENTS

Groundwater availability for this project was assessed against the requirements of the RDNO Subdivision Servicing Bylaw No. 2600 ('the Bylaw') regarding quality, quantity, and year-round availability of potable groundwater. Section 406 of the Bylaw deals with potable water sources other than Community Water Systems, and applicable components of the Bylaw related to this project include:

- Individual water sources must be located on the lot that they supply water to, or, if the water source is located off the lot it serves, the water source and all related appurtenances must be protected by an easement;
- In Electoral Area "C", drilled wells must be shown to be capable of sustainably supplying 6.55 m^3/day (1.0 Imperial gpm or 1.2 US gpm), without negatively impacting neighbouring wells;
- Where drilled wells are proposed as water sources, a well yield test completed by the well driller indicating the well can produce >3.0 Imperial gpm is sufficient for proof of water. Where well yield tests indicate < 3.0 Imperial gpm, pumping tests overseen by a qualified profession must be completed between August 1 and March 1 and an accompanying technical report is needed as proof of water.
- If a dug well is proposed as a water source, it must be tested under the direction of a qualified professional and an accompanying technical report is needed as proof of water
- With regards to water quality, samples are to be collected and evaluated against the Canadian Guidelines for Drinking Water Quality. Where raw groundwater is found to be not potable, a Section 219 Covenant must be registered against the property, and a treatment system may need to be designed to make the water potable.

It is worth noting that the RDNO Bylaw proof of water requirement of 6.55 m^3/day is an arbitrary threshold chosen at the discretion of the RDNO. Bylaw proof water requirements vary between regional districts, and some include short term fire-protection flow requirements as well as longer-term sustainable yield requirements. The most common long-term proof of water requirement is 2.27 m^3/day (500 Imperial gallons per day) and is used in the Districts of Lake Country and West Kelowna, Columbia Shuswap, Central Okanagan, Okanagan Similkameen, and some electoral areas of the RDNO. Regardless of the Bylaw proof of water requirement, the *Water Sustainability Act* provides a deemed private domestic groundwater right of 2.0 m^3/day that is protected under the *Act,* and also has parameters regarding what the water can be used for. Use of groundwater beyond the use definitions for domestic purposes in the *Water Sustainability Act* requires a groundwater licence.

3. PROJECT APPROACH

WWAL conducted the following work program to assess the feasibility of developing groundwater supplies to support the Nodding Hill development:

1. Reviewed the conceptual development plan and well logs for the 18 existing wells on the site.
2. Completed a review of the well logs on-file with the B.C Ministry of Environment (GWELLS application) for the areas within approximately two kilometres of the subject property boundaries. Completed a search for wells in the area for which groundwater licences have been issued.
3. Reviewed Ministry of Environment aquifer mapping for the area, bedrock geology mapping, climate data, relevant reports by others and background hydrogeologic reports for the area in our files.
4. Reviewed the 2007 Associated Engineering and 2020 Golder reports.
5. Installed water level transducers in several wells onsite prior to the pumping test program to collect continuous water level data prior to, during and after the testing program.
6. Designed and oversaw a pumping test program on five wells present within the proposed development.
7. Reached out to well owners on surrounding properties and in the Keddleston and McLennan Road areas to make an offer to monitor domestic water wells during the pumping test program. Met with several neighbouring well owners to assess the feasibility of monitoring their wells, and installed transducers in several offsite wells.
8. Analyzed the data collected and assessed the long-term sustainable yield of the tested wells, the potential for well interference between wells and the potential for groundwater resources to service the proposed development.
9. Prepared this hydrogeologic report.

4. SITE PHYSIOGRPAHY AND CLIMATE

Topography at the subject property slopes moderately westwards, ranging in elevation from approximately 660 metres above sea level (masl) in the western part of the property to 720 masl in the east. The northern half of the property is largely cleared, and the southern half of the property is mostly treed.

Land use to the southwest of the site consists of residential development with lots in the 1 – 2 hectare range, similar to what is being proposed at the subject property (Figures 1 and 4). To the north, east and south the property is adjacent to larger, mostly undeveloped holding properties. Approximately 1 km east and upslope of the site is the Keddleston Road area, which mostly consists of 1 to 8 hectare rural residential properties.

Local climate averages for the site would be similar to those recorded at the Vernon North Climate Station (ID 1128583) located approximately 4 km northwest of the subject property. The Vernon North climate station is at an elevation of 538 m asl. Climate normal data for the Vernon North station from 1981 – 2010 are summarized in Table 4.1 (Environment Canada 2017). The station receives 487 mm/yr of precipitation on average, with ~30% occurring as snow. Precipitation is relatively consistent throughout the year, with the wettest months being November through January on average.

Table 4.1: 1981 – 2010 Climate Normal Data, Vernon North Climate Station (ID 1128583)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rainfall (mm)	11.6	11.7	17	27.2	46.3	49.6	35.4	31.9	32.7	40.7	31.1	9.7	344.9
Snowfall (cm)	40.5	13.5	11.7	1.8	0	0	0	0	0	0.9	26.5	47.3	142.1
Precipitation (mm)	52.2	25.2	28.7	29	46.3	49.6	35.4	31.9	32.7	41.5	57.5	57	487

Future Climate projections indicate changes to precipitation and temperature trends in all seasons in the Okanagan (CPOR 2020). Warmer temperatures are predicted year-round, with considerably hotter summers. The general increase in temperatures throughout the year will have the effect of shortening winter and extending the spring and fall seasons. Increased precipitation is projected for all seasons except the summer, and warmer winters have the potential to reduce mid-elevation snowpacks.

In terms of hydrologic features in the area, there is a small unnamed seasonal creek that runs through the subject property; Figure 1 shows this drainage and its inferred watershed extending upslope. This unnamed drainage may play a key role in aquifer recharge for the subject property and other properties downslope. A second, larger (also unnamed) water course transects lands to the south of the site.

5. AREA WATER SUPPLIES

All properties surrounding the site are believed to obtain domestic water predominantly from onsite water wells. Figure 5.1 below shows the location of the subject property as well as lot lines and the extent of Greater Vernon Water (GVW) service area. Many of the properties directly adjacent to the subject property are large parcels, while subdivisions have occurred to the southwest along McLennan and Mountridge Roads. The formerly used Grey Canal is located approximately 400 m to the west and downslope, and all properties west of the Grey Canal are within the GVW service area. We assume, as did Golder in their 2019/2020 study, that most if not all properties within the GVW service area use municipal water for domestic and irrigation purposes as opposed to private wells. As such, there is likely limited use of groundwater directly west and downslope of Nodding Hill.

Figure 5.1 Subject Property, Cadastral Fabric and Greater Vernon Water Service Area

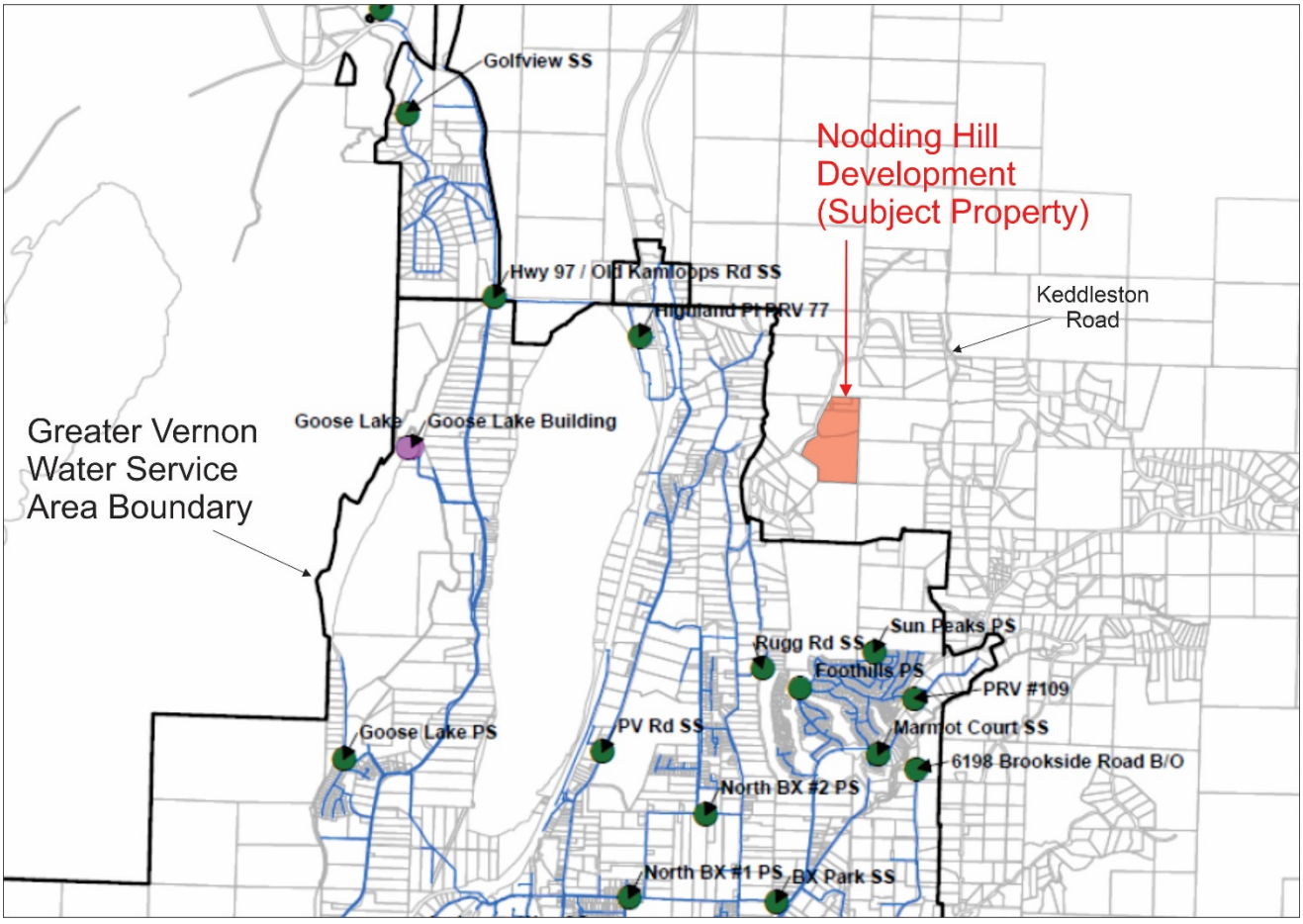


Image Source: Greater Vernon Water 2018 Annual Report.

WWAL also reviewed registered water licenses in the vicinity of the project site, as available on the B.C. Water Resources Atlas. 23 surface water licences are reported within 2 km east and upslope of the subject property, 16 of which are domestic water sources. Seven of the licences are for other purposes as summarized in Table 5.1, and the locations of these seven points of diversion are shown on Figure 1 (attached). Only three of the licences are for an irrigation purpose, and all source water from the same point of diversion on Woolliams Pond and are appurtenant to the property west and across Clearview Road from the point of diversion. The remaining licences are for waterworks (presumably a small community water system), stock watering or conservation, and all have fairly low volumes associated with the licences.

Table 5.1 Summary of Reported Surface Water Licences within 2km East of Nodding Hill
(licences with domestic purposes excluded from table)

Licence Number	Licence Status	Priority Date	Purpose Use	Source Name	Quantity (m^3/day unless otherwise noted)
C063729	Current	June 30, 1969	00B - Waterworks (other than LP)	Schepel Spring / Deer Creek	11.4 m^3/day
C109543	Current	June 11, 1991	02I31 - Livestock & Animal: Stockwatering	Fox Spring	2.27 m^3/day
C126266	Current	June 24, 1976	02I31 - Livestock & Animal: Stockwatering	Woolliams Pond	0.45 m^3/day
C059406	Current	June 24, 1976	03B - Irrigation: Private	Woolliams Pond	28123.3 m^3/yr
C126267	Current	June 24, 1976	03B - Irrigation: Private	Woolliams Pond	616.7 m^3/yr
C126268	Current	June 24, 1976	03B - Irrigation: Private	Woolliams Pond	616.7 m^3/yr
C113482	Current	May 14, 1984	11B - Conservation: Use of Water	Cedar Creek	0.00003 m^3/s

WWAL completed a review of historical aerial photographs of the Nodding Hill area ranging from 1938 to 2018. Attention was paid to the large parcels of land east of Nodding Hill which have been cleared for what appeared to be agricultural purposes. Review of the aerial photos, particularly those in colour, did not show any evidence of active irrigation of these properties. While areas of these properties appeared "greener" than others in some of the photographs, the fields were not uniformly green as would be expected if the fields were uniformly irrigated, as was visible on the agricultural properties downslope of the Grey Canal. The "greener" area of the fields appears to be related to proximity to small ponds (some of which may be dugouts accessing local shallow groundwater sources), drainage features and low-lying areas.

WWAL also reviewed reported water uses for more than 300 reported wells within several kilometres of Nodding Hill. The vast majority of the wells had a reported private domestic use. None of the wells had a reported irrigation use, however the reported use for many of the wells was "unknown." WWAL also completed a search of the BC Water Resources Atlas for the licensing status of wells in the area. There are no licensed water wells within 1.5 km of the subject property, and only two reported licensed wells in Aquifer 351 (both for Aspen Water Utility; information as of October 6, 2021 as obtained from the B.C. Water Resources Atlas).

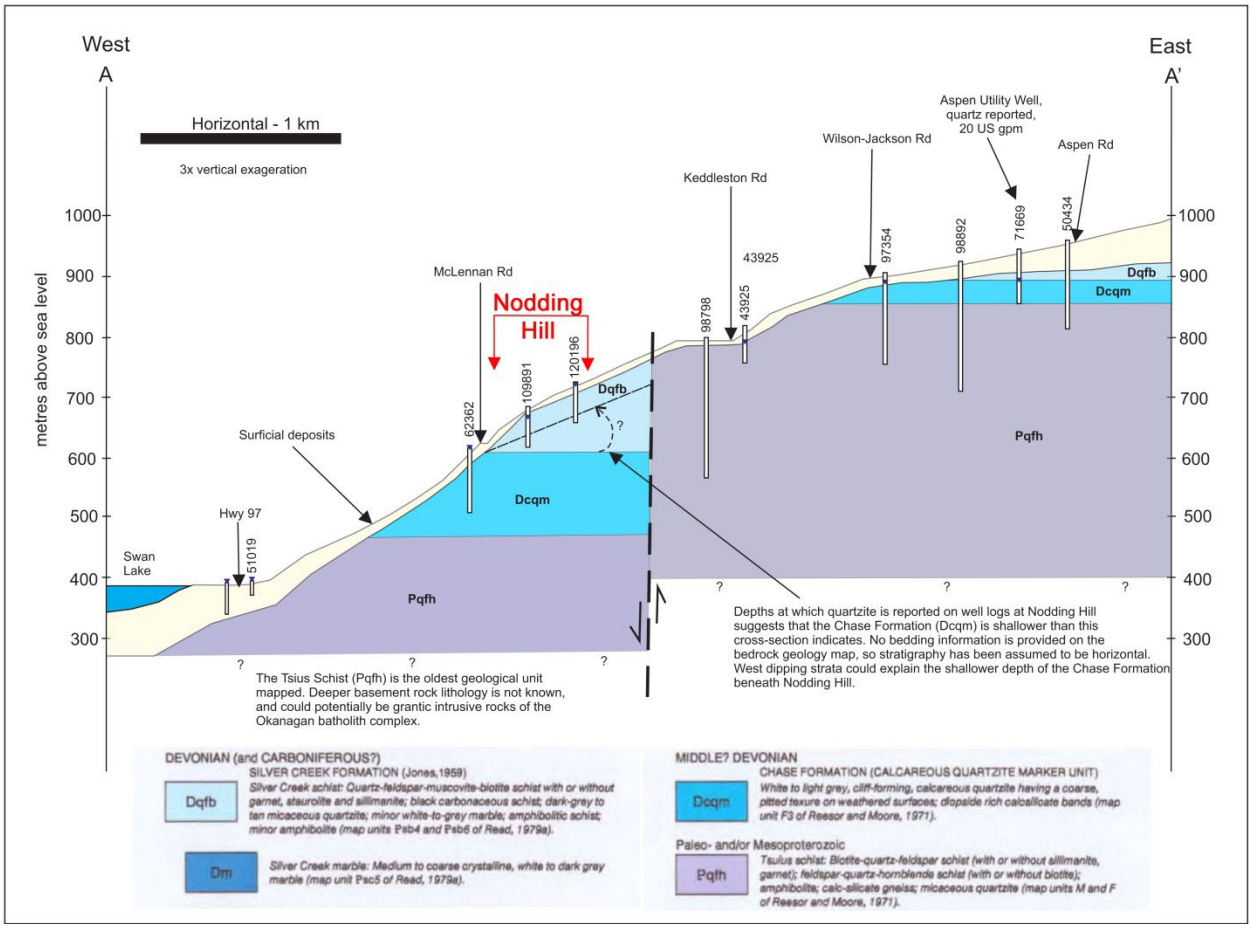
6. SURFICIAL AND BEDROCK GEOLOGY

Surficial geology at the site has been characterized through the drilling of wells on the property, and consists of silt, gravel and sand that ranges in thickness from 3 ft to 78 ft (1 – 24 m). This surficial deposit is likely glacial till. Surficial deposits at the site are typically not water-bearing, however some groundwater was noted during drilling of a handful of the wells in surficial deposits.

Bedrock geology in the Vernon area was mapped in detail by Thompson and Unterschutz (2004) and incorporated into a compilation of bedrock geology mapping of the entire Okanagan Watershed (Okulitch 2013). The geology and geologic structure in the vicinity of the subject property appears to be a key factor in aquifer development and productivity. Figure 2 (attached) depicts the extent of the subject property and bedrock geology and structure in the area, and Figure 3.1 provides a cross-section created by WWAL

extending east-west through Nodding Hill that illustrates the contrasting geology created by the mapped fault located to the east of Nodding Hill site.

Figure 3.1 Conceptual Geological Cross-Section (East-West) Through Nodding Hill



Note: Figure 3.1 is provided in larger format as Figure 3 attached to this report.

The subject property is mapped as being underlain by the Silver Creek Schist, comprised largely of quartz-feldspar-muscovite-biotite schist, with lesser carbonaceous schist and marble. Stratigraphically below the Silver Creek Schist is calcareous quartzite of the Chase Formation. The Chase Formation is a prominent marker unit and based on lithology recorded on well driller logs at the site, is intercepted by many of the wells at Nodding Hill. Quartzite is a very hard metamorphic rock, which was transformed from high-quartz content sandstone by high pressures and heat. The two most productive wells at Nodding Hill (WPIDs 50396 and 62008 – both have 100 US gpm driller-estimated yields) appear to intercept highly fractured zones in the Chase Formation.

Immediately east and upslope of the property is a mapped, generally north-trending fault system that places the Silver Creek Schist into fault contact with similar, but older metamorphic rocks to the east (the Tsius Schist – the oldest rocks on the mapsheet). As bedrock near a fault zone is subjected to geologic stresses, increased fracturing can occur and can result in increased porosity in bedrock, and where fractures are connected, high hydraulic conductivities. Based on the well testing program completed for

this project (See subsequent sections of this report) and the higher apparent productivity of wells at the subject property compared to other reported wells in the area, it appears that faulting near the site coupled with the local bedrock geology has created a relatively productive bedrock aquifer system.

7. SUBJECT WELL DESCRIPTIONS

As mentioned previously, 18 wells have been drilled and are present on the subject property. Figures 1 and 4 (attached) depict the location of these wells, and Table 7.1 provides a summary of key well construction details. Well logs for these wells are provided as an attachment. All of the site wells are completed in a fractured bedrock Aquifer 351 IIC (see next section).

WTN49632 was completed in 1981 as part of a previous subdivision of the property. The remaining wells were drilled between 2014 and 2020. Yields from the wells are variable and range from 1.5 US gpm to 100 US gpm, with a median driller-estimated yield of 9 US gpm. Static water levels are generally high with a median value of 17.4 m (57 ft) below ground. Two of the wells onsite are reported to have flowed under artesian pressure, at least seasonally. Available drawdown in the wells varies considerably. This value, defined for this discussion as the difference between the static water level and total depth of the well, has a median value of 68 m (223 ft).

All 18 of the wells have driller-estimated yields above the RDNO Bylaw requirement of 1.2 US gpm. Also, 66% (12 of the 18 wells) have driller-estimated yields equal to or greater than the RDNO Bylaw threshold of 3.6 US gpm above which pumping tests are not required in support of a subdivision application. Half of the wells had driller-reported yields of 9 US gpm or more. As described further below in Section 9, a total of five 72-hour pumping tests were completed in 2020 on selected wells, the monitoring for which has included months of water level data collection.

Table 7.1 Summary Well Construction Information for Nodding Hill Development Wells

Date of Completion	WPID[2]	Depth of Borehole		Casing depth (ft)		Static water Level (ft)		Driller-Estimated Well yield (USgpm)	Notes
		ft	m	ft	m	ft	m		
Dec, 1981	WTN46392	210	64.0	10	3.0	29.8	9.1	50	Originally flowing artesian @ 10 USgpm
Sept, 2014	38541	200	61.0	49	14.9	20	6.1	13	
Sept, 2014	38542	220	67.1	80	24.4	39	11.9	30	2017 - 72 hr test 5 USgpm
Sept, 2014	38543	180	54.9	18	5.5	49	14.9	9	2017 - 72 hr test 3 USgpm
Sept, 2014	38544	340	103.6	92	28.0	111	33.8	1.5	2020 - 72 hr test 1.25 US gpm
Nov, 2019	50393	300	91.4	17	5.2	64.25	19.6	10	
Nov, 2019	50394	240	73.1	13	4.0	57.25	17.4	25	
Dec, 2019	50395	362	110.3	18	5.5	180	54.9	2.5	2020 - 72 hr test 1.25 US gpm
Dec, 2019	50396	226	68.9	18	5.5	3	0.9	100	artesian spring 2020
Dec, 2019	50397	260	79.2	25	7.6	12	3.7	8	
Dec, 2019	50398	340	103.6	18	5.5	66	20.1	1.5	
Dec, 2019	50399	240	73.1	22	6.7	62.8	19.1	3	2020 - 72 hr test 1.25 US gpm
June 4, 2020	62005	260	79.2	27	8.2	-		9	
June 10, 2020	62006	320	97.5	53	16.2	78	23.8	1.5	
June 16, 2020	62007	280	85.3	100	30.5	117	35.7	30	
June 22, 2020	62008	378	115.2	18	5.5	32	9.8	100	2020 - 72 hr test 30 US gpm
June 26, 2020	62009	460	140.2	90	27.4	71	21.6	4	
July 2, 2020	62012	425	129.5	17	5.2	57	17.4	3.25	2020 - 72 hr test 1.25 US gpm
Average		**291.2**	**88.7**	**38.1**	**11.6**	**61.7**	**18.8**	**22.3**	
Minimum		**180.0**	**54.9**	**10.0**	**3.0**	**3.0**	**0.9**	**1.5**	
Maximum		**460.0**	**140.2**	**100.0**	**30.5**	**180.0**	**54.9**	**100.0**	
Median		**270.0**	**82.3**	**20.0**	**6.1**	**57.3**	**17.4**	**9.0**	

Notes:

1. Static water levels presented as reported on well driller's log, except for WTN46392 for which water levels were measured in October 2020.
2. WPID = Well Plate Identification number, the number on the steel plate attached to the well. WTN = Well Tag Number, the unique GWELLS database number assigned to a well.

8. HYDROGEOLOGIC SETTING AND NEARBY WELLS

The subject property is underlain by provincially mapped bedrock Aquifer 351 IIC. Aquifer 351 is classified as a confined bedrock aquifer, having a low demand, low productivity and low vulnerability to contamination (ENV 2020). Aquifer 351 is an extensive aquifer system (21.8 km^2), extending from Highway 97 in the west, to Silver Star Road in the south, to Greenaway Road in the east. Our conceptual model of groundwater flow in Aquifer 351 is that of a typical, gravity driven groundwater flow regime, with an inferred groundwater flow direction of west or southwest. Recharge to the bedrock aquifer occurs

through infiltration of rainfall and snowmelt in areas where fractured bedrock is exposed at the surface or where saturated surficial deposits overlie fractured bedrock, and via losses from streams that flow over the aquifer. Groundwater flows downgradient (inferred to be westward at the project site) through interconnected fractures in the host bedrock.

Most properties near the site utilize groundwater wells for domestic water, and nearly all wells in the area are completed in Aquifer 351. Figure 1 depicts the location of wells on the subject property, wells reported in the Provincial WELLS database, and other wells in the Keddleston Road area identified in Keddleston Area Water Supply Strategic Plan (Associated Engineering 2007).

Selected details on wells reported in the provincial database are summarized in Table 8.1, which groups wells by geographical area. Differences in driller-estimated yields in wells in these different areas are apparent. In the Keddleston Road area, east and upslope of Nodding Hill and upslope of the mapped fault, driller-estimated yields for wells are lower. Of 21 well logs reviewed, three dry wells are reported and two wells with 20 US gpm estimated yields are the highest yielding wells in the area. The median driller-estimated yield in the area is 1.5 US gpm, which is less than 20% of the median reported well yield at Nodding Hill.

WWAL reviewed the well driller's reports for 11 wells immediately north of Nodding Hill along McLennan Road (and west of the mapped fault). Driller-estimated yields in this area range from 0.5 to 30 US gpm, with a median yield of 4.5 US gpm.

West and south of Nodding Hill along McLennan and Mountridge Roads (also below the mapped fault), logs for 24 wells were reviewed. Three dry wells are reported in this area (all fairly shallow bedrock boreholes less than 78 m / 255 ft) while the highest driller reported yield is 75 US gpm. The median driller-estimated yield in this area is 5.5 US gpm.

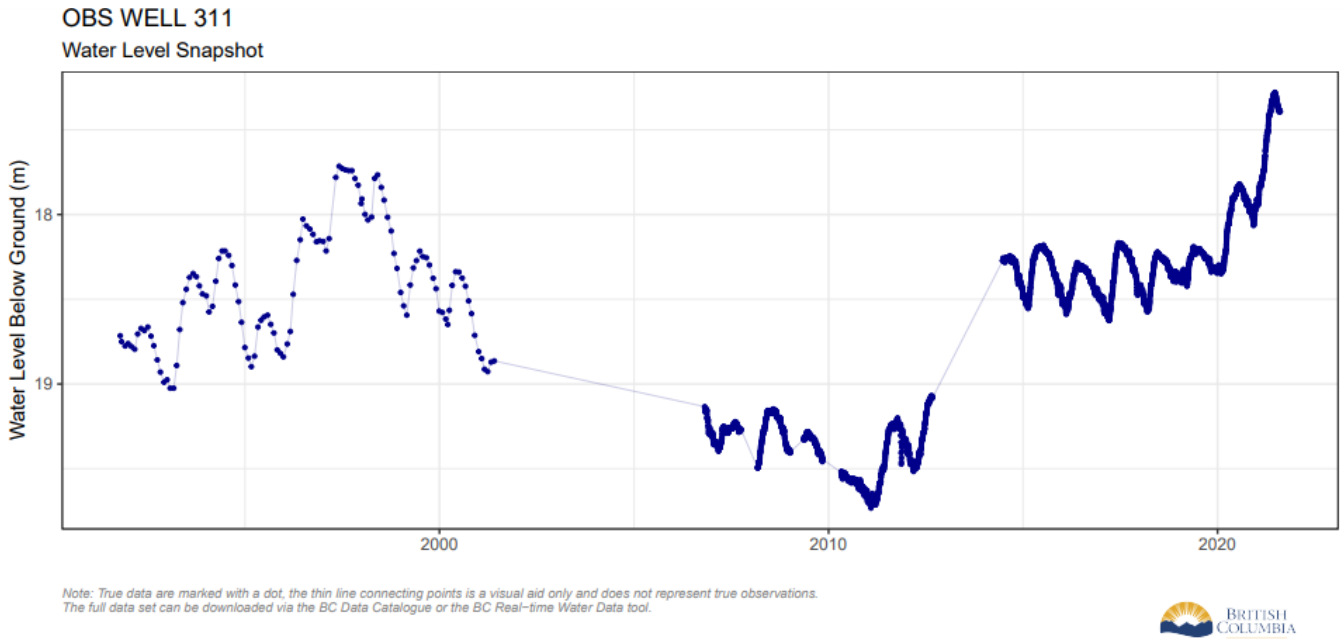
In summary, available well logs indicate that east and upslope of the mapped fault in the Keddleston area, the bedrock aquifer present in that area (interpreted to be hosted by the Tsius Schist) is less productive than areas west of the fault. Median values of driller-reported well yields are three to five times higher west of the fault, based on our review of available data.

Groundwater levels in Aquifer 351 are monitored by the Ministry of Environment at Observation Well 311, located on Keddleston Road, approximately 2 km southeast of the project site. Water levels in Observation Well 311 were monitored between 1991 and 2001, and again from 2006 to present. Figures 8.1 and 8.2 below, depict water levels in Observation Well 311 over the period of record and as a statistical summary of water levels over the last 10 years, respectively. Groundwater levels in Observation Well 311 vary on the order of 0.3 m annually, from seasonal lows that occur in the late winter to seasonal highs that occur in summer. The timing of the onset of rising water levels, which begins in March, suggests that infiltration of snowmelt is a key recharge mechanism. Over longer time frames, groundwater levels have fluctuated more significantly, likely in response to longer term climate trends. Between 1997 and 2011, groundwater levels appear to have steadily declined on the order of 2.3 m, and from 2011 to present, groundwater levels have recovered all of that decline, with 2021 water being the highest for the period of record.

Table 8.1: Well Construction Details for Wells in the Nodding Hill Area, Separated into Geographical Areas.

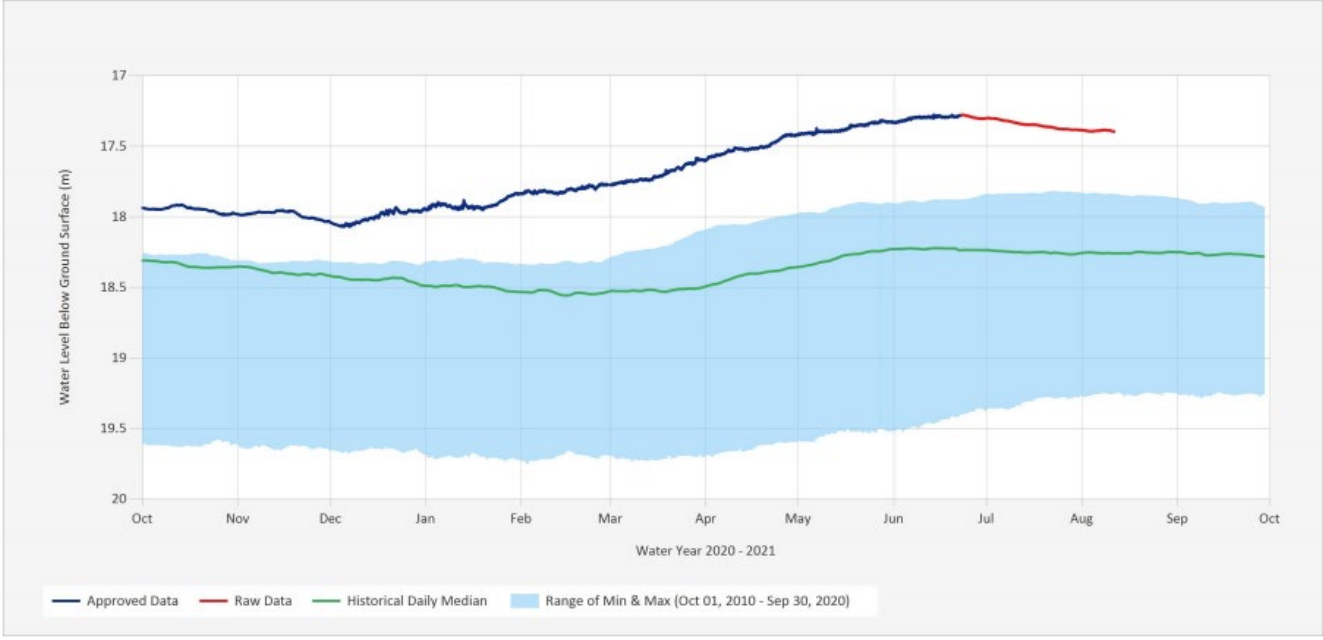
Well Tag Number	Finished Well Depth (ft)	Diameter (in)	Water Depth (ft)	Bedrock Depth (ft)	Well Yield (US gpm)	Street Address
East and Upslope of Nodding Hill (Keddleston and Side Roads)						
47092	204		13	0	20	KEDDLESTON RD
62854	300	6.63	60		1.5	KEDDLESTON RD.
82400	400	6.63	49		1.5	KEDLESTON RD
53206	300			5	0.5	SILVER STAR RD
62857	340	6			10	
62859	340	6.63			1.5	KEDDLESTON RD
63266	200	6.63		7	Dry Hole	8000 DEERWOOD ROAD
63267	300	6.63	19	18	1	8000 DEERWOOD RD
98748	720	6		5	1.5	7759 MCLENNAN
71675	307	6.63	61		3	7970 KEDDLESTON RD
50008	195			45	20	KEDDLESTON RD
43925	116		35	8	0.67	KEDDLESTON RD
119391	670	6		76	0.25	WILSON JACKSON ROAD
74439	180		126		13	HITCHCOCK ROAD
112890	840	6		114	Dry Hole	
37652	200			48	Dry Hole	SILVER STAR
59305	307			74	0.5	7685 KEDDLESTON RD.
53895	420			95	no info	KEDDLESTON RD.
36461	75		20	70	2	KEDDLESTON RD
20265	106		30	40	2.33	SILVER STAR RD
9124	132			112	3	
North of Nodding Hill						
111905	420	6	101	7	30	7616 MCLENNAN ROAD
62364	240			224	5	29TH CRESCENT
49637	270			4	0.5	MACLENNAN RD
80446	202	6	20		2.5	7616 MCLENNAN ROAD
88025	200	6	52	6	9	7765 MCLENNAN ROAD
43929	211			26	5	KEDDLESTON RD
49634	300		18	5	2	MACLANAN RD
50947	250		20	7	2	MCLENNAN RD.
113890	600	6	102	30	4.5	7566 MCLENNAN ROAD
111902	400	6	102	14	10	7616 MCLENNAN ROAD
121870	500	6	133	16	3	7616 MCLENNAN ROAD
West and Southwest of Nodding Hill (McLennan and Mountridge Roads)						
54316	200		89	6	10	MOUNTRIDGE RD
82719	300	6			8	MOUNTRIDGE RD
82447	240	6.63	72	12	7	MOUNTRIDGE RD
46853	210			13	75	MOUNTRIDGE RD
49639	120			12	5	7360 MCLENNAN RD
113935	160	6	61	7	9	7566 MCLENNAN ROAD
52401	160				6	MCLENNAN RD
49633	240			0	Dry Hole	MCLENNAN RD
113891	460	6	93		6	7566 MCLENNAN ROAD
113933	180	6		12	5	7566 MCLENNAN ROAD
114421	220	6	76	5	5	7566 MCLENNAN ROAD
49635	120			15	1	
82448	205	6.63	75	35	12	MT RIDGE RD
36465	120			8	12	
49638	255			12	Dry Hole	MOUNTRIDGE RD
55426	245		132	12	4	MT RIDGE RD
55440	185		52	10	3	MOUNTAIN RIDGE ROAD
49636	135		10	30	6	MOUNTRIDGE RD
82888	185	6		70	Dry Hole	MT RIDGE RD
104123	362	6	20	8	6	7225 MOUNTRIDGE PLACE
55452	345			8	3	MT RIDGE RD
83480	260			8	3	7225 MOUNTRIDGE PL
82419	160	6	28		15	7215 MOUNTRIDGE ROAD
124	140		65	5	3.5	MCLENNAN RD

Figure 8.1 Groundwater Hydrograph for Observation Well 311 – Complete Record



Data Source: BC Observation Well Network Web Application - http://www.env.gov.bc.ca/wsd/data_searches/obswell/map/index.html?ID=311

Figure 8.2 Annual Statistical Hydrograph for Observation Well 311 – 2010-2020



9. PUMPING TEST PROGRAM

In order to further evaluate the aquifer system beneath the subject property, WWAL designed and oversaw a test pumping program on five wells in October 2020. The following rationale was used in designing the testing program, which focused on both the least and most productive wells at the site:

1) RDNO Bylaw 2600 states that for proof of water at the subdivision stage, wells with driller-estimated yields >3.6 US gpm do not require pumping tests, and that the well driller's log and driller's yield test are sufficient to satisfy yield requirements for proof of water. As several of the wells at Nodding Hill had driller-estimated yields below this threshold, four of these wells were subjected to 72-hour constant rate pumping tests at 1.25 US gpm to determine whether they would be capable of meeting the Bylaw quantity requirement.

2) In order to evaluate the collective impact of multiple wells drawing upon the aquifer system beneath the subject property, a centrally located well with a higher driller-estimated yield was subjected to a high-rate pump test. Well WPID 62008 is one of two wells at Nodding Hill that has a driller-estimated yield of 100 US gpm. This well was subjected to a variable rate step test and 72-hour constant rate pump test at 30 US gpm. The results of the step rate test were used to establish the pumping rate for the 72-hour test. The rate chosen is equivalent to 25 domestic wells being operated at the Bylaw requirement at the same time. While 25 domestic wells is greater than the proposed 17 domestic wells, results from the step test indicated that well WPID 62008 was, on a standalone basis, capable of sustaining a greater flow rate of 30 US gpm and consequently that greater flow rate was used for the 72-hour test.

Table 9.1 summarizes the 2020 testing program completed.

Table 9.1: Summary of 2020 Pumping Tests

WPID	Date of Test	Duration	Flow Rate (US gpm)	Data and Graphs
38544	Oct 15-18, 2020	72 hours	1.25	Appendix A
50395	Oct 22-25, 2020	53 hours	1.25	Appendix B
50399	Oct 15-18, 2020	72 hours	1.25	Appendix C
62008	October 28 – Nov 1, 2020	72 hours + step test	30	Appendix D
62012	Oct 22-25, 2020	72 hours	1.25	Appendix E

Prior to the testing program, WWAL deployed water level transducers in three wells on the property (WPIDs 50396, 62009 and 50393) on September 4, 2020 to collect several weeks of pre-test groundwater level data at the site. Monitoring continued after the test pumping.

In addition, WWAL contacted the owners of 9 adjacent wells located outside of the subject property to make the offer to monitor water levels in their wells during the testing program to assess offsite well interference. Of these wells, two offsite well owners (both in the Keddleston area) declined to participate in the program, four wells were assessed and found to be unsuitable for monitoring or that transducers could not be successfully installed, and transducers were successfully installed in three offsite private wells.

Prior to the high-rate 30 US gpm pump test additional monitors were installed in onsite wells. The Ministry of Environment graciously downloaded the transducer in Provincial Observation Well 311 after the pumping test program was complete and provided that water level data to WWAL. Figure 1 identifies the location offsite wells which were either monitored, attempted to be monitored or declined our offer to monitor. Well interference is discussed in a later section of this report.

For the tests on the four low yielding wells, Moore's Well and Pump (B.C. Qualified Pump Installer #WPI 06032807) installed temporary submersible pumps in the wells for the testing. Dedicated water level transducers were installed in each pumping well and continuously recorded water levels in the wells prior to, during and after the tests. WWAL hydrogeologists oversaw the start of each test, and Nodding Hill staff completed field oversight of the majority of the tests. They collected periodic manual water level measurements, checks on discharge rates and made flow adjustments as needed, and frequently downloaded and emailed transducer data to WWAL. For the 1.25 US gpm well tests, discharge rates were controlled with a valve and measured with a calibrated bucket and stopwatch. Water from the tests was discharged to ground a short distance from each well.

For the step test and 72-hour test on WPID 62008, Monashee Aquifer Testing (B.C. Qualified Pump Installer # WPI 19080601) was retained to supply a test pump and remained onsite during the entire testing period to measure water levels and monitor flow rates. Discharge rates were controlled with a valve and were measured with a flow meter. Water from this test was discharged to ground approximately 100 m downslope of the well head near the unnamed drainage that transects the property.

At the end of each test, water level recovery measurements were made for at least two days, and in the case of three of the wells, for several weeks. Following the completion of the autumn 2020 testing program, five water level transducers were left in wells on the subject property and continue to collect water level data.

Near the end of each test, a water quality sample was collected and submitted to CARO Analytical in Kelowna for laboratory analysis.

10. PUMPING TEST RESULTS

The drawdown tests were conducted in October, when water levels in Aquifer 351 were above average levels and declining from seasonal highs.

Water level data and graphs of water levels during the tests are provided as an attachment in Appendices A through E. The results of each pumping test are summarized in the following paragraphs, and Table 6 summarizes the results of each test. Figure 5, attached, is a key compilation of water levels from pumping wells and onsite and offsite monitoring wells prior to, during and following the testing program, and is referred to several times in the following sections.

In keeping with industry standards, WWAL estimated the long-term sustainable yield of a well based on the guidelines published by the province for evaluating long-term well capacity for a Certificate of Public Convenience and Necessity (CPCN Guidelines, Allen et al., 1999). The procedure involves projecting the

drawdown trend measured in the well to a theoretical 100-day pumping duration and applying a 30% safety factor. Semi-logarithmic plots of the time versus the drawdown level and the CPCN sustainable yield calculation for each well is provided in Appendices A through E.

The sustainable yield calculations include the previously noted 30% safety factor, intended to account for seasonal water level fluctuations and variability in aquifer recharge from year to year. We believe the 30% safety factor is adequate for the variability expected at the site.

Table 10.1: Pumping Test Result Summaries

Well ID	Well Depth ft (m)	Available Drawdown ft (m)	Duration of Pumping (hrs)	Pumping Rate (US gpm)	Drawdown at End of Test ft (m)	% of Available Drawdown Used	Sustainable Yield based on CPCN Calc. (US gpm)	Well Rated Yield / Meets Bylaw Requirement?
38544	340 (103.7)	228 (69.5)	72	1.25	49.6 (15.1)	21%	2.6	1.25 US gpm Meets Bylaw
50399	240 (73.2)	55 (16.8)	53	1.25	164 (50.0)	>100%	NA	Does not Meet Bylaw
50395	360 (109.8)	155 (47.3)	72	1.25	42.4 (12.9)	27%	Stabilized	1.25 US gpm Meets Bylaw
62012	425 (129.6)	254 (77.4)	72	1.25	11.5 (3.5)	5%	12.6	1.25 US gpm Meets Bylaw
62008	371 (113.1)	250 (76.2)	72	30	132 (40.3)	53%	31.5	30 US gpm Meets Bylaw

Note:

1) For wells with reported water bearing fractures, available drawdown is the difference between the static water level and the depth of the dominant reported fracture. For wells without fractures reported on well logs, available drawdown is the difference between the static water level and the total depth, minus 20 ft for pump submergence.

2) When water levels stabilize during pumping, the CPCN formula cannot be applied as intended, as it relies on a projection of water level drawdown. In these cases, wells are rated at their tested rates, even though a higher sustainable yield is likely.

3) In cases where the CPCN calculation yields a value higher than the tested rate, the well is conservatively assigned a rated yield of the pumping test rate.

10.1 WPID 38544

Water levels in this well drew down steadily before levelling off but continuing to drawdown at a lesser rate after around 600 minutes of pumping (Figures A1 and A2 – Appendix A). Minor flow adjustments made to maintain the pumping rate are evident in the data. Near the end of the test the drawdown rate appeared to steepen slightly.

Over the course of the 72 hour tests, water levels drew down close to 50 ft (15.1 m), representing 21% of the available drawdown in the well. Following pump shutoff, water levels recovered by 93% in two days. The results of the CPCN calculation provided a theoretical sustainable yield of 2.6 US gpm, and the well

was conservatively rated at the pumping test rate of 1.25 US gpm. This well meets the RDNO Bylaw quantity yield requirement.

10.2 WPID 50399

Water levels in this well drew down from a static water level of 42 ft to 95 ft where water levels remained for more than 1 day. Review of the well driller's log indicated that the primary water-bearing fracture encountered was located near this depth. At approximately two days of pumping, the water level began to drop below this level at a linear and fairly steep rate. It became apparent that pumping water levels would soon reach the pump and pumping water stopped after 53 hours. We interpret the flatlining of pumping water levels at 95 ft and subsequent drop to represent a dewatering of the main water-bearing fracture. Interestingly, during water level recovery, water levels quickly rose above the fracture depth and did not stabilize at that level again while the fracture was being refilled.

As it currently exists, WPID 50399 does not meet the Bylaw quantity requirement.; however, the well could be deepened and reassessed in the future.

10.3 WPID 50395

The bulk of water level drawdown in this well occurred in the first few hours of the test, and pumping water levels essentially stabilized after 1000 minutes of pumping (Figures C1 and C2). Pumping the well at 1.25 US gpm for 72 hours resulted in 42 ft (12.9 m) of drawdown, representing 29% of the available drawdown. Available drawdown in this well was defined using the uppermost water bearing fracture located at 180 ft, even though the total depth of the well is 360 ft and additional water bearing fractures were intercepted below 180 ft (i.e. the available drawdown used is very conservative). As water levels stabilized during the pumping test, the well was conservatively rated at the tested rate of 1.25 US gpm. Water level recovery following the drawdown test was strong, with 97% recovery occurring one day after pump shutoff. This well meets the RDNO Bylaw quantity requirement.

10.4 WPID 62012

WPID 32012 performed very well during the 72-hour pumping test completed at 1.25 US gpm, with an end of test drawdown of only 11.5 ft (3.5 m). The pumping water level at the end of the test was 79.4 ft, while the main water bearing fractures are located at 332 ft and the total depth of the well is 425 ft. Water levels drew down steadily during the test until the final 10 hours where the pumping water level appears to have stabilized. Ignoring the apparent stabilization and projecting the preceding drawdown trend to apply the CPCN formula resulted in a theoretical sustainable yield of 12.6 US gpm. The well is conservatively rated at the tested rate of 1.25 US gpm. This well meets the RDNO Bylaw quantity requirement.

10.5 WPID 62008

WPID 62008 is one of two wells on the Nodding Hill Site with a driller-estimated yield of 100 US gpm, and a more extensive testing program was applied to this well. A variable rate step test was first completed, at rates of 10, 20, 30 and 40 US gpm for one hour at each rate (Figure E1). Following the step test, a 72-hour test at 30 US gpm was initiated. The 30 US gpm pumping rate is 25 times the Bylaw requirement for one well. Viewed through the lens of the *Water Sustainability Act* deemed water right for

domestic wells of 2 m³/day, the well was pumped for three days continuously at a rate equivalent to the deemed water right for 81 domestic wells.

Figures E2 and E3 provide a hydrograph and semi-logarithmic projection of drawdown in the well during the 72 hour constant rate test. Water levels drew down at a consistent rate for the test and plot on a straight line on the semi-logarithmic projection, indicating radial flow conditions and that no boundary conditions were encountered.

The CPCN formula resulted in a theoretical sustainable yield of 31.5 US gpm. This well meets the RDNO Bylaw quantity requirement.

10.5.1 Potential for Well Interference and Water Level Recovery

The potential for well interference to occur between onsite and offsite wells was assessed in detail during the WPID 62008 testing program, during which eight monitoring wells were equipped with transducers and continuously measured water levels. Figure 5 (attached) depicts water levels in these wells, and Table 10.2 summarizes the drawdown observed. The magnitude of water level interference between the pumping well and other wells onsite ranged from 1.63 m to 7.85 m.

Table 10.2: Summary of Measured Well Interference During 72-hour Test on WPID 62008, 30 US gpm.

Well	Drawdown (m)	Distance from Pumping well (m)	Relative Position
WPID 62008 - Pumping	40.31	0	NA
Onsite			
WPID 50396	3.2	160	Upslope to NE
WPID50395	4.39	100	Upslope to SE
WPID62009	1.63	320	Upslope to NE
WPID62012	7.85	340	Downslope to W
WTN49362	4.5	230	Downslope to NW
Offsite			
WTN111902	0.48	575	Cross/Downslope to NNW
WTN84211	0	620	Cross-slope to SE
WTN113935	0	900	Downslope to SW
Observation Well 311	0	1,540	Upslope to SE

Drawdown interference effects were apparent in all of the onsite wells monitored, and a clear response is observed at the onset of pumping (Figure 5 and 5b).

Following pump shutoff, water level recovery responses varied by geographical location. Monitoring wells located downgradient of 62008 began to recover immediately after pumping ceased. In the case of WTN49632 and WPID62012, water levels recovered to higher than pre-test levels. The same occurred in the pumping well, where water levels in WPID 62008 recovered to 4 m higher than pre-test levels. WTN113935, located 900 m to the southwest of the pumping well, did not show interference response to pumping, but two weeks after the test ended, water levels in this well increased to approximately 3 m above pre-test levels.

In contrast, monitoring wells located upgradient of the pumping well (WPIDs 50396, 62009 and 50395) drew down in response to pumping, but did not recover following the end of the test. Following the end of the pumping test on WPID 62008, water levels in these monitoring wells stabilized or resumed a slow but steady trend of water level decline, interpreted to be the ambient water level response for that time of year and similar to the slope of water level decline that was occurring leading up to the testing program.

We interpret the observed monitoring well response to indicate that storage was used from the higher elevation fracture sets intercepted by wells upslope of the pumping well. The fact that water levels recovered in the pumping well and downslope wells suggests that water discharged during the test reinfiltrated back into the aquifer relatively quickly (within days). This rapid recharge response may indicate that Nodding Hill is located above a groundwater recharge zone in the central and eastern part of the property, and transitions to a groundwater discharge zone on the low elevation western part of the property near McLennan Road where flowing artesian wells are reported. The unnamed ephemeral drainage transecting the site is likely a key source of aquifer recharge to wells onsite and further to the west.

Overall, it appears that the fractured bedrock aquifer under the Nodding Hill site behaves as one hydraulically contiguous system. Well interference is observed between wells on the site, which is the main evidence for hydraulic continuity. Our analysis of well log data and well testing results indicate that the underlying water source is comprises of an extensive aquifer system that is capable of receiving recharge. While well yields vary on a local scale, overall, the aquifer capacity appears adequate for the proposed use.

10.5.2 2021 Weather and Regional Groundwater Level Assessment

To provide some context for the water level recovery monitoring completed through 2021 (following the fall 2020 pumping tests), WWAL reviewed historical climate normals, 2021 weather data and water levels for Provincial groundwater observation wells in the Okanagan.

Figure 10.1 below shows monthly precipitation for the Vernon Climate (ID 1128582) station alongside the Vernon North 1981-2010 climate normal precipitation. Recall that the 2020 pumping test program was completed in October. The year 2020 leading up to the pumping tests saw a drier than normal winter, a wetter than normal May and June followed by a very dry summer. Immediately following the pumping test program, precipitation was average to below average. Most of the month of October 2020 was unusually warm and dry.

Following the relatively dry winter of 2020/2021, 2021 was then a particularly dry year, with a pronounced and lengthy drought period occurring in the spring and continuing through summer. The Okanagan Valley entered "extremely dry" (Level 4) drought conditions in August. The Okanagan Basin Water Board described the drought as "unprecedented conditions" and advised that water utilities and municipalities enforce drought stage restrictions (OBWB 2021). The B.C. Ministry of Forests, Lands, Natural Resource Operations and Rural Development requested that water license holders who do not get their water from local utilities reduce their water use by half (MFLNRORD 2021).

All months from January through August 2021 saw below normal precipitation, many months being substantially below average and with no precipitation recorded in July 2021. Coupled with this were two days in the Vernon area with daytime high temperatures above 40, and many more days with daytime highs in the mid to upper 30s. Climate normal precipitation for January through August is 298.3 mm. In 2021 precipitation over that period was 1/3 of normal at 101.4 mm. There are two general effects on groundwater that stem from periods of sustained warm and dry conditions. The first is that there is simply less water to recharge aquifers and sustain water levels as water flows through the system. The second is that soils in aquifer recharge zones become extremely dry and vegetation present in such areas is also stressed, such that when rains do occur, less water will likely infiltrate. These processes in combination mean that the relatively dry winter of 2020/2021 and extremely dry weather in 2021 could have been contributing factors in the lack of full water level recovery observed in some of the wells following the pumping test program.

Figure 10.1 Weather and Climate Normal Data from Vernon Climate Stations

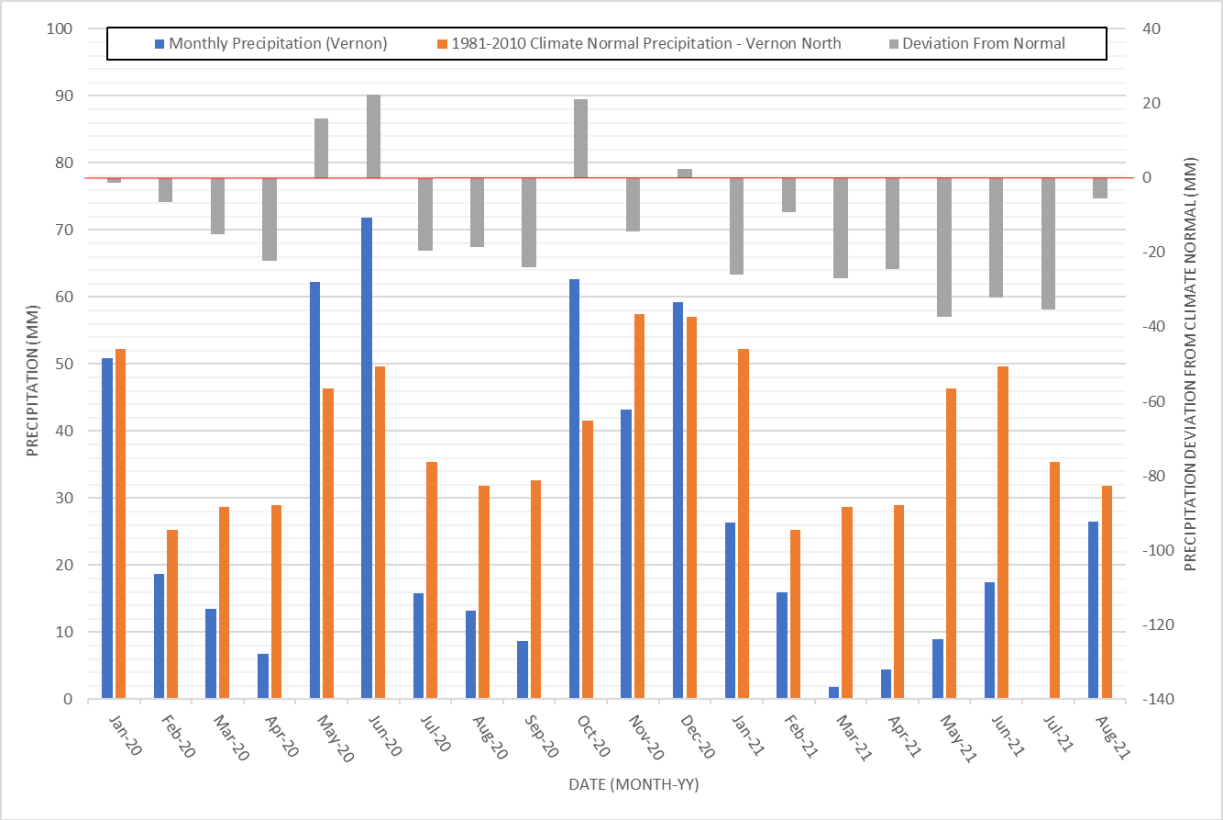
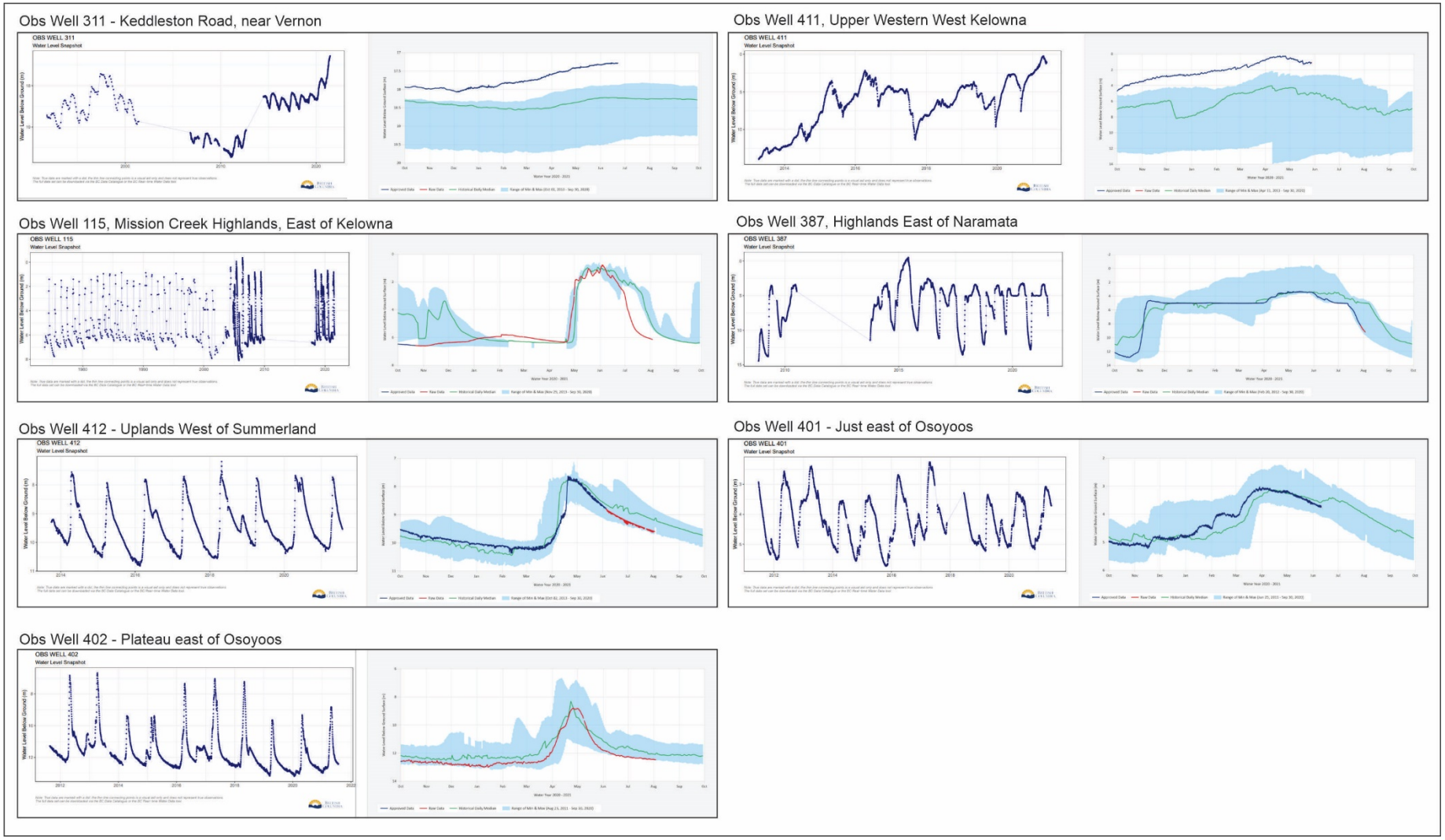


Figure 10.2 displays water level hydrographs and statistical water level data for Provincial Observations wells located in the Okanagan Valley, completed in bedrock aquifers and with data for 2021 that could be obtained online. The closest observation well to the Nodding Hill site is Observation Well #311 in the Keddleston area. This observation well displays the highest water levels for its period of record in 2021 and generally rising water levels over the preceding 10 years. Observation well #411 in West Kelowna displays a similar pattern.

The pattern observed at Observation Wells #311 and #411 is anomalous compared to all other bedrock observation wells in the valley, where 2021 water levels typically were at the low end of their range over the preceding 10 years, or in one case, at average levels.

Water level data for Keddleston Observation Well #311 does not appear to show the same sensitivity to drought as other bedrock wells in the Okanagan. We can only speculate on the cause for this, but the data suggest that there may be a lag response between climate variation and its effects on the bedrock aquifer at that location. Geological differences between Aquifer 351 in the Keddleston Road area and at the Nodding Hill site (discussed in Sections 6 and 8) may result in Observation Well #311 being unrepresentative of conditions in the broader aquifer as it is currently mapped. It is possible that the observation well represents conditions in a more regional groundwater flow system that responds on a longer time frame than some of the other wells in the area.

Figure 10.2 Monitoring Well Hydrographs and Statistical Water Level Data for Okanagan Observation Wells Completed in Bedrock Aquifers



11. WATER QUALITY ASSESSMENT

Water quality for three of the wells at the subject property was previously evaluated by WWAL in 2014 (reported on in WWAL 2017). In October of 2014, WTNs 109890, 109891 and 109892 were chlorinated, briefly pumped, and water samples were collected by Moore's Well and Pump Service.

During the 2020 well testing program, water quality samples were collected from the discharge near the end of four of the pumping tests. In October 2020, WPID's 38544, 62012, 50395 and 62008 were sampled. Samples were collected in clean laboratory supplied bottles and all samples were couriered to CARO Analytical in an iced cooler within 24 hours of sampling. The complete laboratory reports are attached in Appendices A and C through E. Table 11.1 below summarizes select water quality results compared to the Guidelines for Canadian Drinking Water Quality.

For water quality assessments, we define the term potability as water which is pure enough and of sufficient quality to be consumed or used with low risk of immediate or long-term harm. With respect to evaluation against the Guidelines for Canadian Drinking Water Quality (GCDWQ – Health Canada 2020), potable water meets all health-based Maximum Allowable Concentrations (MAC). In samples where parameters are found to exceed only Aesthetic Objectives (AO), the water is considered to be potable but treatment may be desired to address taste or odor concerns.

Water from all four wells sampled in 2020 is similar, characterized as calcium-sulfate-bicarbonate type groundwater that is slightly basic. Water from all four wells is extremely hard (438 – 557 mg/L hardness), which is typical of deep bedrock wells in the Okanagan. All four wells have total dissolved solids (TDS) concentrations that exceed the TDS AO guideline of 500 mg/L.

Iron concentrations in all four wells exceeded the AO guideline of 0.30 mg/L, and manganese concentrations in all four wells exceed the manganese AO of 0.02 mg/L. Manganese was particularly high in WPID 62012 at 0.326 mg/L, and at this concentration, exceeds the manganese MAC of 0.12 mg/L. Both iron and manganese are common aesthetic water quality issues in groundwater supplies in the interior of the province, and their presence in the Nodding Hill wells is not unusual for the area. Iron and manganese concentrations can be reduced to below guideline concentrations with readily available in-home water treatment systems.

We also note that fluoride is elevated in all four wells. In WPIDs 50395 and 62008, fuoride concentrations were measured at 1.40 mg/L, which is slightly below the fluoride MAC of 1.5 mg/L. Fluoride is also naturally occurring in groundwater, the extent to which depends largely on the host rock geology, and elevated fluoride in wells in the Okanagan is fairly widespread. Fluoride concentrations can fluctuate over time, and considering how close fluoride concentrations are to the MAC in WPIDs 50395 and 62008, precautionary treatment to reduce fluoride concentrations should be considered.

Laboratory results confirm that sampled wells meet, or in one case can be readily treated to meet, RDNO Bylaw for potable water standards.

Table 11.1. 2020 Groundwater Quality Summary

Parameter	Units	Well ID				Guideline
Date Samples Collected		**22-Oct-2020**	**25-Oct-2020**	**25-Oct-2020**	**30-Oct-2020**	
Well ID		WPID38544	WPID62012	WPID 50395	WPID 62008	
Field Parameter	**Units**					**GCDWQ**
pH	pH units	8.13	8.05	8.04	7.96	AO = 7-10
Conductivity	us/cm	845	1140	1340	1020	
Turbidity	NTU	5.98	9.42	2.04	0.72	varies
General Parameters and Nutrients						
Total Dissolved Solids	mg/L	**610**	**742**	**845**	**705**	AO < 500
Hardness	mg/L	473	557	554	438	
Alkalinity (total)	mg/L	296	378	356	334	
Fluoride	mg/L	0.80	1.13	1.40	1.40	MAC = 1.5
Nitrate, N	mg/L	<0.010	<0.010	<0.010	<0.010	MAC =10
Nitrite, N	mg/L	<0.010	<0.010	<0.010	<0.010	MAC = 1
Chloride	mg/L	0.71	14.1	5.85	3.19	AO < 250
Sulfate	mg/L	233	252	345	275	AO < 500
Selected Total Ions and Metals						
Aluminum	mg/L	<0.0050	<0.0050	<0.0050	0.0067	OG < 0.1
Antimony	mg/L	<0.00020	<0.00020	<0.00020	<0.00020	MAC =0.006
Arsenic	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	MAC = 0.01
Barium	mg/L	0.0226	0.0405	0.186	0.0150	MAC = 2
Boron	mg/L	<0.0500	<0.0500	<0.0500	0.0610	MAC = 5
Cadmium	mg/L	0.000027	0.000047	0.000051	<0.000010	MAC =0.005
Chromium	mg/L	<0.00050	<0.00050	<0.00050	<0.00050	MAC = 0.05
Copper	mg/L	<0.00040	0.00183	0.00906	0.0254	MAC = 2
Iron	mg/L	**0.637**	**0.974**	**1.39**	**0.328**	AO < 0.30
Lead	mg/L	0.00070	0.00071	0.00382	0.00037	MAC = 0.01
Manganese	mg/L	**0.0730**	**0.326**	**0.0594**	**0.0394**	MAC = 0.12 AO < 0.02
Selenium	mg/L	<0.00050	0.00295	<0.00050	<0.00050	MAC = 0.01
Sodium	mg/L	34.5	56.7	98.3	80.3	AO < 200
Uranium	mg/L	0.00285	0.00635	0.00243	0.000933	MAC = 0.02
Zinc	mg/L	0.290	0.222	0.748	0.0595	AO < 5
Bacteriological Parameters						
Total Coliforms	CFU/100mL	<1	<1	<1	<1	MAC < 1
E. Coli	CFU/100mL	<1	<1	<1	<1	MAC < 1

Notes:

1. All results reported in units of mg/L unless otherwise stated.
2. GCDWQ = Guidelines for Canadian Drinking Water Quality (Health Canada 2017)
3. Green shaded values indicate exceedances of Aesthetic Objective (AO) or Operational Guideline (OG)
4. Orange shaded values indicate exceedances of health-based Maximum Allowable concentration (MAC).

12. SUMMARY OF EXISTING ONSITE WATER SUPPLIES

To summarize potential water supplies onsite, Table 12.1 compiles information for the 18 existing wells on the property, the testing completed and whether these wells are capable of meeting the RDNO Subdivision Servicing Bylaw 2600 requirements. 15 of the 18 wells present meet the RDNO Bylaw quantity requirement, either based on the driller-estimated yield for the well or verified by pumping test. One well was found to not be able to meet the Bylaw quantity requirement following a pumping test, while two wells have driller-estimated yields < 3 Imperial gpm and require a pumping test to confirm they can meet the Bylaw requirement.

Table 12.1. Summary of Existing Water Sources and Bylaw Conformance

Date of Completion	WPID	Driller-Estimated Well yield (USgpm)	Pumping Test	Water Quality Assessment Date	Well Satisfies Bylaw 2600 Yield Requirement?
Nov.-Dec., 1981	WTN46392	50			Yes
Sept, 2014	38541	13		October 10, 2014	Yes
Sept, 2014	38542	30	2017 - 72 hours at 5 US gpm	October 10, 2014	Yes
Sept, 2014	38543	9	2017 - 67 hours at 3 US gpm	October 10, 2014	Yes
Sept, 2014	38544	1.5	2020 - 72 hours at 1.25 US gpm	October 22, 2020	Yes
Nov, 2019	50393	10			Yes
Nov, 2019	50394	25			Yes
Dec, 2019	50395	2.5	2020 - 72 hours at 1.25 US gpm	October 25, 2020	Yes
Dec, 2019	50396	100			Yes
Dec, 2019	50397	8			Yes
Dec, 2019	50398	1.5			Requires Confirmation with a pumping test
Dec, 2019	50399	3	2020 - 53 hours at 1.25 US gpm		No
Jun, 2020	62005	9			Yes
June, 2020	62006	1.5			Requires Confirmation with a pumping test
June, 2020	62007	30			Yes
June, 2020	62008	100	2020 - 72 hr pump test at 30 US gpm	October 30, 2020	Yes
June, 2020	62009	4			Yes
July, 2020	62012	3.25	2020 - 72 hours at 1.25 US gpm	October 30, 2020	Yes

13. DISCUSSION AND CONCLUSIONS

A significant amount of area review and site-specific hydrogeological evaluation has been completed at the Nodding Hill property. Expanding on the WWAL analysis completed in 2017, this 2020 testing program entailed the installation of multiple water level monitoring transducers and the collection of ground water levels for a period of approximately one year, the collection and laboratory analysis of multiple water samples, and 72-hour pumping tests on five onsite wells.

As of the date of this report, 18 wells have been drilled on the subject property, of which 15 wells satisfy RDNO Subdivision Bylaw 2600 water quantity requirements for drilled wells providing a source of domestic potable water. One well did not meet Bylaw requirements when subjected to a 72-hr pumping test, and two wells have lower driller-estimated yields and still require pumping tests to verify adequate yields.

A set of seven onsite wells have been sampled for water quality, either as part of this 2020 assessment or previously in 2014. Water quality results have been relatively consistent with sampled wells generally displaying elevated iron, manganese and/or Total Dissolved Solids, all of which are common aesthetic issues in groundwater in the interior of B.C. Fluoride is elevated in all wells, in one case, above the health-based Guideline for Drinking Water Quality. Elevated fluoride is also common in bedrock wells in the area and can be readily reduced with conventional in-home water treatment systems. Laboratory results confirm that sampled wells meet, or in one case can be readily treated to meet, RDNO Bylaw requirements for potable water standards.

Drilling results to date indicate that the probability of drilling success is good at the subject property with a median driller-reported well yield of 9 US gpm. Should rezoning of the property be approved and any wells remaining to be tested prove unsuitable as a source of potable water during the subdivision process, there is good probability that alternate wells may be drilled that will satisfy Bylaw water quality and quantity requirements.

All of the wells drilled on the site are completed in bedrock Aquifer 351, but it is important to note that the mapped extent of Aquifer 351 does not explicitly take into account underlying geology, which varies across the mapped extent of the aquifer. It is our opinion that differences in the geological setting between the Nodding Hill site and other nearby areas such as the Keddleston Road area result in more favourable conditions for groundwater development in the Nodding Hill area. As shown on Figures 2 and 3, a north-south trending fault is mapped as present between Nodding Hill and the Keddleston Road area to the east. This fault is important to understanding groundwater availability in this area for two reasons:

1) The fault results in different geological units being present under the two areas. Beneath Nodding Hill, the Chase Formation quartzite is present and based on drilling results, this unit appears to be well fractured and hosts a productive aquifer. Faulting has resulted in the Chase Formation not being present beneath the Keddleston Road area, where the older Tsius Schist is present and appears to be less fractured or has less interconnectivity of fractures. A clear difference in driller-

reported well yields exists between wells in the Keddleston area (lower) and wells west of the fault (higher).

2) Faulting typically results in increased fracturing of bedrock around the fault, which can create aquifers with more storage and higher productivity. Harder rocks, such as quartzite and meta-quartzite and gneiss, would be more prone to fracturing while softer rocks, such as schists would be less so. Fault zones in softer rocks can result in reduced permeability in fault zones.

Bedrock aquifers are inherently heterogeneous and the degree of fracturing and interconnectedness of fractures can vary significantly over short distances. This complexity results in varying well yields, and Nodding Hill is no exception, as driller-estimated yields for wells on the site range from 1.5 US gpm to 100 US gpm. The testing programs completed in 2017 and 2020 addressed this variability by selecting wells with a range of driller-estimated yields. The 2020 testing program saw 72 hour pump tests completed on four of the lowest yielding wells on the subject property and on one of the highest yielding wells.

Simulation of the collective effects of multiple wells drawing on the aquifer was evaluated by subjecting a centrally located well, well WPID 62008, to a variable rate step test and a continuous high volume 72-hour pumping test. The pumping rate used for this test (30 US gpm) was chosen based on the results of the step test, and is equivalent to 25 domestic wells being operated at the RDNO Bylaw requirement at the same time (a rate equivalent to the deemed water rights for 81 domestic wells as defined in the *Water Sustainability Act*).

During the course of pumping, measurable interference with wells onsite was observed while more distant wells located beyond the property boundaries showed little or no well interference. Once pumping had stopped, well WPID 62008 and wells located downslope displayed rapid recovery, while wells located upslope did not completely recover. This result is not unexpected as the testing was completed during the time of year when little or no aquifer recharge is occurring. Transducers remain in five wells at the subject property and have been measuring water levels since the conclusion of the 2020 pumping test program. This collected data indicates that water levels continued to recover through the winter of 2020/2021 and into the spring before beginning the typical seasonal decline. The spring and summer of 2021 was abnormally dry and could have been a factor in onsite wells not recovering to pre-test levels.

Data collected during the WPID 62008 test suggests that surface water and snowmelt at the site may quickly recharge the underlying aquifer system, as water discharged to ground from this test appears to have quickly returned to the aquifer and raised water levels in wells downslope. The unnamed seasonal stream that transects the site is likely a significant source of aquifer recharge for the area. Septic systems should be located a minimum of 15 m from this stream in accordance with the guidelines in the Sewerage System Standard Practice Manual.

The approximate watershed for this unnamed season stream is shown on Figure 1 and extends northeast from Nodding Hill to Keddleston Road and beyond. It is important that development within this watershed occur in a way to avoid impacting the function of or flows through this system. The watershed is identified

as "Fully Recorded" by the Province in terms of water licensing, meaning that additional surface water licenses will likely not be issued, which is typical of the area and protective of the resource moving forward.

While our present scope of work does not include a thorough technical review of the 2020 Golder study of Aquifers 349 through 351, it is appropriate that we address certain assumptions made in the study and factors that were not taken into account to both provide context and discuss our related findings.

- Firstly, the Golder water budget is generalized, and based on several assumptions, as would be appropriate for such a broad-based assessment. The results of the water budget assessment should not be taken as a firm estimate of available ground water in the area but rather as an indication of the relative water balance in these aquifers. We acknowledge that the RDNO has retained Golder to expand on their initial findings and that the next phase of work is anticipated to be complete late 2021 or early 2022.

- The Golder study does not take into account the geological/hydrogeological setting underlying these aquifers at a site specific scale, which is quite important as our findings have identified that the presence of a geological fault within Aquifer 351 appears to have significant bearing on aquifer productivity.

- As previously discussed in this report certain assumptions used in the Golder water budget are subjective and therefore possibly not appropriate for this area. For example, assuming domestic extraction equal to the RDNO Subdivision Bylaw Requirement of 6.55 m^3/day (1.0 Imperial Gallon per Minute) per property using a well for domestic potable water is perhaps unreasonably high, as the *Water Sustainability Act* protects domestic water withdrawal only up to 2 m^3/day, and typical household use in rural areas is well below 6.55 m^3/day as evidenced by the widespread use of 2.27 m^3/day by other regional districts and the Ministry of Transportation in subdivision servicing requirements.

- Assumptions related to groundwater use for the irrigation of agricultural properties were likely overstated. Based on our review of historical air photos and water licenses on file with the Province, we find limited indication of active irrigation of properties upslope of the Nodding Hill area, and agricultural properties to the west are supplied by GVW. While there are three licenses on Woolliams Pond for irrigation of properties southeast of the subject property, air photos do not indicate these properties are actively irrigated. Further, there are no wells within 3 km of the site with a reported irrigation use in the Provincial GWELLS database, and no groundwater licenses for wells have been issued within 1.5 km of the subject property. If irrigation with groundwater is occurring in the area, it appears it is done without being licensed and therefore would not be protected or lawful under the *WSA*.

- Lastly, Golder's estimates of the percentage of annual precipitation recharging the local aquifer system (4% or 20 mm/year) are considered low, and a strong rationale for why this value was chosen is not given other than it was used in a previous water balance study (Smerdon et. Al 2009). Other previous groundwater balance studies, such as Phase 2 Okanagan Water Supply and Demand Project: Groundwater Objectives 2 and 3 (Golder-Summit 2009) used higher recharge

estimates of 7% of annual precipitation. The inferred rapid-re-infiltration of water discharged during the pumping test on WPID 62008 indicates, that at least in localized areas, significantly more recharge can occur.

In conclusion, it is our opinion that sufficient groundwater resources exist on the site to support the rezoning application for development to be serviced by private wells without negatively impacting existing wells in the neighbourhood. We recommend a phased approach to development commencing with an initial phase of 10 lots at the north end of the property (Figure 4) while groundwater levels in multiple wells onsite continue to be monitored to develop a better understanding of seasonal groundwater fluctuations and aquifer recharge. We recommend that the longer-term monitoring data be reviewed and interpreted and used as the basis for a decision on subsequent future phases of development to the south.

14. RECOMMENDATIONS

R1 We recommend that development of the proposed 17 lots occur in phases commencing with an initial 10 lots at the north end of the site (Figure 4). Additional lots would form part of a subsequent second phase of subdivision and development.

R2 Water level transducers were installed in five onsite wells in 2020 and remain in place collecting water level data. These transducers should be maintained and groundwater level data should continue to be collected and reviewed periodically by a hydrogeologist. Additional groundwater level data should be collected for 1 to 2 years (or longer if necessary) and should be reviewed and interpreted and used as the basis for a decision on subsequent development to the south.

R3 We understand that the RDNO has commissioned Golder Associates to proceed with the second phase of their assessment of groundwater resources in Aquifers 349, 350 and 351. A significant amount of hydrogeological information has been collected for the Nodding Hill site, and this information may prove valuable to Golder in their study. We suggest making this report available to Golder, and allowing use of wells at Nodding Hill as monitoring wells if beneficial for that study.

R4 The unnamed ephemeral stream corridor through the northern part of Nodding Hill should be protected to avoid impacting flows through this system and what is likely a key recharge source to the aquifer.

R5 Septic systems must be designed and installed by either a Professional Engineer or Registered Onsite Waste Water Practitioner with all components installed in accordance with the Sewerage System Standard Practice Manual. Further, construction of any septic system dispersal fields within 15m of the unnamed ephemeral stream corridor which is located through the northern part of the Nodding Hill properties be prohibited and that septic systems be located at least 30m from a well.

R6 In accordance with the RDNO Subdivision Servicing Bylaw, we recommend that any existing, future newly drilled or altered (deepened) wells with driller estimated yields less than 3.0 Imperial gpm be tested under the direction and oversight of a hydrogeologist.

REFERENCES

Allen, D., A. Badry, B. Ingimundson, G. Wendling, B. Worobets, and N. Morrison. 1999. Evaluating long-term well capacity for a Certificate of Public Convenience and Necessity. Water Management Branch, B.C. Ministry of Environment, Land and Parks. Victoria.

Associated Engineering. 2007. Keddleston Area Water Supply Strategic Plan. Prepared for the Regional District of North Okanagan, March 2007.

Climate Projections for the Okanagan Region (CPOR). 2020. http://www.rdosmaps.bc.ca/min_bylaws/planning/ClimateActionPlan/ClimateProjections_forOkanaganRegion_Feb2020.pdf

Environment Canada (2017). Canadian Climate Normals 1981 to 2010 Station Data. http://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?stnID=1069&autofwd=1

Golder Associates / Summit Environmental Consultants Ltd. 2009. Phase 2 Okanagan Water Supply and Demand Project: Groundwater Objectives 2 and 3 Basin Study. July 2009.

Golder Associates. 2020. Report – Keddleston Groundwater Study, Electoral Area C, Regional District of North Okanagan, B.C. 31 January 2020.

Health Canada (GCDWQ) 2017. Guidelines for Canadian Drinking Water Quality http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/index_e.html

Ministry of Environment (ENV) 2020. Online water well, observation well and aquifer mapping. http://maps.gov.bc.ca/ess/sv/wrbc/

Ministry of Forests, Lands, Natural Resource Operations and Rural Developmen, 2021. Online bulletin, Drought level increasing in the Okanagan, August 14, 2021. https://news.gov.bc.ca/releases/2021FLNRO0068-001605

Okanagan Basin Water Board, 2021. Okanagan Drought Bulletin #2021-2, August 15, 2021. https://www.obwb.ca/okanagan-drought-bulletin-august-13-2021/

Okulitch, A.V. (comp.), 2013. Geology, Okanagan Watershed, British Columbia; Geological Survey of Canada, Open File 6839, scale 1:100 000.

Smerdon, B.D., Allen, D. M., Grasby, S.E. and Berg, M.A. 2009, An approach for predicting groundwater recharge mechanisms in mountainous watersheds. Journal of Hydrology, 365 (2009) 156 – 172.

Thompson, R.I. and Unterschutz, J.L.E. 2004. Geology, Vernon, British Columbia; Geological Survey of Canada Open File 4375, scale 1:50 000

Western Water Associates Ltd. (WWAL). 2017. Groundwater Assessment in Support of Rezoning Application, Nodding Hill Development, near Vernon, B.C. September 27, 2017.

Western Water Associates Ltd.
Standard Report Limitations

1. This Document has been prepared for the particular purpose outlined in the work scope that has been mutually agreed to with the Client.
2. The scope and the period of service provided by Western Water Associates Ltd are subject to restrictions and limitations outlined in subsequent numbered limitations.
3. A complete assessment of all possible conditions or circumstances that may exist at the Site or within the Study Area referenced, has not been undertaken. Therefore, if a service is not expressly indicated, it has not been provided and if a matter is not addressed, no determination has been made by Western Water Associates Ltd. in regards to it.
4. Conditions may exist which were undetectable given the limited nature of the enquiry that Western Water Associates Ltd. was retained to undertake with respect to the assignment. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the Site, or Study Area, which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.
5. In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Western Water Associates Ltd's opinions are based upon information that existed at the time of the production of the Document. It is understood that the Services provided allowed Western Water Associates Ltd to form no more than an opinion of the actual conditions of the Site, or Study Area, at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the Site, or Study Area, nor the surroundings, or any laws or regulations.
6. Any assessments made in this Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either expressed or implied, that the actual conditions will conform exactly to the assessments contained in this Document.
7. Where data supplied by the Client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated.
8. No responsibility is accepted by Western Water Associates Ltd for incomplete or inaccurate data supplied by others.
9. The Client acknowledges that Western Water Associates Ltd may have retained sub-consultants affiliated to provide Services. Western Water Associates Ltd will be fully responsible to the Client for the Services and work done by all of its sub-consultants and subcontractors. The Client agrees that it will only assert claims against and seek to recover losses, damages or other liabilities from Western Water Associates Ltd.
10. This Document is provided for sole use by the Client and is confidential to it and its professional advisers. No responsibility whatsoever for the contents of this Document will be accepted to any person other than the Client. Any use which a third party makes of this Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. Western Water Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Document.

FIGURES

Nodding Hill Developments
Groundwater Resource Assessment in Support of Rezoning
WWAL Ref: 17-049-02

Figure 1: Reported Wells, Aquifers and Surface Water Licences near Nodding Hill Project Site

Legend

- Well Reported in GWELLS database. Offsite, labelled with WTN. Onsite, labelled with WPID.
- Well subjected to 72 hour test at 30 US gpm.
- Well monitored during 72 hour test.
- Well assessed/attempted to monitor during 72 hour test unsuccessfully.
- Well owner contacted with offer to monitor, declined.
- Active surface water licence (licences with use other than domestic labelled with licence number and use)
- Cancelled or abandoned surface water licence

Project: 17-049-02

January 2021

western water ASSOCIATES LTD
Consultants in Hydrogeology and Water Resources Management

0 450m 900m
Approximate Scale

Approximate watershed for unnamed stream passing through northern part of Nodding Hill

Mapped Normal Fault - See Figures 2 and 3

C113482 (Cedar Ck, conservation)

Nodding Hill Property Area of Focus for this Assessment

111902

WTN46392 "Galloway Low Well"

62007
62006
38544
62009
38541
38542
50397
Frank's Well
62005
38543
50396
62012
62008
50398
50393
50395
50394
50399
Carl's Well

98748

Leggat, no well info

C109543 (Fox Spring, stock watering)

Swan Lake

Aquifers 1151 &348

113935
49639

84211 "Galloway South Field Well"

Aquifers 351 and 349

Observation Well 311

Aquifer 351

Aquifer 349

C59406, C126267, C126268 (Woolliams Pond, Irrigation)
C126626, stock watering

C63729 - Deer Ck., waterworks, 11.4 m3/day

Wells Reported in Keddleston Area Strategic Water Plan (AE 2007)

- Well Quantity: Good or Excellent Well Quality: Poor
- Well Dry, Well Not in Use
- Well Quantity: Good or Excellent Well Quality: Good or Excellent
- Well Quantity: Poor Well Quality: Good or Excellent
- Well Quantity: Poor Well Quality: Aesthetically Poor
- Well Quantity: Poor Well Quality: Poor

DEVONIAN (and CARBONIFEROUS?)

SILVER CREEK FORMATION (Jones,1959)

Dqfb — *Silver Creek schist: Quartz-feldspar-muscovite-biotite schist with or without garnet, staurolite and sillimanite; black carbonaceous schist; dark-grey to tan micaceous quartzite; minor white-to-grey marble; amphibolitic schist; minor amphibolite (map units Psb4 and Psb6 of Read, 1979a).*

Dm — *Silver Creek marble: Medium to coarse crystalline, white to dark grey marble (map unit Psc5 of Read, 1979a).*

MIDDLE? DEVONIAN

CHASE FORMATION (CALCAREOUS QUARTZITE MARKER UNIT)

Dcqm — *White to light grey, cliff-forming, calcareous quartzite having a coarse, pitted texure on weathered surfaces; diopside rich calcsilicate bands (map unit F3 of Reesor and Moore, 1971).*

Paleo- and/or Mesoproterozoic

Pqfh — *Tsuius schist: Biotite-quartz-feldspar schist (with or without sillimanite, garnet); feldspar-quartz-hornblende schist (with or without biotite); amphibolite; calc-silicate gneiss; micaceous quartzite (map units M and F of Reesor and Moore, 1971).*

Figure 2: Bedrock Geology and Geologic Structure near the Project Site

WWAL Project #: 17-049-01	Drawn By: RR

Image Source: Open File 4375, Geology Vernon. Thompson and Unterschutz 2004.

western water ASSOCIATES LTD
Consultants in Hydrogeology and Water Resources Management

Nodding Hill Site (approximate)

Cross-section trace, see Figure 3

A

A'

Fault

Dqfb

Dcqm

Eiv

VERNON

Swan Lake

Lake

Creek

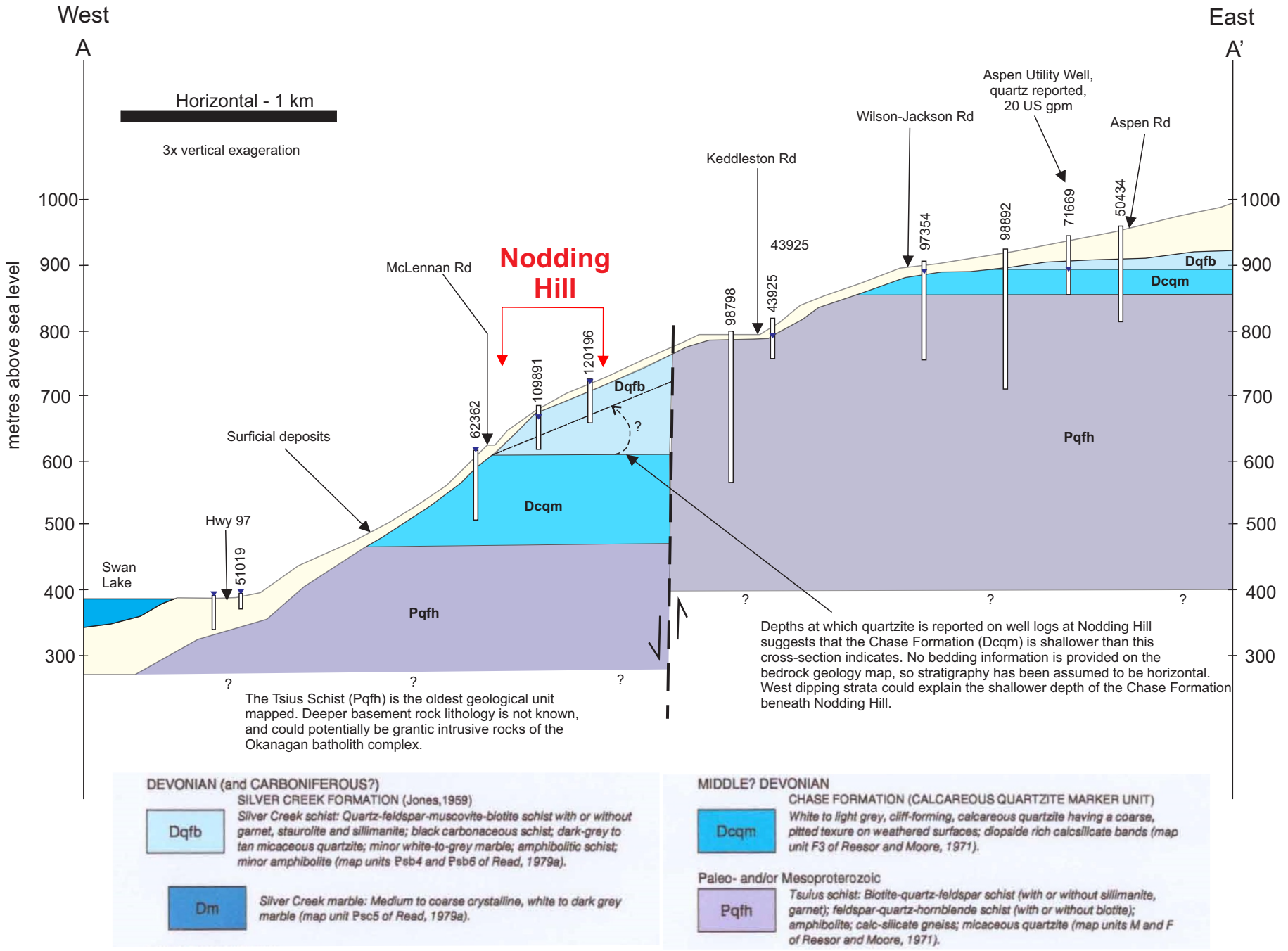


Figure 3: Conceptual Geological Cross-Section, East-West through Nodding Hill Property

WWAL Project: 17-049-02 Drawn By: RR Date: January 2021

western water ASSOCIATES LTD
Consultants in Hydrogeology and Water Resources Management

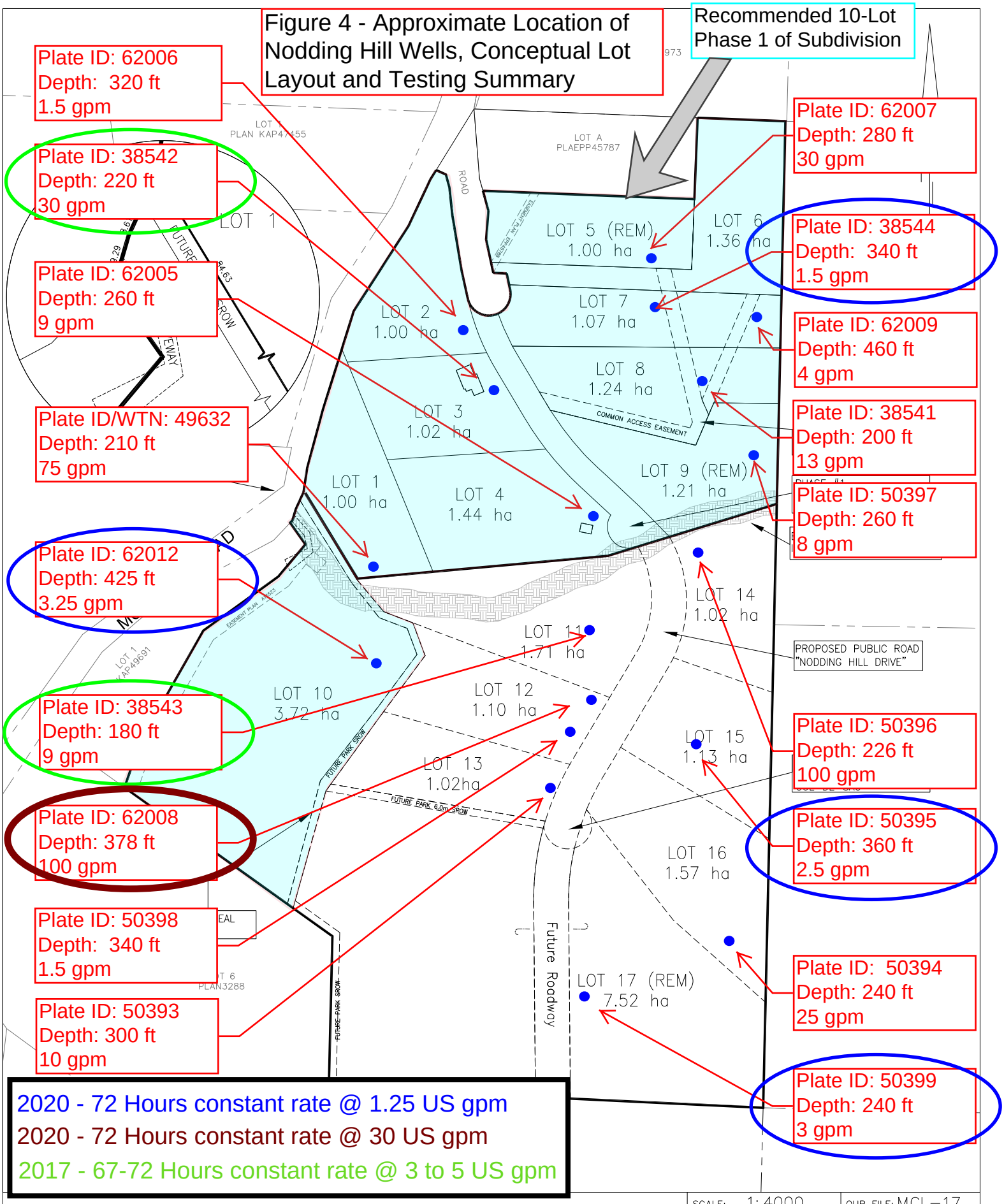


Figure 4 - Approximate Location of Nodding Hill Wells, Conceptual Lot Layout and Testing Summary
Recommended 10-Lot Phase 1 of Subdivision
Plate ID: 62006
Depth: 320 ft
1.5 gpm
Plate ID: 38542
Depth: 220 ft
30 gpm
Plate ID: 62005
Depth: 260 ft
9 gpm
Plate ID/WTN: 49632
Depth: 210 ft
75 gpm
Plate ID: 62012
Depth: 425 ft
3.25 gpm
Plate ID: 38543
Depth: 180 ft
9 gpm
Plate ID: 62008
Depth: 378 ft
100 gpm
Plate ID: 50398
Depth: 340 ft
1.5 gpm
Plate ID: 50393
Depth: 300 ft
10 gpm
Plate ID: 62007
Depth: 280 ft
30 gpm
Plate ID: 38544
Depth: 340 ft
1.5 gpm
Plate ID: 62009
Depth: 460 ft
4 gpm
Plate ID: 38541
Depth: 200 ft
13 gpm
Plate ID: 50397
Depth: 260 ft
8 gpm
Plate ID: 50396
Depth: 226 ft
100 gpm
Plate ID: 50395
Depth: 360 ft
2.5 gpm
Plate ID: 50394
Depth: 240 ft
25 gpm
Plate ID: 50399
Depth: 240 ft
3 gpm
LOT 1
PLAN KAP47455
LOT A
PLAEPP45787
LOT 1
LOT 2
1.00 ha
LOT 3
1.02 ha
LOT 4
1.44 ha
LOT 5 (REM)
1.00 ha
LOT 6
1.36 ha
LOT 7
1.07 ha
LOT 8
1.24 ha
LOT 9 (REM)
1.21 ha
COMMON ACCESS EASEMENT
LOT 10
3.72 ha
LOT 11
1.71 ha
LOT 12
1.10 ha
LOT 13
1.02ha
LOT 14
1.02 ha
LOT 15
1.13 ha
LOT 16
1.57 ha
LOT 17 (REM)
7.52 ha
PROPOSED PUBLIC ROAD
"NODDING HILL DRIVE"
Future Roadway
FUTURE PARK 6.0m SROW
FUTURE PARK SROW
ROAD
2020 - 72 Hours constant rate @ 1.25 US gpm
2020 - 72 Hours constant rate @ 30 US gpm
2017 - 67-72 Hours constant rate @ 3 to 5 US gpm
SKETCH PLAN OF SUBDIVISION OF 7505, 7601 & 7605 McLennan Road
(Total 17 Lots including 3 Remainders)
SCALE: 1: 4000
OUR FILE: MCL–17
DATE: 1 SEP 2020
DRAWN: JFG
NODDING HILL DEVELOPMENTS

Figure 5a: Nodding Hill Long Term Water Levels

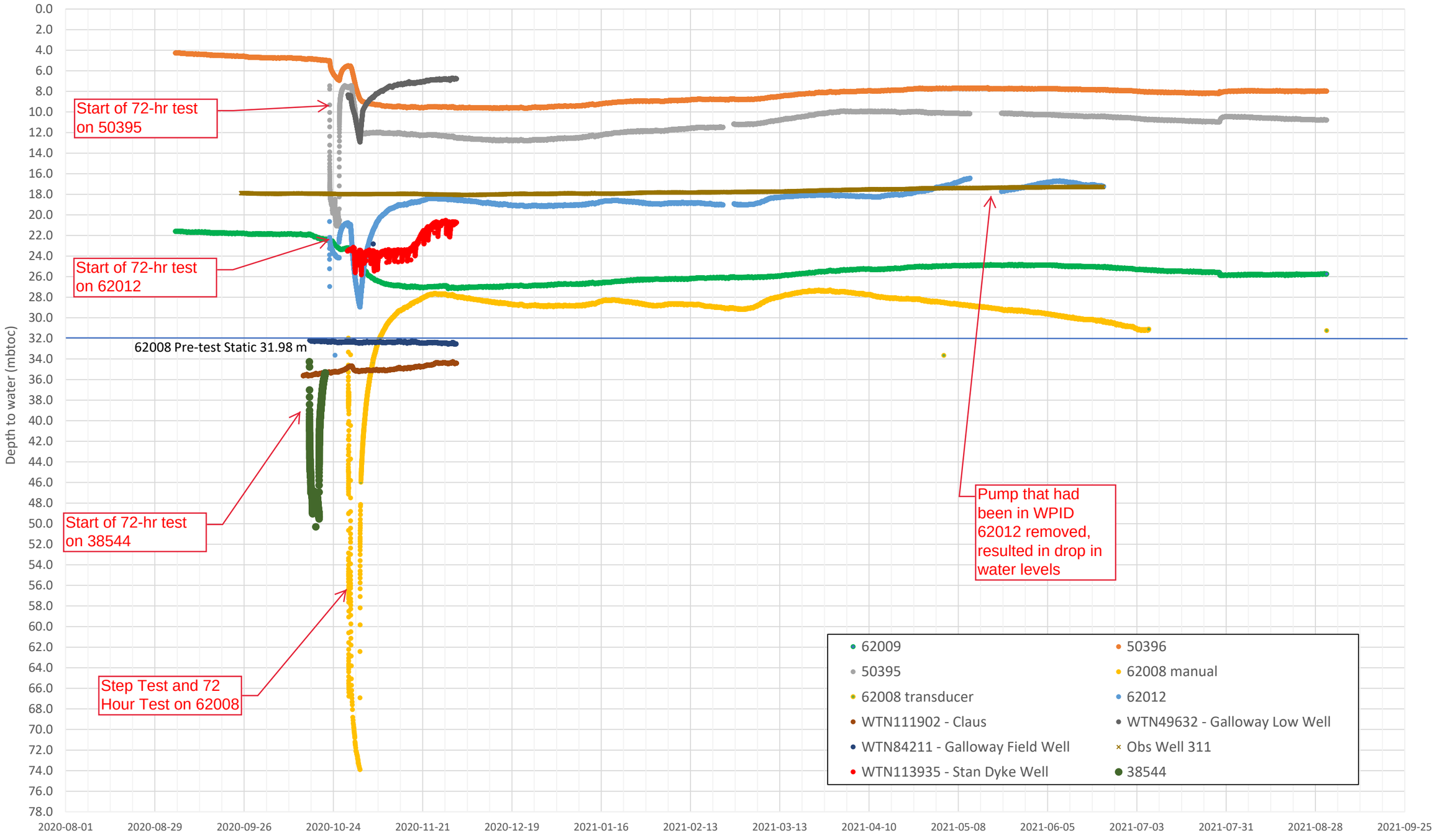
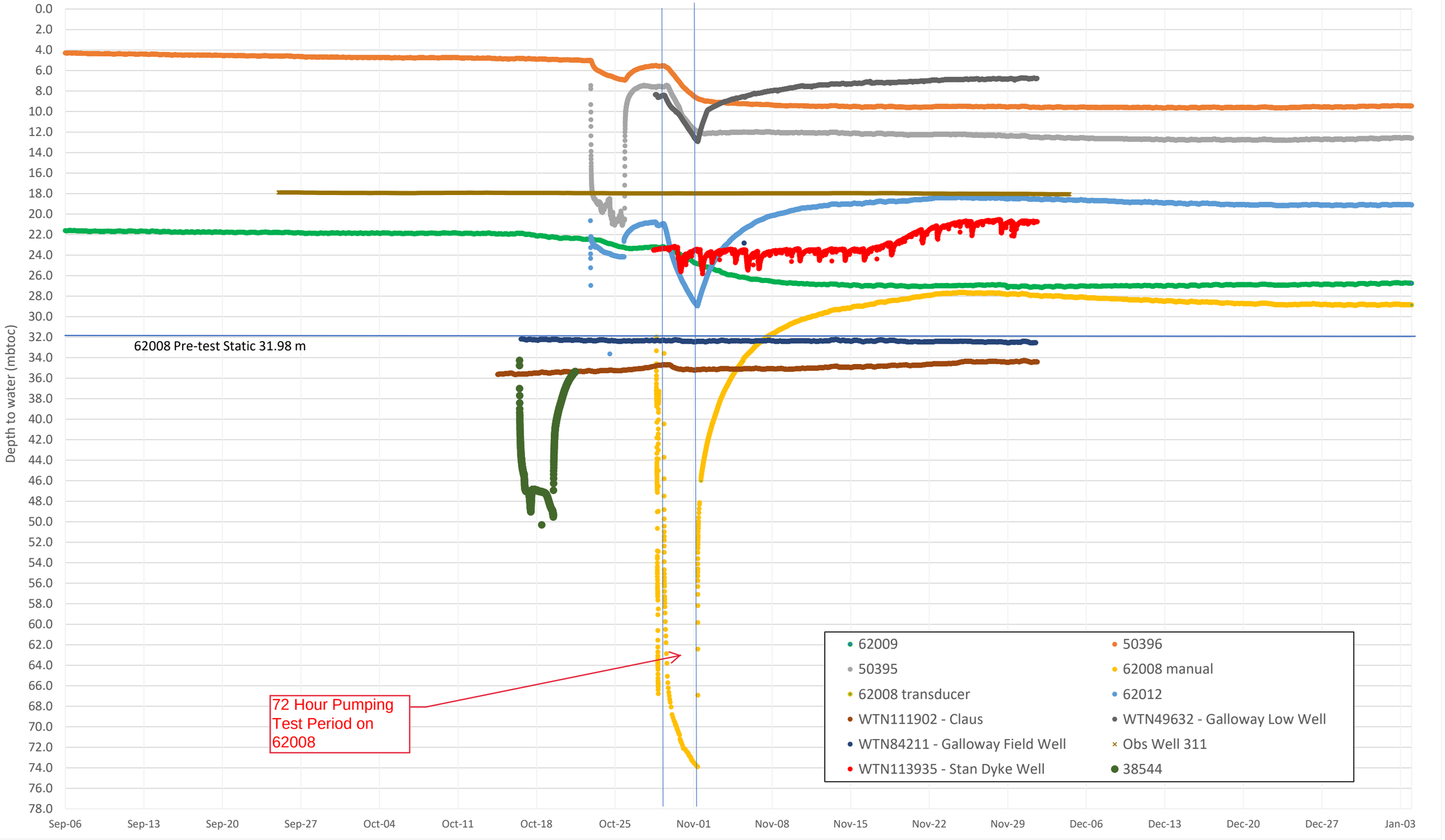


Figure 5b: Nodding Hill Long Term Water Levels
(zoom in around pumping tests)



Appendix A
Pumping Test Graphs and Water Quality Results: WPID 38544

Nodding Hill Developments
Groundwater Resource Assessment in Support of Rezoning
WWAL Ref: 17-049-02

western water ASSOCIATES LTD

Figure A1: WTN38544 - 72 hour Constant Rate Test Hydrograph, 1.25 US gpm, October 15-18, 2020

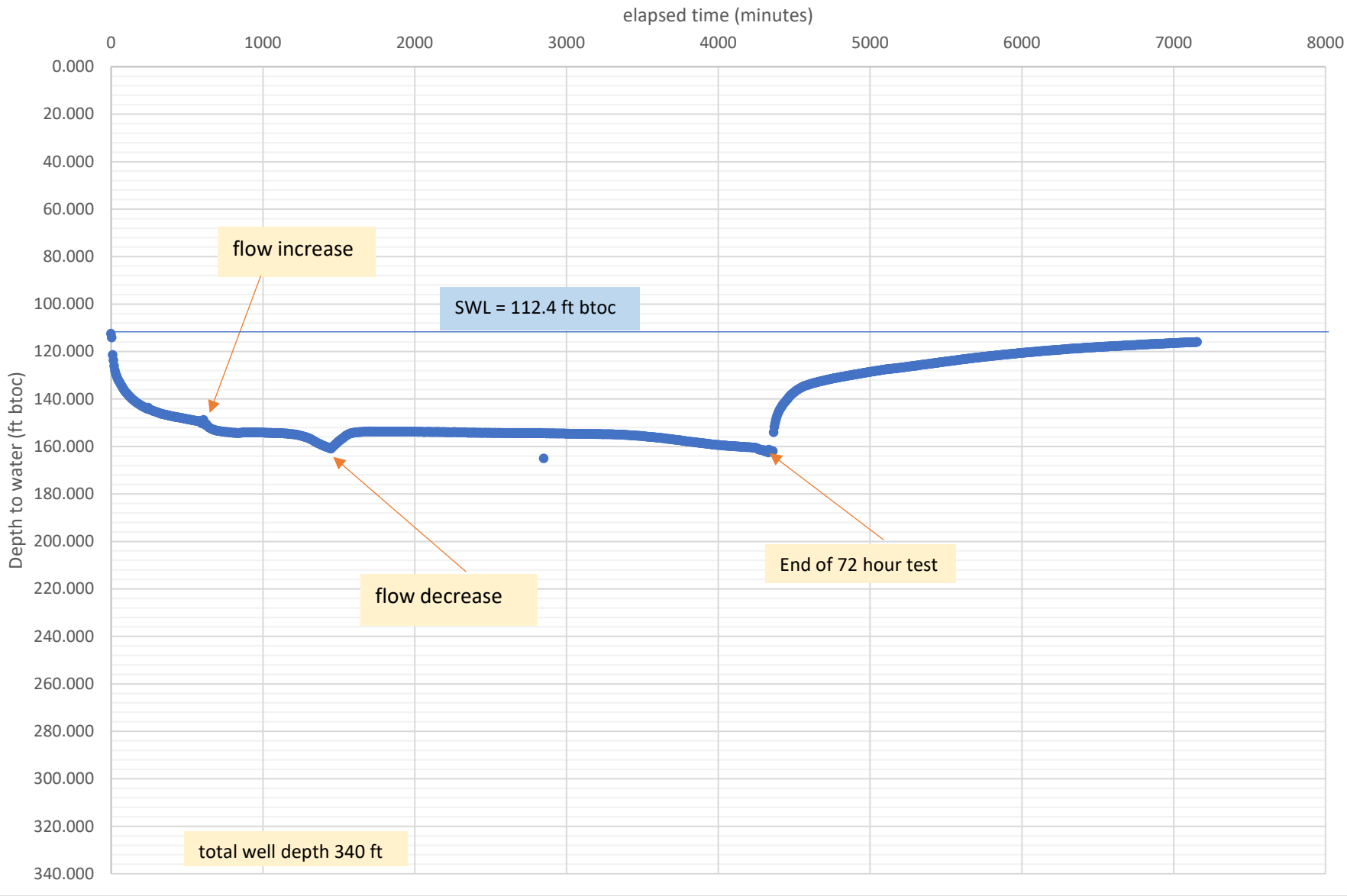
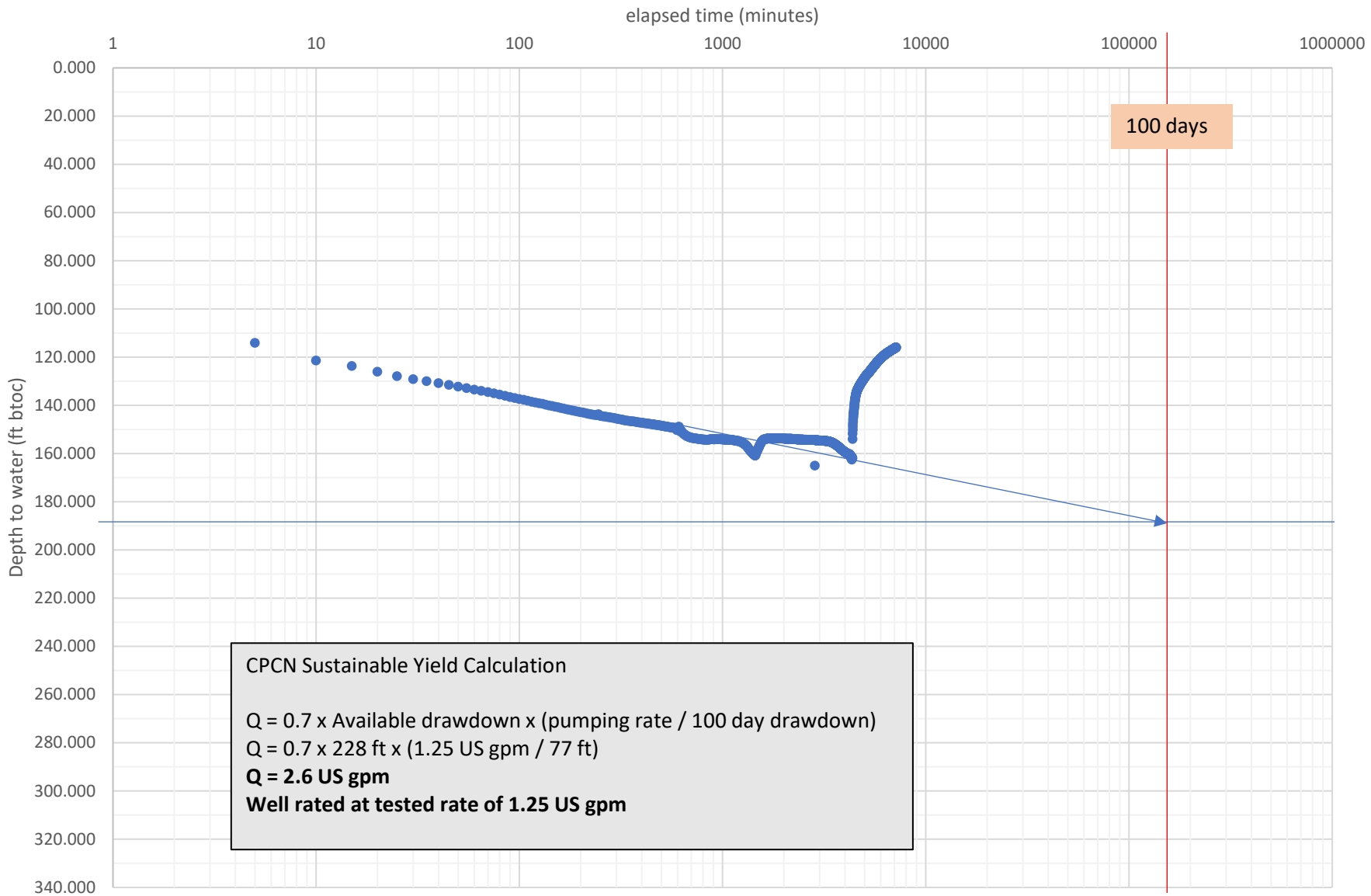


Figure A2: WTN38544 - 72 hour Constant Rate Test Semi-logarithmic Plot,
1.25 US gpm, October 15-18, 2020



CERTIFICATE OF ANALYSIS

REPORTED TO	Western Water Associates Ltd 106 - 5145 26th Street Vernon, BC V1T 8G4		
ATTENTION	Ryan Rhodes	**WORK ORDER**	20J1737
PO NUMBER		**RECEIVED / TEMP**	2020-10-19 14:35 / 6°C
PROJECT	17-049-02	**REPORTED**	2020-10-27 16:59
PROJECT INFO		**COC NUMBER**	B91103

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

If you have any questions or concerns, please contact me at sgulenchyn@caro.ca

Authorized By:

Sara Gulenchyn, B.Sc, P.Chem.
Client Service Manager

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J1737
PROJECT	17-049-02	**REPORTED**	2020-10-27 16:59

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
38544 (20J1737-01) | Matrix: Water | Sampled: 2020-10-19 09:30						
Anions						
Chloride	**0.71**	AO ≤ 250	0.10	mg/L	2020-10-20	
Fluoride	**0.80**	MAC = 1.5	0.10	mg/L	2020-10-20	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2020-10-20	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2020-10-20	
Sulfate	**233**	AO ≤ 500	1.0	mg/L	2020-10-20	
Calculated Parameters						
Hardness, Total (as CaCO3)	**473**	None Required	0.500	mg/L	N/A	
Langelier Index	**1.1**	N/A	-5.0		2020-10-27	
Solids, Total Dissolved	**610**	AO ≤ 500	10.0	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	**296**	N/A	1.0	mg/L	2020-10-21	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-10-21	
Alkalinity, Bicarbonate (as CaCO3)	**296**	N/A	1.0	mg/L	2020-10-21	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-10-21	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-10-21	
Colour, True	< 5.0	AO ≤ 15	5.0	CU	2020-10-20	
Conductivity (EC)	**845**	N/A	2.0	µS/cm	2020-10-21	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	2020-10-21	
pH	**8.13**	7.0-10.5	0.10	pH units	2020-10-21	HT2
Temperature, at pH	**21.2**	N/A		°C	2020-10-21	HT2
Turbidity	**5.98**	OG < 1	0.10	NTU	2020-10-20	
Microbiological Parameters						
Coliforms, Total	**≥ 2**	MAC = 0	1	CFU/100 mL	2020-10-20	
Background Colonies	**>200**	N/A	200	CFU/100 mL	2020-10-20	
E. coli	< 1	MAC = 0	1	CFU/100 mL	2020-10-20	
Total Metals						
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2020-10-27	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2020-10-27	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2020-10-27	
Barium, total	**0.0226**	MAC = 2	0.0050	mg/L	2020-10-27	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2020-10-27	
Cadmium, total	**0.000027**	MAC = 0.005	0.000010	mg/L	2020-10-27	
Calcium, total	**100**	None Required	0.20	mg/L	2020-10-27	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2020-10-27	
Cobalt, total	**0.00016**	N/A	0.00010	mg/L	2020-10-27	
Copper, total	< 0.00040	MAC = 2	0.00040	mg/L	2020-10-27	
Iron, total	**0.637**	AO ≤ 0.3	0.010	mg/L	2020-10-27	
Lead, total	**0.00070**	MAC = 0.005	0.00020	mg/L	2020-10-27	
Magnesium, total	**54.2**	None Required	0.010	mg/L	2020-10-27	
Manganese, total	**0.0730**	MAC = 0.12	0.00020	mg/L	2020-10-27	

TEST RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J1737
PROJECT	17-049-02	**REPORTED**	2020-10-27 16:59

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
38544 (20J1737-01) | Matrix: Water | Sampled: 2020-10-19 09:30, Continued						
Total Metals, Continued						
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2020-10-23	
Molybdenum, total	**0.00544**	N/A	0.00010	mg/L	2020-10-27	
Nickel, total	**0.00072**	N/A	0.00040	mg/L	2020-10-27	
Potassium, total	**6.53**	N/A	0.10	mg/L	2020-10-27	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2020-10-27	
Sodium, total	**34.5**	AO ≤ 200	0.10	mg/L	2020-10-27	
Strontium, total	**1.25**	7	0.0010	mg/L	2020-10-27	
Uranium, total	**0.00285**	MAC = 0.02	0.000020	mg/L	2020-10-27	
Zinc, total	**0.290**	AO ≤ 5	0.0040	mg/L	2020-10-27	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J1737
PROJECT	17-049-02	**REPORTED**	2020-10-27 16:59

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2017)	Titration with H2SO4	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Total in Water	SM 9222* (2017)	Membrane Filtration / Chromocult Agar	✓	Kelowna
Colour, True in Water	SM 2120 C (2017)	Spectrophotometry (456 nm)	✓	Kelowna
Conductivity in Water	SM 2510 B (2017)	Conductivity Meter	✓	Kelowna
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection with In-Line UV Digestion and Amperometry	✓	Kelowna
E. coli in Water	SM 9222* (2017)	Membrane Filtration / Chromocult Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Langelier Index in Water	SM 2330 B (2017)	Calculation		N/A
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
pH in Water	SM 4500-H+ B (2017)	Electrometry	✓	Kelowna
Solids, Total Dissolved in Water	SM 1030 E (2017)	SM 1030 E (2011)		N/A
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
Turbidity in Water	SM 2130 B (2017)	Nephelometry	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
>=	Greater than or equal to the specified Result
>2	Greater than the specified Result
°C	Degrees Celcius
AO	Aesthetic Objective
CFU/100 mL	Colony Forming Units per 100 millilitres
CU	Colour Units (referenced against a platinum cobalt standard)
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
OG	Operational Guideline (treated water)
pH units	pH < 7 = acidic, ph > 7 = basic
µS/cm	Microsiemens per centimetre
ASTM	ASTM International Test Methods
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J1737
PROJECT	17-049-02	**REPORTED**	2020-10-27 16:59

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:sgulenchyn@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline (s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J1737
PROJECT	17-049-02	**REPORTED**	2020-10-27 16:59

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B0J1795										
Blank (B0J1795-BLK1)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B0J1795-BS1)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Chloride	16.1	0.10	mg/L	16.0		100	90-110			
Fluoride	4.00	0.10	mg/L	4.00		100	88-108			
Nitrate (as N)	4.03	0.010	mg/L	4.00		101	90-110			
Nitrite (as N)	2.01	0.010	mg/L	2.00		100	85-115			
Sulfate	15.9	1.0	mg/L	16.0		100	90-110			
General Parameters, Batch B0J1820										
Blank (B0J1820-BLK1)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Turbidity	< 0.10	0.10	NTU							
LCS (B0J1820-BS1)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Turbidity	38.9	0.10	NTU	40.0		97	90-110			
General Parameters, Batch B0J1856										
Blank (B0J1856-BLK1)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Cyanide, Total	< 0.0020	0.0020	mg/L							
Blank (B0J1856-BLK2)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Cyanide, Total	< 0.0020	0.0020	mg/L							
LCS (B0J1856-BS1)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Cyanide, Total	0.0206	0.0020	mg/L	0.0200		103	82-120			
LCS (B0J1856-BS2)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Cyanide, Total	0.0195	0.0020	mg/L	0.0200		97	82-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO Western Water Associates Ltd
PROJECT 17-049-02

WORK ORDER 20J1737
REPORTED 2020-10-27 16:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B0J1856, Continued										
LCS Dup (B0J1856-BSD1)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Cyanide, Total	0.0210	0.0020	mg/L	0.0200		105	82-120	2	10	
LCS Dup (B0J1856-BSD2)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Cyanide, Total	0.0191	0.0020	mg/L	0.0200		96	82-120	2	10	
General Parameters, Batch B0J1874										
Blank (B0J1874-BLK1)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Colour, True	< 5.0	5.0	CU							
LCS (B0J1874-BS1)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Colour, True	21	5.0	CU	20.0		107	85-115			
General Parameters, Batch B0J1982										
Blank (B0J1982-BLK1)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B0J1982-BLK2)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B0J1982-BLK3)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
LCS (B0J1982-BS1)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Alkalinity, Total (as CaCO3)	95.4	1.0	mg/L	100		95	80-120			
LCS (B0J1982-BS2)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Alkalinity, Total (as CaCO3)	96.0	1.0	mg/L	100		96	80-120			
LCS (B0J1982-BS3)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Alkalinity, Total (as CaCO3)	96.0	1.0	mg/L	100		96	80-120			
LCS (B0J1982-BS4)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Conductivity (EC)	1400	2.0	µS/cm	1410		99	95-104			
LCS (B0J1982-BS5)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Conductivity (EC)	1390	2.0	µS/cm	1410		99	95-104			
LCS (B0J1982-BS6)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
Conductivity (EC)	1380	2.0	µS/cm	1410		98	95-104			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J1737
PROJECT	17-049-02	**REPORTED**	2020-10-27 16:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B0J1982, Continued										
Reference (B0J1982-SRM1)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
pH	7.00	0.10	pH units	7.01		100	98-102			
Reference (B0J1982-SRM2)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
pH	7.01	0.10	pH units	7.01		100	98-102			
Reference (B0J1982-SRM3)				Prepared: 2020-10-21, Analyzed: 2020-10-21						
pH	7.00	0.10	pH units	7.01		100	98-102			
Microbiological Parameters, Batch B0J1799										
Blank (B0J1799-BLK1)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLK2)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLK3)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLK4)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLK5)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLK6)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLK7)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLK8)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLK9)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLKA)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLKB)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J1799-BLKC)				Prepared: 2020-10-20, Analyzed: 2020-10-20						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J1737
PROJECT	17-049-02	**REPORTED**	2020-10-27 16:59

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B0J2219										
Blank (B0J2219-BLK1)				Prepared: 2020-10-23, Analyzed: 2020-10-23						
Mercury, total	< 0.000010	0.000010	mg/L							
Blank (B0J2219-BLK2)				Prepared: 2020-10-23, Analyzed: 2020-10-23						
Mercury, total	< 0.000010	0.000010	mg/L							
Matrix Spike (B0J2219-MS1)		**Source: 20J1737-01**		Prepared: 2020-10-23, Analyzed: 2020-10-23						
Mercury, total	0.000222	0.000010	mg/L	0.000250	< 0.000010	89	70-130			
Reference (B0J2219-SRM1)				Prepared: 2020-10-23, Analyzed: 2020-10-23						
Mercury, total	0.00567	0.000010	mg/L	0.00581		98	70-130			
Reference (B0J2219-SRM2)				Prepared: 2020-10-23, Analyzed: 2020-10-23						
Mercury, total	0.00563	0.000010	mg/L	0.00581		97	70-130			
Total Metals, Batch B0J2246										
Blank (B0J2246-BLK1)				Prepared: 2020-10-24, Analyzed: 2020-10-27						
Aluminum, total	< 0.0050	0.0050	mg/L							
Antimony, total	< 0.00020	0.00020	mg/L							
Arsenic, total	< 0.00050	0.00050	mg/L							
Barium, total	< 0.0050	0.0050	mg/L							
Boron, total	< 0.0500	0.0500	mg/L							
Cadmium, total	< 0.000010	0.000010	mg/L							
Calcium, total	< 0.20	0.20	mg/L							
Chromium, total	< 0.00050	0.00050	mg/L							
Cobalt, total	< 0.00010	0.00010	mg/L							
Copper, total	< 0.00040	0.00040	mg/L							
Iron, total	< 0.010	0.010	mg/L							
Lead, total	< 0.00020	0.00020	mg/L							
Magnesium, total	< 0.010	0.010	mg/L							
Manganese, total	< 0.00020	0.00020	mg/L							
Molybdenum, total	< 0.00010	0.00010	mg/L							
Nickel, total	< 0.00040	0.00040	mg/L							
Potassium, total	< 0.10	0.10	mg/L							
Selenium, total	< 0.00050	0.00050	mg/L							
Sodium, total	< 0.10	0.10	mg/L							
Strontium, total	< 0.0010	0.0010	mg/L							
Uranium, total	< 0.000020	0.000020	mg/L							
Zinc, total	< 0.0040	0.0040	mg/L							
LCS (B0J2246-BS1)				Prepared: 2020-10-24, Analyzed: 2020-10-27						
Aluminum, total	0.0235	0.0050	mg/L	0.0199		118	80-120			
Antimony, total	0.0229	0.00020	mg/L	0.0200		114	80-120			
Arsenic, total	0.0205	0.00050	mg/L	0.0200		102	80-120			
Barium, total	0.0197	0.0050	mg/L	0.0198		100	80-120			
Boron, total	< 0.0500	0.0500	mg/L	0.0200		110	80-120			
Cadmium, total	0.0205	0.000010	mg/L	0.0199		103	80-120			
Calcium, total	2.14	0.20	mg/L	2.02		106	80-120			
Chromium, total	0.0203	0.00050	mg/L	0.0198		102	80-120			
Cobalt, total	0.0204	0.00010	mg/L	0.0199		103	80-120			
Copper, total	0.0210	0.00040	mg/L	0.0200		105	80-120			
Iron, total	1.93	0.010	mg/L	2.02		96	80-120			
Lead, total	0.0206	0.00020	mg/L	0.0199		103	80-120			
Magnesium, total	2.11	0.010	mg/L	2.02		104	80-120			
Manganese, total	0.0203	0.00020	mg/L	0.0199		102	80-120			
Molybdenum, total	0.0206	0.00010	mg/L	0.0200		103	80-120			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J1737
PROJECT	17-049-02	**REPORTED**	2020-10-27 16:59

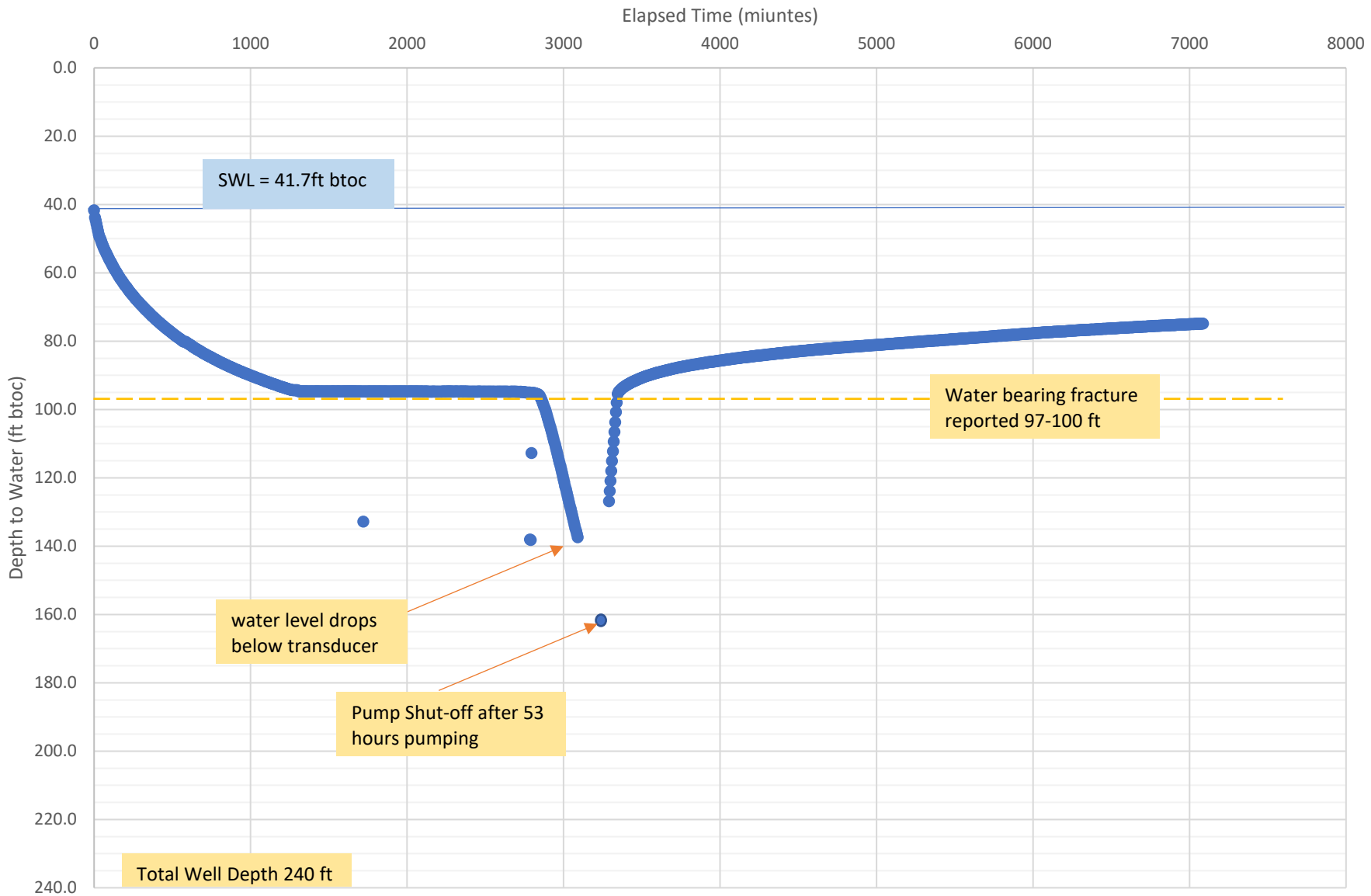
Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B0J2246, Continued										
LCS (B0J2246-BS1), Continued				Prepared: 2020-10-24, Analyzed: 2020-10-27						
Nickel, total	0.0210	0.00040	mg/L	0.0200		105	80-120			
Potassium, total	2.02	0.10	mg/L	2.02		100	80-120			
Selenium, total	0.0202	0.00050	mg/L	0.0200		101	80-120			
Sodium, total	2.03	0.10	mg/L	2.02		101	80-120			
Strontium, total	0.0198	0.0010	mg/L	0.0200		99	80-120			
Uranium, total	0.0203	0.000020	mg/L	0.0200		102	80-120			
Zinc, total	0.0220	0.0040	mg/L	0.0200		110	80-120			
Reference (B0J2246-SRM1)				Prepared: 2020-10-24, Analyzed: 2020-10-27						
Aluminum, total	0.319	0.0050	mg/L	0.299		107	70-130			
Antimony, total	0.0578	0.00020	mg/L	0.0517		112	70-130			
Arsenic, total	0.130	0.00050	mg/L	0.119		109	70-130			
Barium, total	0.793	0.0050	mg/L	0.801		99	70-130			
Boron, total	4.33	0.0500	mg/L	4.11		105	70-130			
Cadmium, total	0.0522	0.000010	mg/L	0.0503		104	70-130			
Calcium, total	10.2	0.20	mg/L	10.7		95	70-130			
Chromium, total	0.254	0.00050	mg/L	0.250		102	70-130			
Cobalt, total	0.0412	0.00010	mg/L	0.0384		107	70-130			
Copper, total	0.518	0.00040	mg/L	0.487		106	70-130			
Iron, total	0.495	0.010	mg/L	0.504		98	70-130			
Lead, total	0.287	0.00020	mg/L	0.278		103	70-130			
Magnesium, total	3.97	0.010	mg/L	3.59		111	70-130			
Manganese, total	0.114	0.00020	mg/L	0.111		103	70-130			
Molybdenum, total	0.209	0.00010	mg/L	0.196		107	70-130			
Nickel, total	0.265	0.00040	mg/L	0.248		107	70-130			
Potassium, total	6.08	0.10	mg/L	5.89		103	70-130			
Selenium, total	0.129	0.00050	mg/L	0.120		107	70-130			
Sodium, total	9.35	0.10	mg/L	8.71		107	70-130			
Strontium, total	0.398	0.0010	mg/L	0.393		101	70-130			
Uranium, total	0.0350	0.000020	mg/L	0.0344		102	70-130			
Zinc, total	2.76	0.0040	mg/L	2.50		110	70-130			

Appendix B
Pumping Test Graph: WPID 50399

Nodding Hill Developments
Groundwater Resource Assessment in Support of Rezoning
WWAL Ref: 17-049-02

western water ASSOCIATES LTD

Figure B1: WTN50399 - 72 hour Constant Rate Test Hydrograph,
1.25 US gpm, October 15-18, 2020



Appendix C
Pumping Test Graphs and Water Quality Results: WPID 50395

Nodding Hill Developments
Groundwater Resource Assessment in Support of Rezoning
WWAL Ref: 17-049-02

western water ASSOCIATES LTD

FIgure C1: WTN50395 - 72 hour Constant Rate Test Hydrograph, 1.25 US gpm, October 22 - 25, 2020

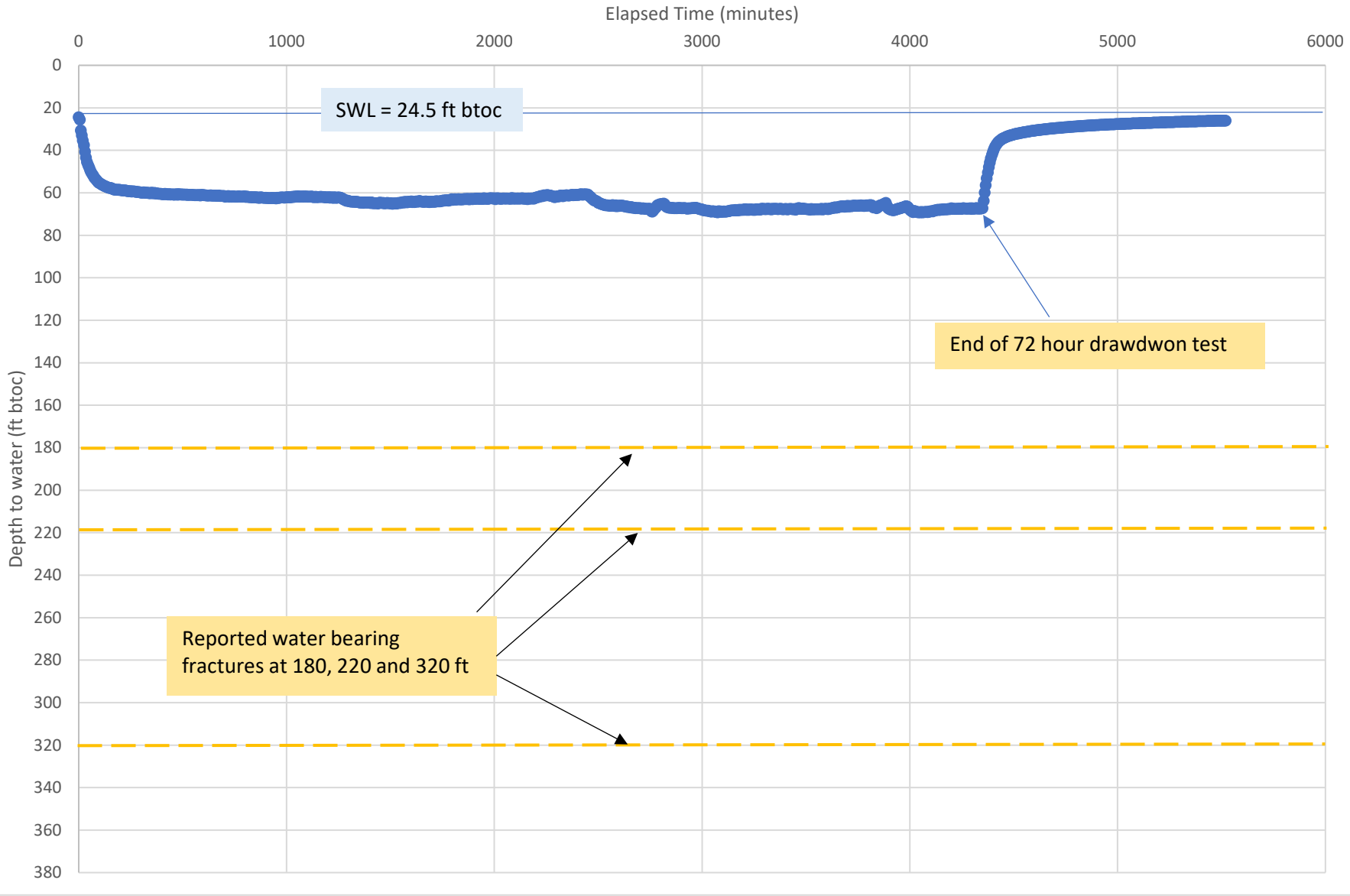
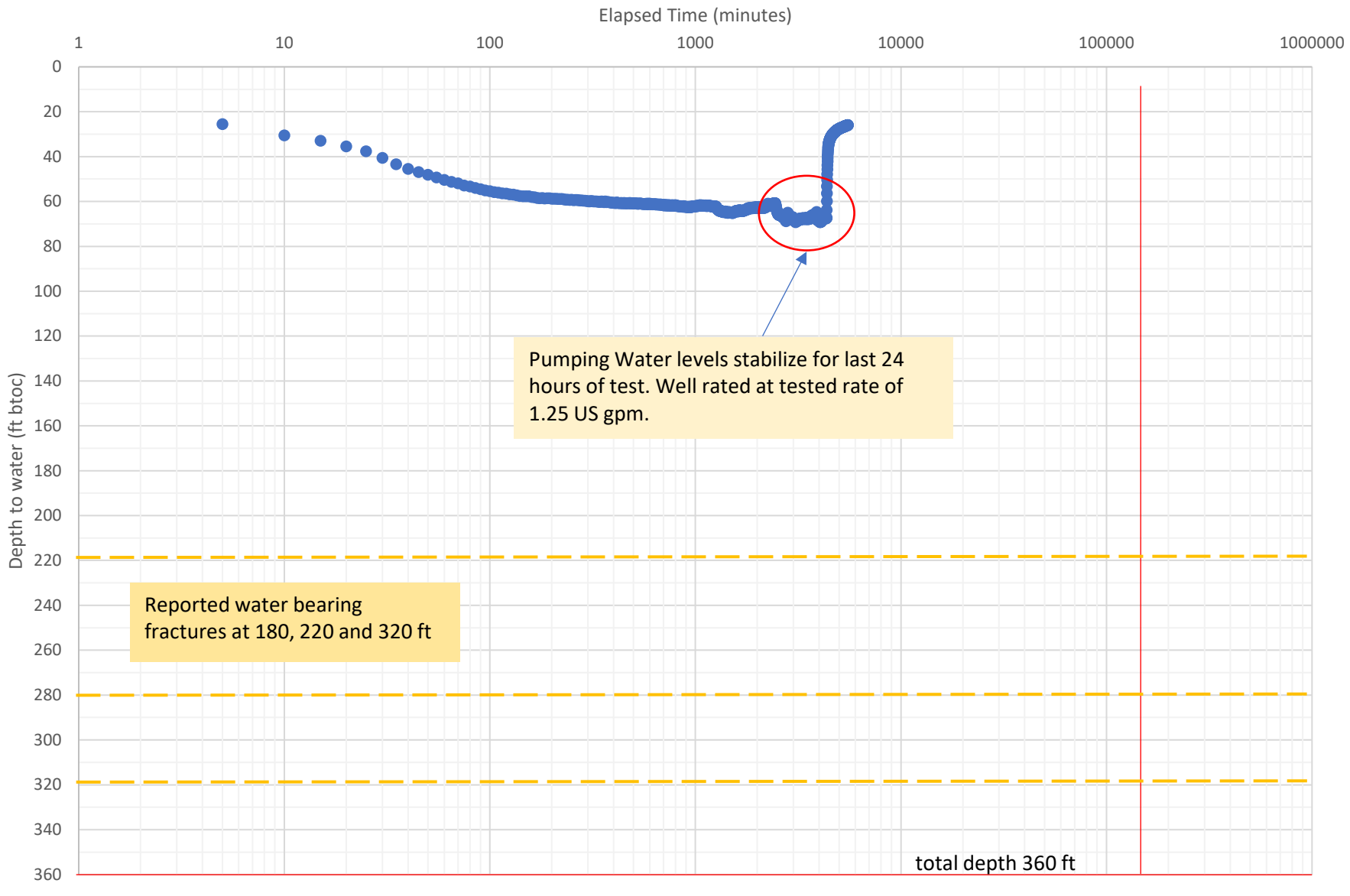


Figure C2: WTN50395 - 72 hour Constant Rate Test Semi-logarithmic Plot, 1.25 US gpm, October 22 - 25, 2020



CERTIFICATE OF ANALYSIS

REPORTED TO	Western Water Associates Ltd 106 - 5145 26th Street Vernon, BC V1T 8G4		
ATTENTION	Ryan Rhodes	**WORK ORDER**	20J2505
PO NUMBER		**RECEIVED / TEMP**	2020-10-26 14:30 / 5°C
PROJECT	17-049-02	**REPORTED**	2020-11-02 17:12
PROJECT INFO		**COC NUMBER**	B64017

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

If you have any questions or concerns, please contact me at sgulenchyn@caro.ca

Authorized By:

Sara Gulenchyn, B.Sc, P.Chem.
Client Service Manager

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J2505
PROJECT	17-049-02	**REPORTED**	2020-11-02 17:12

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
62012 (20J2505-01) | Matrix: Water | Sampled: 2020-10-25 17:00						
Anions						
Chloride	**14.1**	AO ≤ 250	0.10	mg/L	2020-10-27	
Fluoride	**1.13**	MAC = 1.5	0.10	mg/L	2020-10-27	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2020-10-27	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2020-10-27	
Sulfate	**252**	AO ≤ 500	1.0	mg/L	2020-10-27	
Calculated Parameters						
Hardness, Total (as CaCO3)	**557**	None Required	0.500	mg/L	N/A	
Langelier Index	**1.3**	N/A	-5.0		2020-11-02	
Solids, Total Dissolved	**742**	AO ≤ 500	10.0	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	**378**	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Bicarbonate (as CaCO3)	**378**	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-10-28	
Colour, True	< 5.0	AO ≤ 15	5.0	CU	2020-10-27	
Conductivity (EC)	**1140**	N/A	2.0	µS/cm	2020-10-28	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	2020-10-30	
pH	**8.05**	7.0-10.5	0.10	pH units	2020-10-28	HT2
Temperature, at pH	**21.3**	N/A		°C	2020-10-28	HT2
Turbidity	**9.42**	OG < 1	0.10	NTU	2020-10-27	
Microbiological Parameters						
Coliforms, Total	< 1	MAC = 0	1	CFU/100 mL	2020-10-26	
Background Colonies	**>200**	N/A	200	CFU/100 mL	2020-10-26	
E. coli	< 1	MAC = 0	1	CFU/100 mL	2020-10-26	
Total Metals						
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2020-11-01	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2020-11-01	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2020-11-01	
Barium, total	**0.0405**	MAC = 2	0.0050	mg/L	2020-11-01	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2020-11-01	
Cadmium, total	**0.000047**	MAC = 0.005	0.000010	mg/L	2020-11-01	
Calcium, total	**123**	None Required	0.20	mg/L	2020-11-01	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2020-11-01	
Cobalt, total	**0.00099**	N/A	0.00010	mg/L	2020-11-01	
Copper, total	**0.00183**	MAC = 2	0.00040	mg/L	2020-11-01	
Iron, total	**0.974**	AO ≤ 0.3	0.010	mg/L	2020-11-01	
Lead, total	**0.00071**	MAC = 0.005	0.00020	mg/L	2020-11-01	
Magnesium, total	**60.3**	None Required	0.010	mg/L	2020-11-01	
Manganese, total	**0.326**	MAC = 0.12	0.00020	mg/L	2020-11-01	

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J2505
PROJECT	17-049-02	**REPORTED**	2020-11-02 17:12

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
62012 (20J2505-01) | Matrix: Water | Sampled: 2020-10-25 17:00, Continued						
Total Metals, Continued						
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2020-10-30	
Molybdenum, total	**0.00280**	N/A	0.00010	mg/L	2020-11-01	
Nickel, total	**0.00270**	N/A	0.00040	mg/L	2020-11-01	
Potassium, total	**5.48**	N/A	0.10	mg/L	2020-11-01	
Selenium, total	**0.00295**	MAC = 0.05	0.00050	mg/L	2020-11-01	
Sodium, total	**56.7**	AO ≤ 200	0.10	mg/L	2020-11-01	
Strontium, total	**1.81**	7	0.0010	mg/L	2020-11-01	
Uranium, total	**0.00635**	MAC = 0.02	0.000020	mg/L	2020-11-01	
Zinc, total	**0.222**	AO ≤ 5	0.0040	mg/L	2020-11-01	
50395 (20J2505-02) | Matrix: Water | Sampled: 2020-10-25 16:00						
Anions						
Chloride	**5.85**	AO ≤ 250	0.10	mg/L	2020-10-27	
Fluoride	**1.40**	MAC = 1.5	0.10	mg/L	2020-10-27	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2020-10-27	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2020-10-27	
Sulfate	**345**	AO ≤ 500	1.0	mg/L	2020-10-27	
Calculated Parameters						
Hardness, Total (as CaCO3)	**554**	None Required	0.500	mg/L	N/A	
Langelier Index	**1.1**	N/A	-5.0		2020-11-02	
Solids, Total Dissolved	**845**	AO ≤ 500	10.0	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	**356**	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Bicarbonate (as CaCO3)	**356**	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-10-28	
Colour, True	< 5.0	AO ≤ 15	5.0	CU	2020-10-27	
Conductivity (EC)	**1340**	N/A	2.0	µS/cm	2020-10-28	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	2020-10-30	
pH	**8.04**	7.0-10.5	0.10	pH units	2020-10-28	HT2
Temperature, at pH	**21.3**	N/A		°C	2020-10-28	HT2
Turbidity	**2.04**	OG < 1	0.10	NTU	2020-10-27	
Microbiological Parameters						
Coliforms, Total	< 1	MAC = 0	1	CFU/100 mL	2020-10-26	
E. coli	< 1	MAC = 0	1	CFU/100 mL	2020-10-26	
Total Metals						
Aluminum, total	< 0.0050	OG < 0.1	0.0050	mg/L	2020-11-01	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2020-11-01	

TEST RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J2505
PROJECT	17-049-02	**REPORTED**	2020-11-02 17:12

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
50395 (20J2505-02) | Matrix: Water | Sampled: 2020-10-25 16:00, Continued						
Total Metals, Continued						
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2020-11-01	
Barium, total	**0.0186**	MAC = 2	0.0050	mg/L	2020-11-01	
Boron, total	< 0.0500	MAC = 5	0.0500	mg/L	2020-11-01	
Cadmium, total	**0.000051**	MAC = 0.005	0.000010	mg/L	2020-11-01	
Calcium, total	**98.6**	None Required	0.20	mg/L	2020-11-01	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2020-11-01	
Cobalt, total	**0.00017**	N/A	0.00010	mg/L	2020-11-01	
Copper, total	**0.00906**	MAC = 2	0.00040	mg/L	2020-11-01	
Iron, total	**1.39**	AO ≤ 0.3	0.010	mg/L	2020-11-01	
Lead, total	**0.00382**	MAC = 0.005	0.00020	mg/L	2020-11-01	
Magnesium, total	**74.5**	None Required	0.010	mg/L	2020-11-01	
Manganese, total	**0.0594**	MAC = 0.12	0.00020	mg/L	2020-11-01	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2020-10-30	
Molybdenum, total	**0.00256**	N/A	0.00010	mg/L	2020-11-01	
Nickel, total	**0.00079**	N/A	0.00040	mg/L	2020-11-01	
Potassium, total	**5.35**	N/A	0.10	mg/L	2020-11-01	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2020-11-01	
Sodium, total	**98.3**	AO ≤ 200	0.10	mg/L	2020-11-01	
Strontium, total	**2.84**	7	0.0010	mg/L	2020-11-01	
Uranium, total	**0.00243**	MAC = 0.02	0.000020	mg/L	2020-11-01	
Zinc, total	**0.748**	AO ≤ 5	0.0040	mg/L	2020-11-01	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J2505
PROJECT	17-049-02	**REPORTED**	2020-11-02 17:12

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2017)	Titration with H2SO4	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Total in Water	SM 9222* (2017)	Membrane Filtration / Chromocult Agar	✓	Kelowna
Colour, True in Water	SM 2120 C (2017)	Spectrophotometry (456 nm)	✓	Kelowna
Conductivity in Water	SM 2510 B (2017)	Conductivity Meter	✓	Kelowna
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection with In-Line UV Digestion and Amperometry	✓	Kelowna
E. coli in Water	SM 9222* (2017)	Membrane Filtration / Chromocult Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Langelier Index in Water	SM 2330 B (2017)	Calculation		N/A
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
pH in Water	SM 4500-H+ B (2017)	Electrometry	✓	Kelowna
Solids, Total Dissolved in Water	SM 1030 E (2017)	SM 1030 E (2011)		N/A
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
Turbidity in Water	SM 2130 B (2017)	Nephelometry	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
>2	Greater than the specified Result
°C	Degrees Celcius
AO	Aesthetic Objective
CFU/100 mL	Colony Forming Units per 100 millilitres
CU	Colour Units (referenced against a platinum cobalt standard)
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
OG	Operational Guideline (treated water)
pH units	pH < 7 = acidic, ph > 7 = basic
µS/cm	Microsiemens per centimetre
ASTM	ASTM International Test Methods
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J2505
PROJECT	17-049-02	**REPORTED**	2020-11-02 17:12

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:sgulenchyn@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline (s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J2505
PROJECT	17-049-02	**REPORTED**	2020-11-02 17:12

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B0J2424										
Blank (B0J2424-BLK1)				Prepared: 2020-10-27, Analyzed: 2020-10-27						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B0J2424-BLK2)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B0J2424-BS1)				Prepared: 2020-10-27, Analyzed: 2020-10-27						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Fluoride	4.05	0.10	mg/L	4.00		101	88-108			
Nitrate (as N)	3.91	0.010	mg/L	4.00		98	90-110			
Nitrite (as N)	2.04	0.010	mg/L	2.00		102	85-115			
Sulfate	16.0	1.0	mg/L	16.0		100	90-110			
LCS (B0J2424-BS2)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Chloride	15.7	0.10	mg/L	16.0		98	90-110			
Fluoride	4.03	0.10	mg/L	4.00		101	88-108			
Nitrate (as N)	3.99	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.06	0.010	mg/L	2.00		103	85-115			
Sulfate	15.9	1.0	mg/L	16.0		100	90-110			
General Parameters, Batch B0J2421										
Blank (B0J2421-BLK1)				Prepared: 2020-10-27, Analyzed: 2020-10-27						
Turbidity	< 0.10	0.10	NTU							
LCS (B0J2421-BS1)				Prepared: 2020-10-27, Analyzed: 2020-10-27						
Turbidity	41.2	0.10	NTU	40.0		103	90-110			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J2505
PROJECT	17-049-02	**REPORTED**	2020-11-02 17:12

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B0J2421, Continued										
Duplicate (B0J2421-DUP1)	**Source: 20J2505-01**			Prepared: 2020-10-27, Analyzed: 2020-10-27						
Turbidity	9.31	0.10	NTU		9.42			1	15	
General Parameters, Batch B0J2472										
Blank (B0J2472-BLK1)				Prepared: 2020-10-27, Analyzed: 2020-10-27						
Colour, True	< 5.0	5.0	CU							
LCS (B0J2472-BS1)				Prepared: 2020-10-27, Analyzed: 2020-10-27						
Colour, True	21	5.0	CU	20.0		103	85-115			
General Parameters, Batch B0J2619										
Blank (B0J2619-BLK1)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B0J2619-BLK2)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B0J2619-BLK3)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
LCS (B0J2619-BS1)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Alkalinity, Total (as CaCO3)	102	1.0	mg/L	100		102	80-120			
LCS (B0J2619-BS2)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Alkalinity, Total (as CaCO3)	102	1.0	mg/L	100		102	80-120			
LCS (B0J2619-BS3)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Alkalinity, Total (as CaCO3)	101	1.0	mg/L	100		101	80-120			
LCS (B0J2619-BS4)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Conductivity (EC)	1430	2.0	µS/cm	1410		101	95-104			
LCS (B0J2619-BS5)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Conductivity (EC)	1350	2.0	µS/cm	1410		96	95-104			
LCS (B0J2619-BS6)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
Conductivity (EC)	1360	2.0	µS/cm	1410		96	95-104			
Reference (B0J2619-SRM1)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
pH	6.98	0.10	pH units	7.01		100	98-102			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO Western Water Associates Ltd
PROJECT 17-049-02
WORK ORDER 20J2505
REPORTED 2020-11-02 17:12

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B0J2619, Continued										
Reference (B0J2619-SRM2)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
pH	6.99	0.10	pH units	7.01		100	98-102			
Reference (B0J2619-SRM3)				Prepared: 2020-10-28, Analyzed: 2020-10-28						
pH	6.98	0.10	pH units	7.01		100	98-102			
General Parameters, Batch B0J2771										
Blank (B0J2771-BLK1)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Cyanide, Total	< 0.0020	0.0020	mg/L							
Blank (B0J2771-BLK2)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Cyanide, Total	< 0.0020	0.0020	mg/L							
LCS (B0J2771-BS1)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Cyanide, Total	0.0203	0.0020	mg/L	0.0200		102	82-120			
LCS (B0J2771-BS2)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Cyanide, Total	0.0226	0.0020	mg/L	0.0200		113	82-120			
LCS Dup (B0J2771-BSD1)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Cyanide, Total	0.0209	0.0020	mg/L	0.0200		104	82-120	3	10	
LCS Dup (B0J2771-BSD2)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Cyanide, Total	0.0222	0.0020	mg/L	0.0200		111	82-120	2	10	
Microbiological Parameters, Batch B0J2341										
Blank (B0J2341-BLK1)				Prepared: 2020-10-26, Analyzed: 2020-10-26						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J2341-BLK2)				Prepared: 2020-10-26, Analyzed: 2020-10-26						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J2341-BLK3)				Prepared: 2020-10-26, Analyzed: 2020-10-26						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J2341-BLK4)				Prepared: 2020-10-26, Analyzed: 2020-10-26						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Total Metals, Batch B0J2731										
Blank (B0J2731-BLK1)				Prepared: 2020-10-29, Analyzed: 2020-11-01						
Aluminum, total	< 0.0050	0.0050	mg/L							
Antimony, total	< 0.00020	0.00020	mg/L							
Arsenic, total	< 0.00050	0.00050	mg/L							
Barium, total	< 0.0050	0.0050	mg/L							
Boron, total	< 0.0500	0.0500	mg/L							
Cadmium, total	< 0.000010	0.000010	mg/L							
Calcium, total	< 0.20	0.20	mg/L							
Chromium, total	< 0.00050	0.00050	mg/L							
Cobalt, total	< 0.00010	0.00010	mg/L							
Copper, total	< 0.00040	0.00040	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J2505
PROJECT	17-049-02	**REPORTED**	2020-11-02 17:12

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B0J2731, Continued										
Blank (B0J2731-BLK1), Continued				Prepared: 2020-10-29, Analyzed: 2020-11-01						
Iron, total	< 0.010	0.010	mg/L							
Lead, total	< 0.00020	0.00020	mg/L							
Magnesium, total	< 0.010	0.010	mg/L							
Manganese, total	< 0.00020	0.00020	mg/L							
Molybdenum, total	< 0.00010	0.00010	mg/L							
Nickel, total	< 0.00040	0.00040	mg/L							
Potassium, total	< 0.10	0.10	mg/L							
Selenium, total	< 0.00050	0.00050	mg/L							
Sodium, total	< 0.10	0.10	mg/L							
Strontium, total	< 0.0010	0.0010	mg/L							
Uranium, total	< 0.000020	0.000020	mg/L							
Zinc, total	< 0.0040	0.0040	mg/L							
LCS (B0J2731-BS1)				Prepared: 2020-10-29, Analyzed: 2020-11-01						
Aluminum, total	0.0175	0.0050	mg/L	0.0199		88	80-120			
Antimony, total	0.0205	0.00020	mg/L	0.0200		103	80-120			
Arsenic, total	0.0207	0.00050	mg/L	0.0200		103	80-120			
Barium, total	0.0203	0.0050	mg/L	0.0198		103	80-120			
Boron, total	< 0.0500	0.0500	mg/L	0.0200		109	80-120			
Cadmium, total	0.0204	0.000010	mg/L	0.0199		103	80-120			
Calcium, total	1.93	0.20	mg/L	2.02		96	80-120			
Chromium, total	0.0208	0.00050	mg/L	0.0198		105	80-120			
Cobalt, total	0.0210	0.00010	mg/L	0.0199		105	80-120			
Copper, total	0.0215	0.00040	mg/L	0.0200		107	80-120			
Iron, total	2.02	0.010	mg/L	2.02		100	80-120			
Lead, total	0.0211	0.00020	mg/L	0.0199		106	80-120			
Magnesium, total	2.11	0.010	mg/L	2.02		104	80-120			
Manganese, total	0.0200	0.00020	mg/L	0.0199		101	80-120			
Molybdenum, total	0.0199	0.00010	mg/L	0.0200		99	80-120			
Nickel, total	0.0213	0.00040	mg/L	0.0200		107	80-120			
Potassium, total	2.00	0.10	mg/L	2.02		99	80-120			
Selenium, total	0.0207	0.00050	mg/L	0.0200		104	80-120			
Sodium, total	2.04	0.10	mg/L	2.02		101	80-120			
Strontium, total	0.0204	0.0010	mg/L	0.0200		102	80-120			
Uranium, total	0.0208	0.000020	mg/L	0.0200		104	80-120			
Zinc, total	0.0218	0.0040	mg/L	0.0200		109	80-120			
Reference (B0J2731-SRM1)				Prepared: 2020-10-29, Analyzed: 2020-11-01						
Aluminum, total	0.294	0.0050	mg/L	0.299		98	70-130			
Antimony, total	0.0514	0.00020	mg/L	0.0517		99	70-130			
Arsenic, total	0.127	0.00050	mg/L	0.119		106	70-130			
Barium, total	0.808	0.0050	mg/L	0.801		101	70-130			
Boron, total	4.06	0.0500	mg/L	4.11		99	70-130			
Cadmium, total	0.0510	0.000010	mg/L	0.0503		101	70-130			
Calcium, total	10.2	0.20	mg/L	10.7		96	70-130			
Chromium, total	0.266	0.00050	mg/L	0.250		106	70-130			
Cobalt, total	0.0414	0.00010	mg/L	0.0384		108	70-130			
Copper, total	0.527	0.00040	mg/L	0.487		108	70-130			
Iron, total	0.524	0.010	mg/L	0.504		104	70-130			
Lead, total	0.299	0.00020	mg/L	0.278		108	70-130			
Magnesium, total	3.92	0.010	mg/L	3.59		109	70-130			
Manganese, total	0.113	0.00020	mg/L	0.111		101	70-130			
Molybdenum, total	0.203	0.00010	mg/L	0.196		104	70-130			
Nickel, total	0.263	0.00040	mg/L	0.248		106	70-130			
Potassium, total	6.33	0.10	mg/L	5.89		108	70-130			
Selenium, total	0.124	0.00050	mg/L	0.120		104	70-130			
Sodium, total	9.33	0.10	mg/L	8.71		107	70-130			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J2505
PROJECT	17-049-02	**REPORTED**	2020-11-02 17:12

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B0J2731, Continued										
Reference (B0J2731-SRM1), Continued				Prepared: 2020-10-29, Analyzed: 2020-11-01						
Strontium, total	0.407	0.0010	mg/L	0.393		104	70-130			
Uranium, total	0.0356	0.000020	mg/L	0.0344		103	70-130			
Zinc, total	2.62	0.0040	mg/L	2.50		105	70-130			
Total Metals, Batch B0J2876										
Blank (B0J2876-BLK1)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Mercury, total	< 0.000010	0.000010	mg/L							
Blank (B0J2876-BLK2)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Mercury, total	< 0.000010	0.000010	mg/L							
Reference (B0J2876-SRM1)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Mercury, total	0.00571	0.000010	mg/L	0.00581		98	70-130			
Reference (B0J2876-SRM2)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Mercury, total	0.00523	0.000010	mg/L	0.00581		90	70-130			

Appendix D
Pumping Test Graphs and Water Quality Results: WPID 62012

Nodding Hill Developments
Groundwater Resource Assessment in Support of Rezoning
WWAL Ref: 17-049-02

western water ASSOCIATES LTD

Figure D1: WTN62012 - 72 hour Constant Rate Test Hydrograph,
1.25 US gpm, October 22 -25, 2020

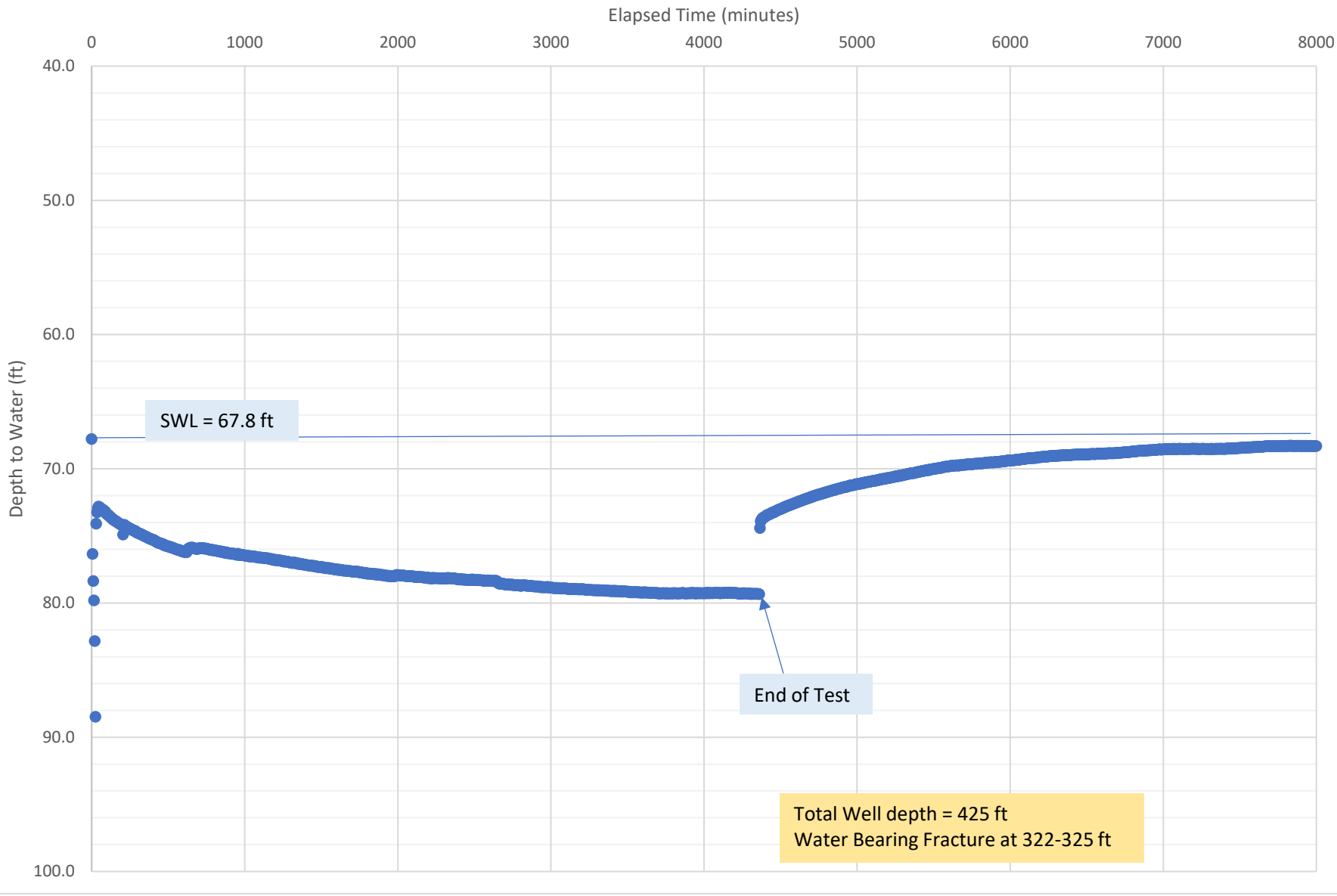
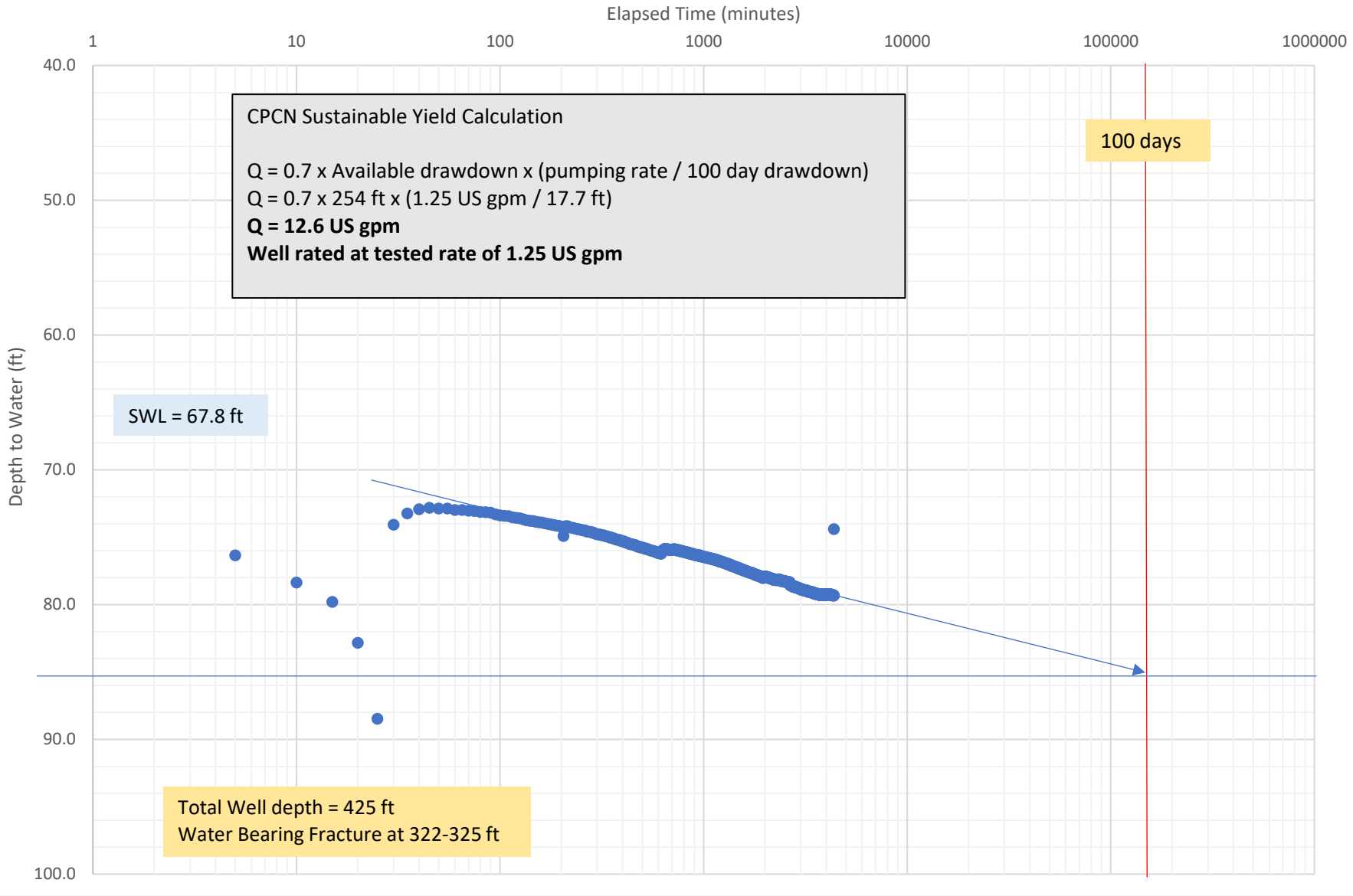


Figure D2: WTN62012 - 72-hour Constant Rate Test Semi-Logarithmic Projection, 1.25 US gpm, October 22 -25, 2020



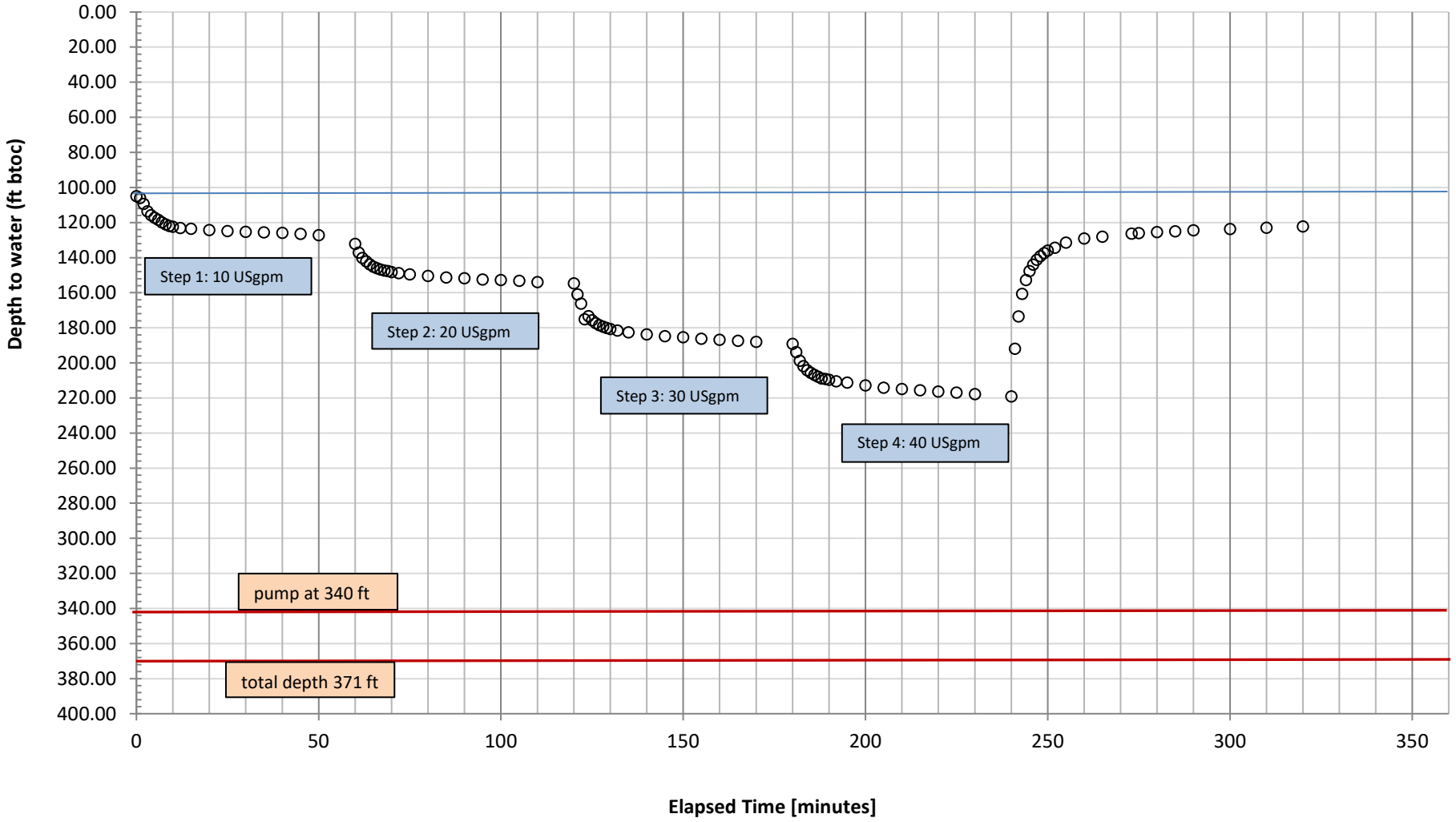
Appendix E
Pumping Test Graphs and Water Quality Results: WPID 62008

Nodding Hill Developments
Groundwater Resource Assessment in Support of Rezoning
WWAL Ref: 17-049-02

western water ASSOCIATES LTD

Project No: 17-049-02, Table E1 - Nodding Hill WPID62008 Step Test, October 28, 2020.

Well depth = 371 ft	Well diameter = 6 in		Measurement method =		Flow Meter	Pump Depth = 340 ft					
Comments	Real Time	Time since pump started, t (minutes)	Water level measurement (btoc) (m)	Water level measurement (btoc) (ft)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	Specific Capacity	
										L/s/m	Usgpm/ft
STATIC	16:30 Oct. 28, 2020	0	31.98	104.94	--	0.00	0.00	0.00	0.00	--	--
		1	32.29	105.95	0.31	1.01	0.31	0.63	10	2.05	9.90
		2	33.33	109.37	1.04	4.43	1.35	0.63	10	0.47	2.26
		3	34.61	113.55	1.27	8.61	2.62	0.63	10	0.24	1.16
		4	35.29	115.80	0.69	10.86	3.31	0.63	10	0.19	0.92
		5	35.76	117.34	0.47	12.40	3.78	0.63	10	0.17	0.81
		6	36.09	118.42	0.33	13.48	4.11	0.63	10	0.15	0.74
		7	36.55	119.91	0.45	14.97	4.56	0.63	10	0.14	0.67
		8	36.88	121.00	0.33	16.06	4.89	0.63	10	0.13	0.62
		9	37.15	121.88	0.27	16.94	5.16	0.63	10	0.12	0.59
		10	37.32	122.45	0.17	17.51	5.34	0.63	10	0.12	0.57
		12	37.53	123.13	0.21	18.19	5.54	0.63	10	0.11	0.55
		15	37.66	123.55	0.13	18.61	5.67	0.63	10	0.11	0.54
		20	37.90	124.35	0.24	19.41	5.92	0.63	10	0.11	0.52
		25	38.04	124.81	0.14	19.87	6.06	0.63	10	0.10	0.50
		30	38.19	125.31	0.15	20.37	6.21	0.63	10	0.10	0.49
		35	38.29	125.64	0.10	20.70	6.31	0.63	10	0.10	0.48
		40	38.38	125.91	0.08	20.97	6.39	0.63	10	0.10	0.48
		45	38.56	126.50	0.18	21.56	6.57	0.63	10	0.10	0.46
		50	38.75	127.15	0.20	22.21	6.77	0.63	10	0.09	0.45
		60	40.30	132.24	1.55	27.30	8.32	0.63	10	0.08	0.37
		61	41.82	137.20	1.51	32.26	9.83	1.26	20	0.13	0.62
		62	42.75	140.26	0.93	35.32	10.77	1.26	20	0.12	0.57
		63	43.34	142.19	0.59	37.25	11.35	1.26	20	0.11	0.54
		64	43.86	143.90	0.52	38.96	11.87	1.26	20	0.11	0.51
		65	44.25	145.17	0.39	40.23	12.26	1.26	20	0.10	0.50
		66	44.53	146.11	0.29	41.17	12.55	1.26	20	0.10	0.49
		67	44.75	146.83	0.22	41.89	12.77	1.26	20	0.10	0.48
		68	44.93	147.40	0.17	42.46	12.94	1.26	20	0.10	0.47
		69	45.02	147.70	0.09	42.76	13.03	1.26	20	0.10	0.47
		70	45.19	148.26	0.17	43.32	13.20	1.26	20	0.10	0.46
		72	45.38	148.90	0.20	43.96	13.40	1.26	20	0.09	0.45
		75	45.60	149.62	0.22	44.68	13.62	1.26	20	0.09	0.45
		80	45.86	150.47	0.26	45.53	13.88	1.26	20	0.09	0.44
		85	46.12	151.32	0.26	46.38	14.14	1.26	20	0.09	0.43
		90	46.26	151.79	0.14	46.85	14.28	1.26	20	0.09	0.43
		95	46.46	152.45	0.20	47.51	14.48	1.26	20	0.09	0.42
		100	46.56	152.76	0.09	47.82	14.57	1.26	20	0.09	0.42
		105	46.72	153.28	0.16	48.34	14.73	1.26	20	0.09	0.41
		110	46.92	153.93	0.20	48.99	14.93	1.26	20	0.08	0.41
		120	47.16	154.73	0.24	49.79	15.18	1.26	20	0.08	0.40
		121	49.05	160.93	1.89	55.99	17.06	1.89	30	0.11	0.54
		122	50.66	166.22	1.61	61.28	18.68	1.89	30	0.10	0.49
		123	53.37	175.10	2.71	70.16	21.38	1.89	30	0.09	0.43
		124	52.85	173.40	-0.52	68.46	20.87	1.89	30	0.09	0.44
		125	53.58	175.80	0.73	70.86	21.60	1.89	30	0.09	0.42
		126	54.03	177.27	0.45	72.33	22.05	1.89	30	0.09	0.41
		127	54.40	178.47	0.37	73.53	22.41	1.89	30	0.08	0.41
		128	54.67	179.37	0.27	74.43	22.69	1.89	30	0.08	0.40
		129	54.89	180.10	0.22	75.16	22.91	1.89	30	0.08	0.40
		130	55.07	180.70	0.18	75.76	23.09	1.89	30	0.08	0.40
		132	55.36	181.65	0.29	76.71	23.38	1.89	30	0.08	0.39
		135	55.67	182.65	0.30	77.71	23.68	1.89	30	0.08	0.39
		140	56.03	183.83	0.36	78.89	24.04	1.89	30	0.08	0.38
		145	56.31	184.74	0.28	79.80	24.32	1.89	30	0.08	0.38
		150	56.51	185.40	0.20	80.46	24.52	1.89	30	0.08	0.37
		155	56.77	186.25	0.26	81.31	24.78	1.89	30	0.08	0.37
		160	56.95	186.84	0.18	81.90	24.96	1.89	30	0.08	0.37
		165	57.13	187.45	0.19	82.51	25.15	1.89	30	0.08	0.36
		170	57.31	188.03	0.18	83.09	25.32	1.89	30	0.07	0.36
		180	57.66	189.18	0.35	84.24	25.68	1.89	30	0.07	0.36
		181	59.07	193.82	1.41	88.88	27.09	1.89	30	0.07	0.34
		182	60.62	198.90	1.55	93.96	28.64	1.89	30	0.07	0.32
		183	61.55	201.96	0.93	97.02	29.57	1.89	30	0.06	0.31
		184	62.23	204.17	0.67	99.23	30.24	1.89	30	0.06	0.30
		185	62.71	205.76	0.48	100.82	30.73	2.52	40	0.08	0.40
		186	63.07	206.93	0.36	101.99	31.09	2.52	40	0.08	0.39
		187	63.35	207.86	0.28	102.91	31.37	2.52	40	0.08	0.39
		188	63.66	208.86	0.30	103.91	31.67	2.52	40	0.08	0.38
		189	63.77	209.24	0.12	104.29	31.79	2.52	40	0.08	0.38
		190	63.90	209.64	0.12	104.69	31.91	2.52	40	0.08	0.38
		192	64.15	210.47	0.25	105.52	32.16	2.52	40	0.08	0.38
		195	64.41	211.32	0.26	106.37	32.42	2.52	40	0.08	0.38
		200	64.87	212.83	0.46	107.88	32.88	2.52	40	0.08	0.37
		205	65.27	214.16	0.41	109.21	33.29	2.52	40	0.08	0.37
		210	65.52	214.97	0.25	110.02	33.54	2.52	40	0.08	0.36
		215	65.73	215.67	0.21	110.72	33.75	2.52	40	0.07	0.36
		220	65.93	216.31	0.20	111.36	33.94	2.52	40	0.07	0.36
		225	66.12	216.93	0.19	111.98	34.13	2.52	40	0.07	0.36
		230	66.40	217.85	0.28	112.90	34.41	2.52	40	0.07	0.35
		240	66.78	219.10	0.38	114.15	34.79	2.52	40	0.07	0.35
	recovery	241	58.52	192.00	-8.26	87.06	26.53	0.00	0		
		242	52.90	173.58	-5.61	68.64	20.92	0.00	0		
		243	48.98	160.70	-3.93	55.76	16.99	0.00	0		
		244	46.55	152.72	-2.43	47.78	14.56	0.00	0		
		245	45.01	147.69	-1.53	42.75	13.03	0.00	0		
		246	43.89	144.00	-1.12	39.06	11.90	0.00	0		
		247	43.04	141.21	-0.85	36.27	11.05	0.00	0		
		248	42.41	139.16	-0.62	34.22	10.43	0.00	0		
		249	41.87	137.39	-0.54	32.45	9.89	0.00	0		
		250	41.46	136.02	-0.42	31.08	9.47	0.00	0		
		252	40.96	134.40	-0.49	29.46	8.98	0.00	0		
		255	40.08	131.50	-0.88	26.56	8.10	0.00	0		
		260	39.35	129.10	-0.73	24.16	7.36	0.00	0		
		265	39.04	128.08	-0.31	23.14	7.05	0.00	0		
		273	38.49	126.30	-0.54	21.36	6.51	0.00	0		
		275	38.43	126.10	-0.06	21.16	6.45	0.00	0		
		280	38.26	125.52	-0.18	20.58	6.27	0.00	0		
		285	38.10	125.00	-0.16	20.06	6.11	0.00	0		
		290	37.95	124.50	-0.15	19.56	5.96	0.00	0		
		300	37.70	123.70	-0.24	18.76	5.72	0.00	0		
		310	37.50	123.04	-0.20	18.10	5.52	0.00	0		
		320	37.28	122.30	-0.23	17.36	5.29	0.00	0		



Nodding Hill WPID 62008

TITLE

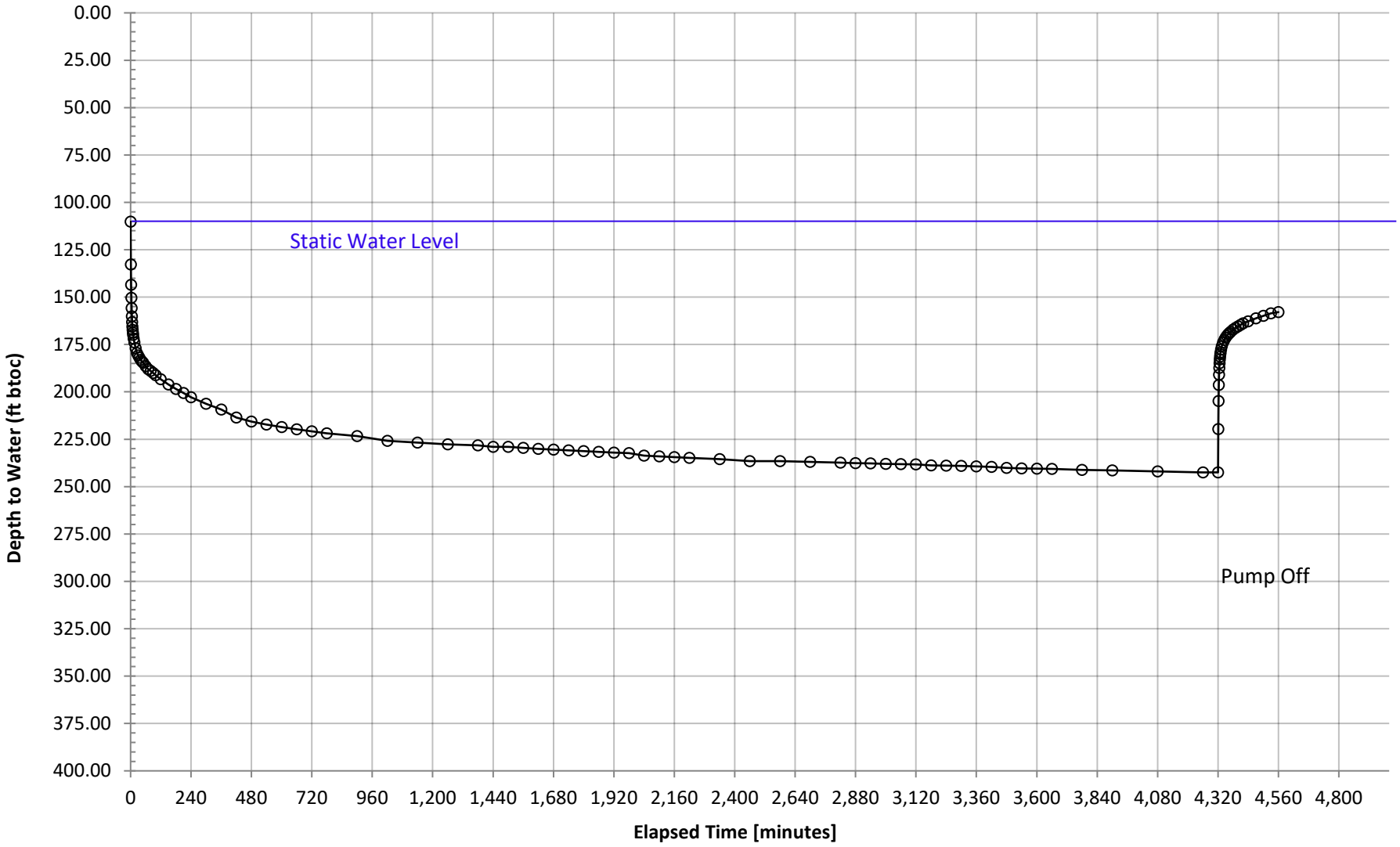
Figure E1 - Variable Rate Step Test Hydrograph

western water ASSOCIATES LTD
Consultants in Hydrogeology and Water Resources Management

DRAWN	RR	TEST DATE	October 28, 2020	JOB NO.	17-049-02
CHECKED	RR	SCALE	na	DWG. NO.	na
REVIEWED		DRAWING DATE	October 2020	FIGURE NO.	

Project No: 17-049-02, Table E2 - Nodding Hill WPID62008, Constant Rate Test, October 29 - November 1, 2020

Well depth = 371 ft	Well diameter = 6 in		Measurement method =		Flow Meter	Pump Depth = 340 ft					
Comments	Real Time	Time since pump started, t (minutes)	Water level measurement (btoc) (m)	Water level measurement (btoc) (ft)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	Specific Capacity	
										L/s/m	Usgpm/ft
STATIC	2020-10-29 9:00 AM	0	33.59	110.21	--	0.00	0.00	0.0	0	--	--
		1	40.47	132.78	6.88	22.57	6.88	1.9	30	0.27	1.33
		2	43.72	143.43	3.25	33.22	10.12	1.9	30	0.19	0.90
		3	45.82	150.32	2.10	40.11	12.22	1.9	30	0.15	0.75
		4	47.50	155.84	1.68	45.63	13.91	1.9	30	0.14	0.66
		5	48.82	160.19	1.33	49.98	15.23	1.9	30	0.12	0.60
		6	49.73	163.15	0.90	52.94	16.14	1.9	30	0.12	0.57
		7	50.44	165.51	0.72	55.30	16.85	1.9	30	0.11	0.54
		8	50.99	167.3	0.55	57.09	17.40	1.9	30	0.11	0.53
		9	51.44	168.79	0.45	58.58	17.85	1.9	30	0.11	0.51
		10	51.81	169.99	0.37	59.78	18.22	1.9	30	0.10	0.50
		12	52.39	171.89	0.58	61.68	18.80	1.9	30	0.10	0.49
		15	53.00	173.88	0.61	63.67	19.41	1.9	30	0.10	0.47
		20	53.91	176.89	0.92	66.68	20.32	1.9	30	0.09	0.45
		25	54.68	179.4	0.77	69.19	21.09	1.9	30	0.09	0.43
		30	55.09	180.74	0.41	70.53	21.50	1.9	30	0.09	0.43
		35	55.46	181.98	0.38	71.77	21.87	1.9	30	0.09	0.42
		40	55.81	183.12	0.35	72.91	22.22	1.9	30	0.09	0.41
		45	56.05	183.91	0.24	73.70	22.46	1.9	30	0.08	0.41
		50	56.28	184.67	0.23	74.46	22.69	1.9	30	0.08	0.40
		60	56.81	186.39	0.52	76.18	23.22	1.9	30	0.08	0.39
		70	57.31	188.04	0.50	77.83	23.72	1.9	30	0.08	0.39
		80	57.60	189	0.29	78.79	24.01	1.9	30	0.08	0.38
		90	57.93	190.08	0.33	79.87	24.34	1.9	30	0.08	0.38
		100	58.30	191.27	0.36	81.06	24.71	1.9	30	0.08	0.37
		120	58.91	193.3	0.62	83.09	25.32	1.9	30	0.07	0.36
		150	59.75	196.05	0.84	85.84	26.16	1.9	30	0.07	0.35
		180	60.50	198.51	0.75	88.30	26.91	1.9	30	0.07	0.34
		210	61.16	200.65	0.65	90.44	27.56	1.9	30	0.07	0.33
		240	61.81	202.8	0.66	92.59	28.22	1.9	30	0.07	0.32
		300	62.87	206.27	1.06	96.06	29.28	1.9	30	0.06	0.31
		360	63.82	209.39	0.95	99.18	30.23	1.9	30	0.06	0.30
		420	65.09	213.55	1.27	103.33	31.50	1.9	30	0.06	0.29
		480	65.71	215.61	0.63	105.39	32.12	1.9	30	0.06	0.28
		540	66.21	217.25	0.50	107.03	32.62	1.9	30	0.06	0.28
		600	66.64	218.63	0.42	108.41	33.04	1.9	30	0.06	0.28
		660	66.97	219.72	0.33	109.50	33.38	1.9	30	0.06	0.27
		720	67.32	220.89	0.36	110.67	33.73	1.9	30	0.06	0.27
		780	67.62	221.85	0.29	111.63	34.03	1.9	30	0.06	0.27
		900	68.07	223.35	0.46	113.13	34.48	1.9	30	0.05	0.27
		1020	68.82	225.80	0.75	115.58	35.23	1.9	30	0.05	0.26
Recovery		1140	69.11	226.76	0.29	116.54	35.52	1.9	30	0.05	0.26
		1260	69.40	227.70	0.29	117.48	35.81	1.9	30	0.05	0.26
		1380	69.57	228.27	0.17	118.05	35.98	1.9	30	0.05	0.25
		1440	69.82	229.07	0.24	118.85	36.23	1.9	30	0.05	0.25
		1500	69.82	229.07	0.00	118.85	36.23	1.9	30	0.05	0.25
		1560	69.95	229.51	0.13	119.29	36.36	1.9	30	0.05	0.25
		1620	70.11	230.04	0.16	119.82	36.52	1.9	30	0.05	0.25
		1680	70.23	230.43	0.12	120.21	36.64	1.9	30	0.05	0.25
		1740	70.35	230.82	0.40	120.60	36.76	1.9	30	0.05	0.25
		1800	70.47	231.21	0.12	120.99	36.88	1.9	30	0.05	0.25
		1860	70.60	231.65	0.13	121.43	37.01	1.9	30	0.05	0.25
		1920	70.71	232.00	0.11	121.78	37.12	1.9	30	0.05	0.25
		1980	70.80	232.28	0.09	122.06	37.21	1.9	30	0.05	0.25
		2040	71.21	233.65	0.42	123.43	37.62	1.9	30	0.05	0.24
		2100	71.32	234.00	0.11	123.78	37.73	1.9	30	0.05	0.24
		2160	71.45	234.43	0.13	124.21	37.86	1.9	30	0.05	0.24
		2220	71.56	234.80	0.11	124.58	37.97	1.9	30	0.05	0.24
		2340	71.79	235.53	0.22	125.31	38.20	1.9	30	0.05	0.24
		2460	72.11	236.60	0.33	126.38	38.52	1.9	30	0.05	0.24
		2580	72.11	236.60	0.00	126.38	38.52	1.9	30	0.05	0.24
		2700	72.22	236.96	0.11	126.74	38.63	1.9	30	0.05	0.24
		2820	72.36	237.40	0.13	127.18	38.77	1.9	30	0.05	0.24
		2880	72.42	237.60	0.06	127.38	38.83	1.9	30	0.05	0.24
		2940	72.46	237.75	0.05	127.53	38.87	1.9	30	0.05	0.24
		3000	72.52	237.95	0.06	127.73	38.93	1.9	30	0.05	0.23
		3060	72.57	238.10	0.05	127.88	38.98	1.9	30	0.05	0.23
		3120	72.64	238.32	0.07	128.10	39.05	1.9	30	0.05	0.23
		3180	72.80	238.85	0.16	128.63	39.21	1.9	30	0.05	0.23
		3240	72.84	238.98	0.04	128.76	39.25	1.9	30	0.05	0.23
		3300	72.87	239.10	0.04	128.88	39.28	1.9	30	0.05	0.23
		3360	72.94	239.30	0.06	129.08	39.34	1.9	30	0.05	0.23
		3420	73.02	239.58	0.09	129.36	39.43	1.9	30	0.05	0.23
		3480	73.18	240.11	0.16	129.89	39.59	1.9	30	0.05	0.23
		3540	73.27	240.41	0.09	130.19	39.68	1.9	30	0.05	0.23
		3600	73.29	240.46	0.02	130.24	39.70	1.9	30	0.05	0.23
		3660	73.35	240.67	0.06	130.45	39.76	1.9	30	0.05	0.23
		3780	73.50	241.16	0.15	130.94	39.91	1.9	30	0.05	0.23
		3900	73.61	241.50	0.10	131.28	40.02	1.9	30	0.05	0.23
		4080	73.74	241.95	0.14	131.73	40.15	1.9	30	0.05	0.23
		4260	73.90	242.45	0.15	132.23	40.30	1.9	30	0.05	0.23
		4320	73.90	242.48	0.01	132.26	40.31	1.9	30	0.05	0.23
Recovery		4321	66.93	219.59	-6.98	109.37	33.34				
		4322	62.44	204.85	-4.49	94.64	28.84				
		4323	59.83	196.31	-2.60	86.10	26.24				
		4324	58.20	190.94	-1.64	80.73	24.61				
		4325	57.10	187.33	-1.10	77.12	23.51				
		4326	56.34	184.84	-0.76	74.63	22.75				
		4327	55.75	182.90	-0.59	72.69	22.15				
		4328	55.29	181.40	-0.46	71.19	21.70				
		4329	54.91	180.16	-0.38	69.95	21.32				
		4330	54.60	179.15	-0.31	68.94	21.01				
		4332	54.12	177.58	-0.48	67.37	20.53				
		4335	53.61	175.89	-0.52	65.68	20.02				
		4340	53.01	173.91	-0.60	63.70	19.41				
		4345	52.58	172.51	-0.43	62.30	18.99				
		4350	52.24	171.41	-0.34	61.20	18.65				
		4355	51.97	170.51	-0.27	60.30	18.38				
		4360	51.73	169.71	-0.24	59.50	18.13				
		4365	51.51	169.01	-0.21	58.80	17.92				
		4370	51.33	168.40	-0.19	58.19	17.74				
		4380	50.96	167.21	-0.36	57.00	17.37				
		4390	50.67	166.25	-0.29	56.04	17.08				
		4400	50.42	165.44	-0.25	55.23	16.83				
		4410	50.19	164.67	-0.23	54.46	16.60				
		4420	49.96	163.91	-0.23	53.70	16.37				
		4440	49.60	162.73	-0.36	52.52	16.01				
		4470	49.14	161.23	-0.46	51.02	15.55				
		4500	48.73	159.89	-0.41	49.68	15.14				
		4530	48.32	158.55	-0.41	48.34	14.73				
		4560	48.14	157.95	-0.18	47.74	14.55				



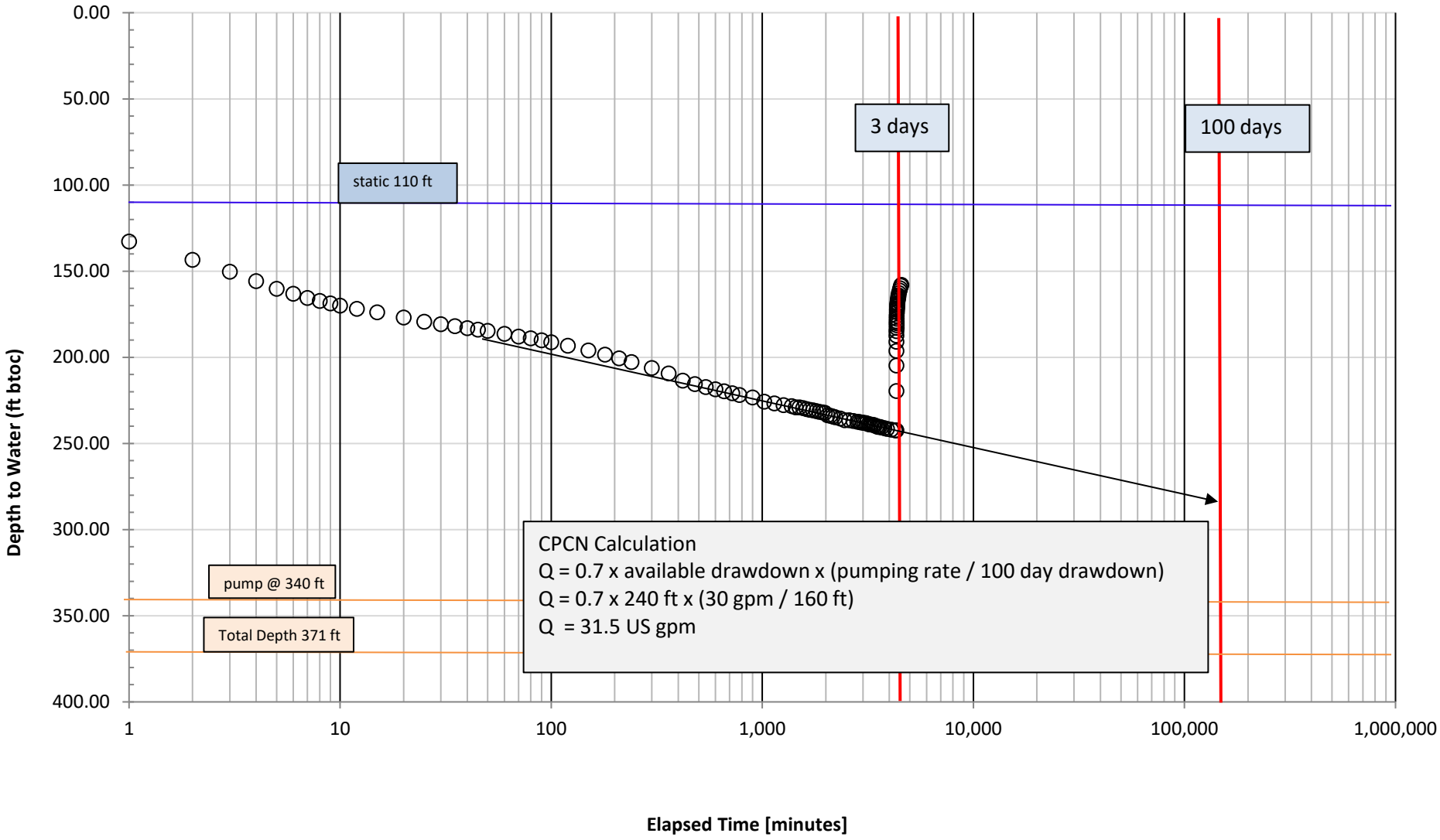
Nodding Hill WPID 62008

TITLE

Figure E2 - Constant Rate Test Hydrograph, 30 US gpm (Oct 29 - Nov 1, 2020)

western water ASSOCIATES LTD
Consultants in Hydrogeology and Water Resources Management

DRAWN	RR	DATE	January 21, 2021	JOB NO.	17-049-02
CHECKED	RR	SCALE	na	DWG. NO.	na
REVIEWED		FILE NO.		FIGURE NO.	



Nodding Hill WPID 62008

TITLE **Figure E3 - Semi Log Plot - 72 hour Constant Rate Pumping Test at 30 US gpm**

western water ASSOCIATES LTD
Consultants in Hydrogeology and Water Resources Management

DRAWN	RR	DATE	Test Start Oct 29, 2020	JOB NO.	17-049-02
CHECKED	RR	SCALE	na	DWG. NO.	na
REVIEWED		FILE NO.		FIGURE NO.	

CERTIFICATE OF ANALYSIS

REPORTED TO	Western Water Associates Ltd 106 - 5145 26th Street Vernon, BC V1T 8G4		
ATTENTION	Ryan Rhodes	**WORK ORDER**	20J3166
PO NUMBER		**RECEIVED / TEMP**	2020-10-30 14:30 / 10°C
PROJECT	17-049-02	**REPORTED**	2020-11-09 14:19
PROJECT INFO		**COC NUMBER**	B64009

Introduction:

CARO Analytical Services is a testing laboratory full of smart, engaged scientists driven to make the world a safer and healthier place. Through our clients' projects we become an essential element for a better world. We employ methods conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts. CARO is accredited by the Canadian Association for Laboratories Accreditation (CALA) to ISO/IEC 17025:2017 for specific tests listed in the scope of accreditation approved by CALA.

Big Picture Sidekicks

You know that the sample you collected after snowshoeing to site, digging 5 meters, and racing to get it on a plane so you can submit it to the lab for time sensitive results needed to make important and expensive decisions (whew) is VERY important. We know that too.

We've Got Chemistry

It's simple. We figure the more you enjoy working with our fun and engaged team members; the more likely you are to give us continued opportunities to support you.

Ahead of the Curve

Through research, regulation knowledge, and instrumentation, we are your analytical centre for the technical knowledge you need, BEFORE you need it, so you can stay up to date and in the know.

If you have any questions or concerns, please contact me at sgulenchyn@caro.ca

Authorized By:

Sara Gulenchyn, B.Sc, P.Chem.
Client Service Manager

CARO ANALYTICAL SERVICES

TEST RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J3166
PROJECT	17-049-02	**REPORTED**	2020-11-09 14:19

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
62008 (20J3166-01) | Matrix: Water | Sampled: 2020-10-30 10:00						
Anions						
Chloride	**3.19**	AO ≤ 250	0.10	mg/L	2020-10-31	
Fluoride	**1.40**	MAC = 1.5	0.10	mg/L	2020-10-31	
Nitrate (as N)	< 0.010	MAC = 10	0.010	mg/L	2020-10-31	
Nitrite (as N)	< 0.010	MAC = 1	0.010	mg/L	2020-10-31	
Sulfate	**275**	AO ≤ 500	1.0	mg/L	2020-10-31	
Calculated Parameters						
Hardness, Total (as CaCO3)	**438**	None Required	0.500	mg/L	N/A	
Langelier Index	**0.9**	N/A	-5.0		2020-11-09	
Solids, Total Dissolved	**705**	AO ≤ 500	10.0	mg/L	N/A	
General Parameters						
Alkalinity, Total (as CaCO3)	**334**	N/A	1.0	mg/L	2020-11-03	
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-11-03	
Alkalinity, Bicarbonate (as CaCO3)	**334**	N/A	1.0	mg/L	2020-11-03	
Alkalinity, Carbonate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-11-03	
Alkalinity, Hydroxide (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-11-03	
Colour, True	< 5.0	AO ≤ 15	5.0	CU	2020-10-31	
Conductivity (EC)	**1020**	N/A	2.0	µS/cm	2020-11-03	
Cyanide, Total	< 0.0020	MAC = 0.2	0.0020	mg/L	2020-11-02	
pH	**7.96**	7.0-10.5	0.10	pH units	2020-11-03	HT2
Temperature, at pH	**20.0**	N/A		°C	2020-11-03	HT2
Turbidity	**0.72**	OG < 1	0.10	NTU	2020-10-31	
Microbiological Parameters						
Coliforms, Total	< 1	MAC = 0	1	CFU/100 mL	2020-10-30	
E. coli	< 1	MAC = 0	1	CFU/100 mL	2020-10-30	
Total Metals						
Aluminum, total	**0.0067**	OG < 0.1	0.0050	mg/L	2020-11-07	
Antimony, total	< 0.00020	MAC = 0.006	0.00020	mg/L	2020-11-07	
Arsenic, total	< 0.00050	MAC = 0.01	0.00050	mg/L	2020-11-07	
Barium, total	**0.0150**	MAC = 2	0.0050	mg/L	2020-11-07	
Boron, total	**0.0610**	MAC = 5	0.0500	mg/L	2020-11-07	
Cadmium, total	< 0.000010	MAC = 0.005	0.000010	mg/L	2020-11-07	
Calcium, total	**76.4**	None Required	0.20	mg/L	2020-11-07	
Chromium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2020-11-07	
Cobalt, total	**0.00025**	N/A	0.00010	mg/L	2020-11-07	
Copper, total	**0.00254**	MAC = 2	0.00040	mg/L	2020-11-07	
Iron, total	**0.328**	AO ≤ 0.3	0.010	mg/L	2020-11-07	
Lead, total	**0.00037**	MAC = 0.005	0.00020	mg/L	2020-11-07	
Magnesium, total	**60.1**	None Required	0.010	mg/L	2020-11-07	
Manganese, total	**0.0394**	MAC = 0.12	0.00020	mg/L	2020-11-07	
Mercury, total	< 0.000010	MAC = 0.001	0.000010	mg/L	2020-11-04	

TEST RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J3166
PROJECT	17-049-02	**REPORTED**	2020-11-09 14:19

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
62008 (20J3166-01) | Matrix: Water | Sampled: 2020-10-30 10:00, Continued						
Total Metals, Continued						
Molybdenum, total	**0.00204**	N/A	0.00010	mg/L	2020-11-07	
Nickel, total	**0.00066**	N/A	0.00040	mg/L	2020-11-07	
Potassium, total	**6.61**	N/A	0.10	mg/L	2020-11-07	
Selenium, total	< 0.00050	MAC = 0.05	0.00050	mg/L	2020-11-07	
Sodium, total	**80.3**	AO ≤ 200	0.10	mg/L	2020-11-07	
Strontium, total	**2.10**	7	0.0010	mg/L	2020-11-07	
Uranium, total	**0.000933**	MAC = 0.02	0.000020	mg/L	2020-11-07	
Zinc, total	**0.0595**	AO ≤ 5	0.0040	mg/L	2020-11-07	

Sample Qualifiers:

HT2 The 15 minute recommended holding time (from sampling to analysis) has been exceeded - field analysis is recommended.

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J3166
PROJECT	17-049-02	**REPORTED**	2020-11-09 14:19

Analysis Description	Method Ref.	Technique	Accredited	Location
Alkalinity in Water	SM 2320 B* (2017)	Titration with H2SO4	✓	Kelowna
Anions in Water	SM 4110 B (2017)	Ion Chromatography	✓	Kelowna
Coliforms, Total in Water	SM 9222* (2017)	Membrane Filtration / Chromocult Agar	✓	Kelowna
Colour, True in Water	SM 2120 C (2017)	Spectrophotometry (456 nm)	✓	Kelowna
Conductivity in Water	SM 2510 B (2017)	Conductivity Meter	✓	Kelowna
Cyanide, SAD in Water	ASTM D7511-12	Flow Injection with In-Line UV Digestion and Amperometry	✓	Kelowna
E. coli in Water	SM 9222* (2017)	Membrane Filtration / Chromocult Agar	✓	Kelowna
Hardness in Water	SM 2340 B* (2017)	Calculation: 2.497 [total Ca] + 4.118 [total Mg] (Est)	✓	N/A
Langelier Index in Water	SM 2330 B (2017)	Calculation		N/A
Mercury, total in Water	EPA 245.7*	BrCl2 Oxidation / Cold Vapor Atomic Fluorescence Spectrometry (CVAFS)	✓	Richmond
pH in Water	SM 4500-H+ B (2017)	Electrometry	✓	Kelowna
Solids, Total Dissolved in Water	SM 1030 E (2017)	SM 1030 E (2011)		N/A
Total Metals in Water	EPA 200.2 / EPA 6020B	HNO3+HCl Hot Block Digestion / Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS)	✓	Richmond
Turbidity in Water	SM 2130 B (2017)	Nephelometry	✓	Kelowna

Note: An asterisk in the Method Reference indicates that the CARO method has been modified from the reference method

Glossary of Terms:

RL	Reporting Limit (default)
<	Less than the specified Reporting Limit (RL) - the actual RL may be higher than the default RL due to various factors
°C	Degrees Celcius
AO	Aesthetic Objective
CFU/100 mL	Colony Forming Units per 100 millilitres
CU	Colour Units (referenced against a platinum cobalt standard)
MAC	Maximum Acceptable Concentration (health based)
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
OG	Operational Guideline (treated water)
pH units	pH < 7 = acidic, ph > 7 = basic
µS/cm	Microsiemens per centimetre
ASTM	ASTM International Test Methods
EPA	United States Environmental Protection Agency Test Methods
SM	Standard Methods for the Examination of Water and Wastewater, American Public Health Association

APPENDIX 1: SUPPORTING INFORMATION

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J3166
PROJECT	17-049-02	**REPORTED**	2020-11-09 14:19

General Comments:

The results in this report apply to the samples analyzed in accordance with the Chain of Custody document. This analytical report must be reproduced in its entirety. CARO is not responsible for any loss or damage resulting directly or indirectly from error or omission in the conduct of testing. Liability is limited to the cost of analysis. Samples will be disposed of 30 days after the test report has been issued unless otherwise agreed to in writing.

Results in **Bold** indicate values that are above CARO's method reporting limits. Any results that are above regulatory limits are highlighted **red**. Please note that results will only be highlighted red if the regulatory limits are included on the CARO report. Any Bold and/or highlighted results do not take into account method uncertainty. If you would like method uncertainty or regulatory limits to be included on your report, please contact your Account Manager:sgulenchyn@caro.ca

Please note any regulatory guidelines applied to this report are added as a convenience to the client, at their request, to help provide some initial context to analytical results obtained. Although CARO makes every effort to ensure accuracy of the associated regulatory guideline(s) applied, the guidelines applied cannot be assumed to be correct due to a variety of factors and as such CARO Analytical Services assumes no liability or responsibility for the use of those guidelines to make any decisions. The original source of the regulation should be verified and a review of the guideline (s) should be validated as correct in order to make any decisions arising from the comparison of the analytical data obtained to the relevant regulatory guideline for one's particular circumstances. Further, CARO Analytical Services assumes no liability or responsibility for any loss attributed from the use of these guidelines in any way.

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J3166
PROJECT	17-049-02	**REPORTED**	2020-11-09 14:19

The following section displays the quality control (QC) data that is associated with your sample data. Groups of samples are prepared in "batches" and analyzed in conjunction with QC samples that ensure your data is of the highest quality. Common QC types include:

- **Method Blank (Blk)**: A blank sample that undergoes sample processing identical to that carried out for the test samples. Method blank results are used to assess contamination from the laboratory environment and reagents.
- **Duplicate (Dup)**: An additional or second portion of a randomly selected sample in the analytical run carried through the entire analytical process. Duplicates provide a measure of the analytical method's precision (reproducibility).
- **Blank Spike (BS)**: A sample of known concentration which undergoes processing identical to that carried out for test samples, also referred to as a laboratory control sample (LCS). Blank spikes provide a measure of the analytical method's accuracy.
- **Matrix Spike (MS)**: A second aliquot of sample is fortified with with a known concentration of target analytes and carried through the entire analytical process. Matrix spikes evaluate potential matrix effects that may affect the analyte recovery.
- **Reference Material (SRM)**: A homogenous material of similar matrix to the samples, certified for the parameter(s) listed. Reference Materials ensure that the analytical process is adequate to achieve acceptable recoveries of the parameter(s) tested.

Each QC type is analyzed at a 5-10% frequency, i.e. one blank/duplicate/spike for every 10-20 samples. For all types of QC, the specified recovery (% Rec) and relative percent difference (RPD) limits are derived from long-term method performance averages and/or prescribed by the reference method.

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B0J2895										
Blank (B0J2895-BLK1)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B0J2895-BLK2)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
Blank (B0J2895-BLK3)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Chloride	< 0.10	0.10	mg/L							
Fluoride	< 0.10	0.10	mg/L							
Nitrate (as N)	< 0.010	0.010	mg/L							
Nitrite (as N)	< 0.010	0.010	mg/L							
Sulfate	< 1.0	1.0	mg/L							
LCS (B0J2895-BS1)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Fluoride	3.97	0.10	mg/L	4.00		99	88-108			
Nitrate (as N)	4.01	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.02	0.010	mg/L	2.00		101	85-115			
Sulfate	16.0	1.0	mg/L	16.0		100	90-110			
LCS (B0J2895-BS2)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Chloride	16.0	0.10	mg/L	16.0		100	90-110			
Fluoride	3.91	0.10	mg/L	4.00		98	88-108			
Nitrate (as N)	4.01	0.010	mg/L	4.00		100	90-110			
Nitrite (as N)	2.05	0.010	mg/L	2.00		103	85-115			
Sulfate	16.1	1.0	mg/L	16.0		101	90-110			
LCS (B0J2895-BS3)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Chloride	16.1	0.10	mg/L	16.0		100	90-110			
Fluoride	3.94	0.10	mg/L	4.00		98	88-108			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J3166
PROJECT	17-049-02	**REPORTED**	2020-11-09 14:19

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B0J2895, Continued										
LCS (B0J2895-BS3), Continued				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Nitrate (as N)	4.02	0.010	mg/L	4.00		101	90-110			
Nitrite (as N)	2.04	0.010	mg/L	2.00		102	85-115			
Sulfate	16.1	1.0	mg/L	16.0		101	90-110			
General Parameters, Batch B0J2892										
Blank (B0J2892-BLK1)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Colour, True	< 5.0	5.0	CU							
Blank (B0J2892-BLK2)				Prepared: 2020-11-03, Analyzed: 2020-11-03						
Colour, True	< 5.0	5.0	CU							
LCS (B0J2892-BS1)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Colour, True	20	5.0	CU	20.0		102	85-115			
LCS (B0J2892-BS2)				Prepared: 2020-11-03, Analyzed: 2020-11-03						
Colour, True	21	5.0	CU	20.0		103	85-115			
General Parameters, Batch B0J2893										
Blank (B0J2893-BLK1)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Turbidity	< 0.10	0.10	NTU							
Blank (B0J2893-BLK2)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Turbidity	< 0.10	0.10	NTU							
LCS (B0J2893-BS1)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Turbidity	38.7	0.10	NTU	40.0		97	90-110			
LCS (B0J2893-BS2)				Prepared: 2020-10-31, Analyzed: 2020-10-31						
Turbidity	38.6	0.10	NTU	40.0		96	90-110			
General Parameters, Batch B0K0042										
Blank (B0K0042-BLK1)				Prepared: 2020-11-02, Analyzed: 2020-11-02						
Cyanide, Total	< 0.0020	0.0020	mg/L							
LCS (B0K0042-BS1)				Prepared: 2020-11-02, Analyzed: 2020-11-02						
Cyanide, Total	0.0192	0.0020	mg/L	0.0200		96	82-120			
LCS Dup (B0K0042-BSD1)				Prepared: 2020-11-02, Analyzed: 2020-11-02						
Cyanide, Total	0.0193	0.0020	mg/L	0.0200		96	82-120	< 1	10	
General Parameters, Batch B0K0127										
Blank (B0K0127-BLK1)				Prepared: 2020-11-03, Analyzed: 2020-11-03						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
Blank (B0K0127-BLK2)				Prepared: 2020-11-03, Analyzed: 2020-11-03						
Alkalinity, Total (as CaCO3)	< 1.0	1.0	mg/L							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J3166
PROJECT	17-049-02	**REPORTED**	2020-11-09 14:19

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters, Batch B0K0127, Continued										
Blank (B0K0127-BLK2), Continued				Prepared: 2020-11-03, Analyzed: 2020-11-03						
Alkalinity, Phenolphthalein (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Carbonate (as CaCO3)	< 1.0	1.0	mg/L							
Alkalinity, Hydroxide (as CaCO3)	< 1.0	1.0	mg/L							
Conductivity (EC)	< 2.0	2.0	µS/cm							
LCS (B0K0127-BS1)				Prepared: 2020-11-03, Analyzed: 2020-11-03						
Alkalinity, Total (as CaCO3)	105	1.0	mg/L	100		105	80-120			
LCS (B0K0127-BS2)				Prepared: 2020-11-03, Analyzed: 2020-11-03						
Alkalinity, Total (as CaCO3)	106	1.0	mg/L	100		106	80-120			
LCS (B0K0127-BS3)				Prepared: 2020-11-03, Analyzed: 2020-11-03						
Conductivity (EC)	1420	2.0	µS/cm	1410		100	95-104			
LCS (B0K0127-BS4)				Prepared: 2020-11-03, Analyzed: 2020-11-03						
Conductivity (EC)	1400	2.0	µS/cm	1410		99	95-104			
Reference (B0K0127-SRM1)				Prepared: 2020-11-03, Analyzed: 2020-11-03						
pH	6.99	0.10	pH units	7.01		100	98-102			
Reference (B0K0127-SRM2)				Prepared: 2020-11-03, Analyzed: 2020-11-03						
pH	6.99	0.10	pH units	7.01		100	98-102			
Microbiological Parameters, Batch B0J2823										
Blank (B0J2823-BLK1)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J2823-BLK2)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J2823-BLK3)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J2823-BLK4)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J2823-BLK5)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J2823-BLK6)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J2823-BLK7)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							
Blank (B0J2823-BLK8)				Prepared: 2020-10-30, Analyzed: 2020-10-30						
Coliforms, Total	< 1	1	CFU/100 mL							
E. coli	< 1	1	CFU/100 mL							

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J3166
PROJECT	17-049-02	**REPORTED**	2020-11-09 14:19

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B0K0216										
Blank (B0K0216-BLK1)				Prepared: 2020-11-03, Analyzed: 2020-11-07						
Aluminum, total	< 0.0050	0.0050	mg/L							
Antimony, total	< 0.00020	0.00020	mg/L							
Arsenic, total	< 0.00050	0.00050	mg/L							
Barium, total	< 0.0050	0.0050	mg/L							
Boron, total	< 0.0500	0.0500	mg/L							
Cadmium, total	< 0.000010	0.000010	mg/L							
Calcium, total	< 0.20	0.20	mg/L							
Chromium, total	< 0.00050	0.00050	mg/L							
Cobalt, total	< 0.00010	0.00010	mg/L							
Copper, total	< 0.00040	0.00040	mg/L							
Iron, total	< 0.010	0.010	mg/L							
Lead, total	< 0.00020	0.00020	mg/L							
Magnesium, total	< 0.010	0.010	mg/L							
Manganese, total	< 0.00020	0.00020	mg/L							
Molybdenum, total	< 0.00010	0.00010	mg/L							
Nickel, total	< 0.00040	0.00040	mg/L							
Potassium, total	< 0.10	0.10	mg/L							
Selenium, total	< 0.00050	0.00050	mg/L							
Sodium, total	< 0.10	0.10	mg/L							
Strontium, total	< 0.0010	0.0010	mg/L							
Uranium, total	< 0.000020	0.000020	mg/L							
Zinc, total	< 0.0040	0.0040	mg/L							
LCS (B0K0216-BS1)				Prepared: 2020-11-03, Analyzed: 2020-11-07						
Aluminum, total	0.0238	0.0050	mg/L	0.0199		119	80-120			
Antimony, total	0.0208	0.00020	mg/L	0.0200		104	80-120			
Arsenic, total	0.0206	0.00050	mg/L	0.0200		103	80-120			
Barium, total	0.0205	0.0050	mg/L	0.0198		104	80-120			
Boron, total	< 0.0500	0.0500	mg/L	0.0200		107	80-120			
Cadmium, total	0.0207	0.000010	mg/L	0.0199		104	80-120			
Calcium, total	1.93	0.20	mg/L	2.02		96	80-120			
Chromium, total	0.0204	0.00050	mg/L	0.0198		103	80-120			
Cobalt, total	0.0209	0.00010	mg/L	0.0199		105	80-120			
Copper, total	0.0204	0.00040	mg/L	0.0200		102	80-120			
Iron, total	2.12	0.010	mg/L	2.02		105	80-120			
Lead, total	0.0209	0.00020	mg/L	0.0199		105	80-120			
Magnesium, total	2.06	0.010	mg/L	2.02		102	80-120			
Manganese, total	0.0202	0.00020	mg/L	0.0199		102	80-120			
Molybdenum, total	0.0203	0.00010	mg/L	0.0200		102	80-120			
Nickel, total	0.0210	0.00040	mg/L	0.0200		105	80-120			
Potassium, total	1.93	0.10	mg/L	2.02		96	80-120			
Selenium, total	0.0216	0.00050	mg/L	0.0200		108	80-120			
Sodium, total	1.94	0.10	mg/L	2.02		96	80-120			
Strontium, total	0.0204	0.0010	mg/L	0.0200		102	80-120			
Uranium, total	0.0209	0.000020	mg/L	0.0200		104	80-120			
Zinc, total	0.0217	0.0040	mg/L	0.0200		108	80-120			
Reference (B0K0216-SRM1)				Prepared: 2020-11-03, Analyzed: 2020-11-07						
Aluminum, total	0.322	0.0050	mg/L	0.299		108	70-130			
Antimony, total	0.0528	0.00020	mg/L	0.0517		102	70-130			
Arsenic, total	0.127	0.00050	mg/L	0.119		107	70-130			
Barium, total	0.819	0.0050	mg/L	0.801		102	70-130			
Boron, total	4.20	0.0500	mg/L	4.11		102	70-130			
Cadmium, total	0.0527	0.000010	mg/L	0.0503		105	70-130			
Calcium, total	10.3	0.20	mg/L	10.7		96	70-130			
Chromium, total	0.259	0.00050	mg/L	0.250		104	70-130			
Cobalt, total	0.0418	0.00010	mg/L	0.0384		109	70-130			

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO	Western Water Associates Ltd	**WORK ORDER**	20J3166
PROJECT	17-049-02	**REPORTED**	2020-11-09 14:19

Analyte	Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch B0K0216, Continued										
Reference (B0K0216-SRM1), Continued				Prepared: 2020-11-03, Analyzed: 2020-11-07						
Copper, total	0.519	0.00040	mg/L	0.487		106	70-130			
Iron, total	0.566	0.010	mg/L	0.504		112	70-130			
Lead, total	0.300	0.00020	mg/L	0.278		108	70-130			
Magnesium, total	3.89	0.010	mg/L	3.59		108	70-130			
Manganese, total	0.113	0.00020	mg/L	0.111		102	70-130			
Molybdenum, total	0.206	0.00010	mg/L	0.196		105	70-130			
Nickel, total	0.270	0.00040	mg/L	0.248		109	70-130			
Potassium, total	6.18	0.10	mg/L	5.89		105	70-130			
Selenium, total	0.131	0.00050	mg/L	0.120		109	70-130			
Sodium, total	9.17	0.10	mg/L	8.71		105	70-130			
Strontium, total	0.407	0.0010	mg/L	0.393		103	70-130			
Uranium, total	0.0372	0.000020	mg/L	0.0344		108	70-130			
Zinc, total	2.67	0.0040	mg/L	2.50		107	70-130			
Total Metals, Batch B0K0274										
Blank (B0K0274-BLK1)				Prepared: 2020-11-04, Analyzed: 2020-11-04						
Mercury, total	< 0.000010	0.000010	mg/L							
Reference (B0K0274-SRM1)				Prepared: 2020-11-04, Analyzed: 2020-11-04						
Mercury, total	0.00564	0.000010	mg/L	0.00581		97	70-130			

Appendix F
Nodding Hill Well Logs

Nodding Hill Developments
Groundwater Resource Assessment in Support of Rezoning
WWAL Ref: 17-049-02

western water ASSOCIATES LTD

F6

BRITISH COLUMBIA
The Best Place on Earth

Ministry of Environment

☒ **Well Construction Report**
☐ **Well Closure Report**
☐ **Well Alteration Report**

Stamp company name/address/ phone/fax/email here, if desired.

Ministry Well ID Plate Number: 62012
Ministry Well Tag Number: _____
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Nodding Hill Development Ltd
Mailing address: 7601 McLennon Rd Town Vernon Prov. BC Postal Code V1B 3S7
Well Location (see note 2): Address: Street no. _____ Street name _____ Town _____
(or) **Legal description:** Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____
(or) **PID:** 010-991-352 (and) **Description of well location (attach sketch, if nec.):** _____

NAD 83: Zone: Nad 83 **(see note 3)** (and) **UTM Easting:** 119°13.242 W m **UTM Northing:** 50°19.680 N m (or) **Latitude (see note 4):** _____ **Longitude:** _____

Method of drilling: ☒ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify): _____

Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2255 ft (asl) Method (see note 5): GPS

Class of well (see note 6): Water Supply **Sub-class of well:** Domestic.

Water supply wells: indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material: Clay	Silt	Till	Sand with clay/silt	Sand, fine-med	Sand, med-coarse	Sand with gravel	Bedrock Material: Siltstone/shale	Sandstone	Conglomerate	Limestone	Basalt	Volcanic	Cyrstalline	Other Surficial/ Bedrock	Colour: Red	Orange	Brown	Tan	Light Grey	Blue	Green	Dark Grey	Hardness: Very Hard	Hard	Dense/Stiff	Loose	Water Content: Dry	Moist	Wet	High Production	Lost circulation	Not Available	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	4	○	○	○	●	○	○	●	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	●	●	○	○	○	○	○	
4	16	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	●	○	○	○	○	●	○	●	○	○	○	○	○	○	Very weathered
16	23	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	●	○	●	○	○	○	○	○	○	○	○	○	
23	145	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	●	○	○	○	○	●	○	●	○	●	○	○	○	○	○	○	○	
145	322	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	●	○	●	○	○	○	○	○	○	○	○	○	
322	325	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	3¼ GPM.
325	400	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	●	○	●	○	○	○	○	○	○	○	○	○	
400	425	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	Black/straight sulphides
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	1hr to drill 5'

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	16½	6	Stl	.219	V.

Surface seal: Type: Bentonite Depth: 15 ft
Method of installation: ☒ Poured ☐ Pumped Thickness: 2 in
Backfill: Type: _____ Depth: _____ ft
Liner: ☒ PVC ☐ Other (specify): _____
Diameter: 4 in Thickness: .250 in
From: 5 ft (bgl) To: 425 ft (bgl) Perforated: From: 405 ft (bgl) To 425 ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Bail ☐ Plug ☐ Plate ☐ Other (specify): _____
Filter pack: From: _____ ft To: _____ ft Thickness: _____ in
Type and size of material: _____

Developed by:
☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
Other (specify): _____ Total duration: 1 hrs
Notes: _____

Well yield estimated by:
Pumping (☒ Air lifting) ☐ Bailing ☐ Other (specify): _____
Rate: 3¼ USgpm Duration: 1 hrs
SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:
☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):
Name (first, last) (see note 19): Walter Howe.
Registration no. (see note 20): 05081001.
Consultant (if applicable; name and company): _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible _____

Final well completion data:
Total depth drilled: 425 ft Finished well depth: 425 ft (bgl)
Final stick up: 18 in Depth to bedrock: 4 ft (bgl)
SWL: 57. ft (btoc) Estimated well yield: 3¼ USgpm
Artesian flow: _____ USgpm, or Artesian pressure: _____ ft
Type of well cap: Vented Well disinfected: ☒ Yes ☐ No
Where well ID plate is attached: To casing

Well closure information:
Reason for closure: _____
Method of closure: ☐ Poured ☐ Pumped
Sealant material: _____ Backfill material: _____
Details of closure (see note 16): _____

Date of work (YYYY/MM/DD):
Started: 2020 06 26 **Completed:** 20200702
Comments: _____

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet ____ of ____

BRITISH COLUMBIA — The Best Place on Earth

Ministry of Environment

☒ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

Stamp company name/address/ phone/fax/e-mail here, if desired.

Ministry Well ID Plate Number: 38541
Ministry Well Tag Number: 109892
☐ Confirmation/alternative specs. attached
☒ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Robert Gallaway

Mailing address: _____ Town: Vernon Prov.: BC Postal Code: V1B 3S7

Well Location: Address: Street no.: 7601 Street name: McLennon Rd Town: Vernon

(or) Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____

(or) PID: 010 991 362 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: Nad 83 (see note 2) (and) UTM Easting: 119° 13.105 w m (or) Latitude (see note 3): 50° 19' 50.7°
UTM Northing: 50° 19.845 m m Longitude: 119° 13' 6.3°

Method of drilling: ☒ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify): _____

Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2325 ft (est) Method (see note 4): GPS.

Class of well (see note 6): Water Supply Sub-class of well: Domestic

Water supply wells: Indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	4	S	Brown	silt.		
4	23	M	Brown	Gravel.		
23	48	M	Brown	Gravel silt	26 gpm.	cased off
48	50	M	Grey	silt clay gravel.		
50	60	H	white	Quartz.		
60	72	S	Grey	Bentonite.		
72	115	H	Blk & white			
115	116	M	red	Fractures (rust).	16 gpm.	
116	143	M	Purple			
143	165	M	white	Lime stone	136 gpm.	
165	200	M	Blk green white			

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Well Thickness in	Drive Shoe
0	49	6	Steel	.250	✓

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Surface seal: Type: Bentonite Depth: 20' ft
Method of installation: ☒ Poured ☐ Pumped Thickness: 2. in
Backfill: Type: _____ Depth: _____ ft
Liner: ☒ PVC ☐ Other (specify): _____
Diameter: 4 in Thickness: .250 in
From: 20 ft (bgl) To: 49 20 ft (bgl) Perforated: From: 160 ft (bgl) To: 200 ft (bgl)

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____
Filter pack: From: ___ ft To: ___ ft Thickness: _____ in
Type and size of material: _____

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
☐ Other (specify): _____ Total duration: 1 hrs
Notes: _____

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: 13 USgpm Duration: 3 hrs
SWL before test: 20 ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Wesley Howe
Registration no. (see note 20): 05081001
Consultant (if applicable; name and company): _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements of the *Water Act* and the Ground Water Protection Regulation.
Signature of Driller Responsible: _____ Date: _____

Final well completion data:

Total depth drilled: 200 ft Finished well depth: 200 ft (bgl)
Final stick up: 12 in Depth to bedrock: 47 ft (bgl)
SWL: 20 ft (btoc) Estimated well yield: 13 USgpm
Artesian flow: _____ USgpm, or Artesian pressure: _____ ft
Type of well cap: welded Well disinfected: ☐ Yes ☒ No
Where well ID plate is attached: To casing.

Well closure information:

Reason for closure: _____
Method of closure: ☐ Poured ☐ Pumped
Sealant material: _____ Backfill material: _____
Details of closure (see note 17): _____

Date of work (YYYY/MM/DD):

Started: 2011 08 10 Completed: 2011 08 15

Comments: _____

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy canary: Driller copy pink: Ministry copy

Sheet ___ of ___

BRITISH COLUMBIA
The Best Place on Earth

Ministry of Environment

Aqua Source Drilling Ltd

☒ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

Stamp company name/address/ phone/fax/e-mail here, if desired

Ministry Well ID Plate Number: 38542
Ministry Well Tag Number: 109891
☐ Confirmation/alternative specs. attached
☒ Original well construction report attached

Red lettering indicates minimum mandatory information. **See reverse for notes & definitions of abbreviations.**

Owner name: Robert Galloway

Mailing address: Town Vernon Prov. BC Postal Code V1B 3S7

Well Location: Address: Street no. 7601 Street name McLennon Rd Town Vernon

(or) Legal description: Lot ____ Plan ____ D.L. ____ Block ____ Sec. ____ Twp. ____ Rg. ____ Land District ____

(or) PID: 010-991-357 (and) Description of well location (attach sketch, if nec.):

NAD 83: Zone: Nad 83 (see note 2) (and) UTM Easting: 119° 13.246 W m UTM Northing: 50° 19.838 N m (or) Latitude (see note 3): 50° 19' 50.28" Longitude: 119° 13' 14.76"

Method of drilling: ☒ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify):

Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2312 ft (asl) Method (see note 4): GPS

Class of well (see note 5): Water Supply Sub-class of well: Domestic

Water supply wells: indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify):

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	4	S	Black	silt.		
4	78	M	Brown	Gravel silt		
78	80	M	Purple	Bedrock		
80	92	M	white			
92	140	M	Green			
140	185	H	Black + white		2 GPM	Fractured
185	218	H	Green + white	marble	30 GPM	
218	220	S	Blue + white	Quartz + clay		

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Wall Thickness in	Drive Shoe
0	80	6	Steel	.250	✓

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Surface seal: Type: Bentonite Depth: 20 ft
Method of installation: ☒ Poured ☐ Pumped Thickness: 2 in
Backfill: Type: Depth: ft

Liner: ☒ PVC ☐ Other (specify):
Diameter: 4 in Thickness: .250 in
From: 20 ft (bgl) To: ~~218~~ 220 ft (bgl) Perforated: From: 180 ft (bgl) To: 220 ft (bgl)

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify):
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Bail ☐ Plug ☐ Plate ☐ Other (specify):
Filter pack: From: ft To: ft Thickness: in
Type and size of material:

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
☐ Other (specify): Total duration: 2 hrs
Notes:

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify):
Rate: 30 USgpm Duration: 2 hrs
SWL before test: 39 ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Walter Hess
Registration no. (see note 20): 050 81001
Consultant (if applicable; name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the *Water Act* and the Ground Water Protection Regulation.
Signature of Driller Responsible

Final well completion data:

Total depth drilled: 220 ft Finished well depth: 220 ft (bgl)
Final stick up: 12 in Depth to bedrock: 78 ft (bgl)
SWL: 39 ft (btoc) Estimated well yield: 30 USgpm
Artesian flow: USgpm, or Artesian pressure: ft
Type of well cap: welded cap Well disinfected: ☐ Yes ☒ No
Where well ID plate is attached: To casing

Well closure information:

Reason for closure:
Method of closure: ☐ Poured ☐ Pumped
Sealant material: Backfill material:
Details of closure (see note 17):

Date of work (YYYY/MM/DD):

Started: 2014 09 15 Completed: 2014 09 17
Comments:

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet ____ of ____

BRITISH COLUMBIA — The Best Place on Earth

Ministry of Environment

☒ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

Stamp company name/address/ phone/fax/e-mail here, if desired.

Ministry Well ID Plate Number: 35543
Ministry Well Tag Number: 109890
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Robert Galloway

Mailing address: _____ Town Vernon Prov. BC Postal Code V1B 3S7

Well Location: Address: Street no. 7601 Street name McLeacon Rd Town Vernon

(or) Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____

(or) PID: 010 991 352 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: Nad 83 (see note 2) (and) UTM Easting: 119° 13.181 W m UTM Northing: 50° 19.731 N m (or) Latitude (see note 3): 50°19'43.86" Longitude: 119°13'10.86"

Method of drilling: ☒ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify): _____

Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2304 ft (est) Method (see note 4): GPS.

Class of well (see note 5): Water Supply Sub-class of well: Domestic

Water supply wells: Indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	3	S	Brown	silt		
3	13	H	Black/white	Bedrock		
13	15	M	rsd		-	Fractured
15	16	M	Black/white			
16	17	M	rsd			Fractured
17	60	H	Black/white			
60	66	H	rsd		2.	Fractured
66	130	H	Black/white			
130	134	H	Blk		14.25	Fractured
134	190	H	Black/white			

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Well Thickness in	Drive Shoe
0	18	6	STEEL	250	✓

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Surface seal: Type: Bentonite Depth: 18 ft
Method of installation: ☒ Poured ☐ Pumped Thickness: _____ in
Backfill: Type: _____ Depth: _____ ft
Liner: ☐ PVC ☐ Other (specify): _____
Diameter: _____ in Thickness: _____ in
From: ____ ft (bgl) To: ____ ft (bgl) Perforated: From: ____ ft (bgl) To: ____ ft (bgl)

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____
Filter pack: From: ____ ft To: ____ ft Thickness: _____ in
Type and size of material: _____

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
☐ Other (specify): _____ Total duration: 4 hrs
Notes: _____

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: 9 USgpm Duration: 4 hrs
SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: _____ Water sample collected: ☐

Final well completion data:

Total depth drilled: 190 ft Finished well depth: 190 ft (bgl)
Final stick up: 18 in Depth to bedrock: 3 ft (bgl)
SWL: 49? ft (btoc) Estimated well yield: 9. USgpm
Artesian flow: _____ USgpm, or Artesian pressure: _____ ft
Type of well cap: welded cap. Well disinfected: ☐ Yes ☐ No
Where well ID plate is attached: To casing

Well closure information:

Reason for closure: _____
Method of closure: ☐ Poured ☐ Pumped
Sealant material: _____ Backfill material: _____
Details of closure (see note 17): _____

Well driller (print clearly):

Name (first, last) (see note 19): Walter Howe
Registration no. (see note 20): 05081001
Consultant (if applicable; name and company): _____

Date of work (YYYY/MM/DD):

Started: 2014 09 17 Completed: 2014 09 21
Comments: _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the *Water Act* and the Ground Water Protection Regulation.

Signature of Driller Responsible: _____

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

White: Customer copy | Canary: Driller copy | Pink: Ministry copy

Sheet ____ of ____

BRITISH COLUMBIA — The Best Place on Earth

Ministry of Environment

☑ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

Stamp company name/address/ phone/fax/e-mail here, if desired.

Ministry Well ID Plate Number: 38544
Ministry Well Tag Number: 109889
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Robert Galloway

Mailing address: _____ Town Vernon Prov. BC Postal Code V0C 2S7

Well Location: Address: Street no. 7601 Street name McLennan Rd Town Vernon

(or) Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____

(or) PID: 010 991 352 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: Nad 83 (see note 2) (and) UTM Easting: 119° 13.137 w m UTM Northing: 50° 19.878 n m (or) Latitude (see note 3): 50° 19' 52.68" Longitude: 119° 13' 8.22"

Method of drilling: ☑ air rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ excavating ☐ other (specify): _____

Orientation of well: ☐ vertical ☐ horizontal Ground elevation: 2379 ft (asl) Method (see note 4): GPS

Class of well (see note 5): Water Supply Sub-class of well: Domestic

Water supply wells: Indicate intended water use: ☑ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 7-14) or closure description (see notes 15 and 16)

From ft (bgl)	To ft (bgl)	Relative Hardness	Colour	Material Description (Use recommended terms on reverse. List in order of decreasing amount, if applicable)	Water-bearing Estimated Flow (USgpm)	Observations (e.g., fractured, weathered, well sorted, silty wash), closure details
0	6	m	Grey	silt gravel		
6	38	m	Brown	Gravel Sand		
38	44	H	Black	rock		
44	46	m	white	rock		
46	90	S	red	Quartz, minerals + red slop		
90	102	m	Purple			
102	123	m	Light green			
123	145	H	Black & white			
145	190	S	Green & white	soapstone		
190	314	m	Green	black & white		
314	340	H	Black			

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material / Open Hole	Well Thickness in	Drive Shoe
0	92	6	STEEL	.250	✓

Surface seal: Type: Bentonite Depth: 18' ft

Method of installation: ☑ Poured ☐ Pumped Thickness: _____ in

Backfill: Type: _____ Depth: _____ ft

Liner: ☐ PVC ☐ Other (specify): _____

Diameter: _____ in Thickness: _____ in

From: ____ ft (bgl) To: ____ ft (bgl) Perforated: From: ____ ft (bgl) To: ____ ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☐ Telescope ☐ Pipe size

Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____

Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe

Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____

Filter pack: From: ____ ft To: ____ ft Thickness: _____ in

Type and size of material: _____

Developed by:

☑ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

☐ Other (specify): _____ Total duration: 2 hrs

Notes: _____

Well yield estimated by:

☐ Pumping ☑ Air lifting ☐ Bailing ☐ Other (specify): _____

Rate: 1 1/2 USgpm Duration: 2 hrs

SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:

☑ Fresh ☐ Salty ☑ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Walter Hems

Registration no. (see note 20): 0505001

Consultant (if applicable; name and company): _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the *Water Act* and the Ground Water Protection Regulation.

Signature of Driller Responsible: [signature]

Final well completion data:

Total depth drilled: 340 ft Finished well depth: 340 ft (bgl)

Final stick up: 18 in Depth to bedrock: 38' ft (bgl)

SWL: 111.2 ft (btoc) Estimated well yield: 1 1/2 USgpm

Artesian flow: _____ USgpm, or Artesian pressure: _____ ft

Type of well cap: Welded cap Well disinfected: ☐ Yes ☐ No

Where well ID plate is attached: To casing

Well closure information:

Reason for closure: _____

Method of closure: ☐ Poured ☐ Pumped

Sealant material: _____ Backfill material: _____

Details of closure (see note 17): _____

Date of work (YYYY/MM/DD):

Started: 2014 0924 Completed: 2014 0929

Comments: _____

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy canary: Driller copy pink: Ministry copy

Sheet ____ of ____

Province of British Columbia Ministry of Environment Water Management Branch

WTN 49632

WATER WELL RECORD

Date 81/11/24 (YR/MO/DY)

Legal Description & Address

Descriptive Location McLeod Rd. Vernon B.C.

Owners Name & Address D.R.D. Holding Inc. 1108 Calloway Vernon B.C.

NTS MAP ELEV WELL No. 7

UTM Z E N UTM Date 19 Remainder Lot 2 Pl 2558

1. TYPE OF WORK: 1 ☑ New Well 2 ☐ Reconditioned 3 ☐ Deepened 4 ☐ Abandoned

2. WORK METHOD: 1 ☐ Cable tool 2 ☐ Bored 3 ☐ Jetted 4 ☑ Rotary a ☐ mud b ☒ air c ☐ reverse 5 ☐ Other

3. WATER WELL USE: 1 ☑ Domestic 2 ☐ Municipal 3 ☐ Irrigation 4 ☐ Commercial & Industrial 5 ☐ Other

4. DRILLING ADDITIVES

5. MEASUREMENTS from 1 ☑ ground level 2 ☐ top of casing

FROM ft	TO ft	6. WELL LOG DESCRIPTION	SWL ft
0	6	Brown Till & Rock. Gravel.	
6	14	Dark. Blue Rock. very Cracked.	
14	40	Dark. Blue with Hard White Layers	
40	90	Green Rock. with White Layers	
90	130	Cracked Brown Rock. With Green Layers	
130	160	Dark. Blue Rock. with Clay Layers.	
160	190	Green + Blue Rock.	
190	210	Red by Cracked White + Brown Rock.	
		10 ft of 6" Cassing.	
		3 g.p.m AT 100 FT. 75 g.p.m. 180 FT.	
		Pumping 73 g.p.m. By Air Lift.	
		Cleaned + Developed.	
		Flowing 10 g.p.m.	

7. CONSULTANT

Address

8. WELL LOCATION SKETCH

9. CASING: Materials 1 ☐ Steel 2 ☐ Galvanized 3 ☐ Wood 4 ☐ Plastic 5 ☐ Concrete 6 ☐ Other

							units
Hole Diameter							ins
Diameter	6"						ins
from							ft
to							ft
Thickness							ins
Weight							lb/ft

Pitless unit ft 1 ☐ above 2 ☐ below ground level

1 ☐ Welded 2 ☐ Cemented 3 ☐ Threaded 4 ☐ New 5 ☐ Used

Perforations:

Shoe(s):

Open hole, from to ft Diameter ins

Grout:

10. SCREEN: 1 ☐ Nominal 2 ☐ Pipe Size

Type 1 ☐ Continuous Slot 2 ☐ Perforated 3 ☐ Louvre 4 ☐ Other

Material 1 ☐ Stainless Steel 2 ☐ Plastic 3 ☐ Other

Set from to ft below ground level

SCREEN & BLANKS								units
Length								ft
Diam. I D								ins
Slot Size								ins
from								ft
to								ft

Fittings, top bottom

Gravel Pack

11. DEVELOPED BY: 1 ☐ Surging 2 ☐ Jetting 3 ☑ Air 4 ☐ Bailing 5 ☐ Pumping 6 ☐ Other

12. TEST 1 ☐ Pump 2 ☐ Bail Date (YR/MO/DY)

Rate 75 USgpm Temp °C SWL before test ft

ft after test of hrs mins

TIME in mins & DRAWDOWN in ft				TIME in mins & RECOVERY in ft			
mins	WL	mins	WL	mins	WL	mins	WL

13.

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
	100 ft	50 USgpm

14. WATER TYPE: 1 ☒ fresh 2 ☐ salty 3 ☒ clear 4 ☐ cloudy

colour smell ; gas 1 ☐ yes 2 ☐ no

15. WATER ANALYSIS: 1 ☐ Hardness mg/l

2 ☐ Iron mg/l 3 ☐ Chloride mg/l

4 ☐ pH Field Date

Lab Date (YR/MO/DY)

SITE I D No 7

16. FINAL WELL COMPLETION DATA

Well Depth 210 ft Water Flowing 10 USgpm

Static Water Level Flowing ft Pressure Head ft

Back filled

Well Head Completion

17. DRILLER (PLEASE PRINT) SURNAME Youngi FIRST NAME Ricky

Signature Ricky Knight

18. CONTRACTOR, Address

K. & W. Drilling LTD

3905 - 17th Ave Vernon B.C.

Member, BCWWDA ☐ yes ☒ no ;

BRITISH COLUMBIA
The Best Place on Earth

Ministry of Environment

☒ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

AQUA SOURCE DRILLING LTD.
2803 30th Ave.
Vernon, B.C. V1T 3E3
Bus: 250-275-0920

Ministry Well ID Plate Number: 50393
Stamp completed name, address, phone/e-mail here, if desired
Ministry Well Tag Number:
☐ Confirmation/alternative specs. attached.
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Nodding Hill Development Ltd
Mailing address: 760P McLennon Rd Town Vernon Prov. BC Postal Code V1B 3S7
Well Location (see note 2): Address: Street no. _____ Street name _____ Town _____
(or) Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____
(or) PID: 010-991-352 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: Nad 83 (see note 3) (and) UTM Easting: 119° 13. 197 W m UTM Northing: 50° 19. 661 N m (or) Latitude (see note 4): 50.32768N Lat
Longitude: 119.21995W.
Method of drilling: ☒ air rotary ☐ duel rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify): _____
Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2260 ft (asl) Method (see note 5): GPS
Class of well (see note 6): Water Supply Sub-class of well: Domestic
*Water supply wells: indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material: Clay	Silt	Till	Sand with clay/silt	Sand, fine-med	Sand, med-coarse	Sand with gravel	Bedrock Material: Siltstone/shale	Sandstone	Conglomerate	Limestone	Basalt	Volcanic	Crystalline	Other Surficial/ Bedrock	Colour: Red	Orange	Brown	Tan	Light Grey	Blue	Green	Dark Grey	Hardness: Very Hard	Hard	Dense/Stiff	Loose	Water Content: Dry	Moist	Wet	High Production	Lost circulation	Not Available	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	6	○	○	○	◐	○	○	○	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	◐	○	◐	○	○	○	○	○	
6	32	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	◐	○	○	○	○	○	Black & white Fractured
32	120	○	○	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	○	○	Black & white.
120	140	○	○	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	○	○	white.
140	160	○	○	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	○	○	Black & white.
160	180	○	○	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	○	○	white
180	300	○	○	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	○	○	○	◐	○	○	○	○	○	○	○	○	○	Black & white
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	40' ½ GPM.
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	120' 2½ GPM.
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	280 10 GPM.

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	17	6	Steel	.219	✓

Surface seal: Type: Bentonite Depth: 17. ft
Method of installation: ☒ Poured ☐ Pumped Thickness: 2. in
Backfill: Type: _____ Depth: _____ ft
Liner: ☒ PVC ☐ Other (specify): _____
Diameter: 4 in Thickness: .250 in
From: 10 ft (bgl) To: 300 ft (bgl) Perforated: From: 280 ft (bgl) To: 300 ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____
Filter pack: From: _____ ft To: _____ ft Thickness: _____ in
Type and size of material: _____

Developed by:
☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
Other (specify): _____ Total duration: 1 hrs
Notes: _____

Well yield estimated by:
☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: 10 USgpm Duration: 1 hrs
SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:
☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):
Name (first, last) (see note 19): Walter Howe
Registration no. (see note 20): 05081001
Consultant (if applicable; name and company): _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements of the Water Act and the Ground Water Protection Regulation.
Signature of Driller Responsible: [signature]

Final well completion data:
Total depth drilled: 300 ft Finished well depth: 300 ft (bgl)
Final stick up: 36 in Depth to bedrock: 6 ft (bgl)
SWL: 64.25 ft (btoc) Estimated well yield: 10 USgpm
Artesian flow: _____ USgpm; or Artesian pressure: _____ ft
Type of well cap: Vented Well disinfected: ☒ Yes ☐ No
Where well ID plate is attached: To casing

Well closure information:
Reason for closure: _____
Method of closure: ☐ Poured ☐ Pumped
Sealant material: _____ Backfill material: _____
Details of closure (see note 16): _____

Date of work (YYYY/MM/DD):
Started: 2019 11 21 Completed: 2019 11 25
Comments: 18' void at 275'

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet ____ of ____

2

BRITISH COLUMBIA The Best Place on Earth | Ministry of Environment

☒ Well Construction Report ☐ Well Closure Report ☐ Well Alteration Report

AQUA SOURCE DRILLING LTD
Stamp company name/address/phone/fax/email here, if applicable
2302 30th Ave.
Vernon, B.C. V1T 3B3

Ministry Well ID Plate Number: 50394
Ministry Well Tag Number: _____
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Nodding Hill Development Ltd
Mailing address: 7601 McLennon Rd Town Vernon Prov. BC Postal Code V1B 3S7
Well Location (see note 2): Address: Street no. _____ Street name _____ Town _____
(or) Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____
(or) PID: 010 991 352 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: Nad 83 (see note 3) (and) UTM Easting: 119° 13. 058 W m (or) Latitude (see note 4): 50. 32710 N
UTM Northing: 50° 19. 626 N m Longitude: 119. 21763 W

Method of drilling: ☒ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify): _____
Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2388 ft (asl) Method (see note 5): GPS
Class of well (see note 6): Water Supply Sub-class of well: Domestic
*Water supply wells: indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material: Clay	Silt	Till	Sand with clay/silt	Sand, fine-med	Sand, med-coarse	Sand with gravel	Bedrock Material: Siltstone/shale	Sandstone	Conglomerate	Limestone	Basalt	Volcanic	Crystalline	Other Surficial/Bedrock	Colour: Red	Orange	Brown	Tan	Light Grey	Blue	Green	Dark Grey	Hardness: Very Hard	Hard	Dense/Stiff	Loose	Water Content: Dry	Moist	Wet	High Production	Lost circulation	Not Available	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	3	○	○	○	◉	○	○	○	○	○	○	○	○	○	○	○	○	○	◉	○	○	○	○	○	○	○	○	◉	○	○	◉	○	○	○	
3	40	○	○	○	○	○	○	○	○	○	○	○	○	◉	○	○	○	○	○	○	○	○	○	○	○	◉	○	○	◉	○	○	○	○	○	○	Grey & white
40	60	○	○	○	○	○	○	○	○	○	○	○	○	◉	○	○	○	○	○	○	○	○	○	○	○	○	◉	○	◉	○	○	○	○	○	○	white with clay
60	80	○	○	○	○	○	○	○	○	○	○	○	○	○	◉	○	○	○	○	○	○	○	○	○	◉	○	○	○	○	○	○	○	○	○	○	Black + white
80	240	○	○	○	○	○	○	○	○	○	○	○	○	○	◉	○	○	○	○	○	○	○	○	○	◉	○	○	○	○	○	○	○	○	○	○	Grey + white
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	100' 1 GPM
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	160 2 GPM.
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	180 4 1/2 GPM.
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	220 25 GPM.
		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	13	6	Steel	.219	✓

Surface seal: Type: Bentonit Depth: 13. ft
Method of installation: ☒ Poured ☐ Pumped Thickness: 2 in
Backfill: Type: _____ Depth: _____ ft
Liner: ☒ PVC ☐ Other (specify): _____
Diameter: _____ in Thickness: _____ in
From: 6 ft (bgl) To: 240 ft (bgl) Perforated: From: 220 ft (bgl) To: 240 (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____
Filter pack: From: _____ ft To: _____ ft Thickness: _____ in
Type and size of material: _____

Developed by:
☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
Other (specify): _____ Total duration: 1/2 hrs
Notes: _____

Well yield estimated by:
☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: 25 USgpm Duration: 1/2 hrs
SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:
☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):
Name (first, last) (see note 19): Walter Howse
Registration no. (see note 20): 05081001
Consultant (if applicable; name and company): _____

DECLARATION: Well constructed, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible: _____

Final well completion data:
Total depth drilled: 240 ft Finished well depth: 240 ft (bgl)
Final stick up: 20 in Depth to bedrock: 3 ft (bgl)
SWL: 57.25 ft (btoc) Estimated well yield: 25 USgpm
Artesian flow: _____ USgpm; or Artesian pressure: _____ ft
Type of well cap: Vented Well disinfected: ☐ Yes ☐ No
Where well ID plate is attached: To casing

Well closure information:
Reason for closure: _____
Method of closure: ☐ Poured ☐ Pumped
Sealant material: _____ Backfill material: _____
Details of closure (see note 16): _____

Date of work (YYYY/MM/DD):
Started: 2019 11 26 Completed: 2019 11 27
Comments: _____

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet _____ of _____

5.

BRITISH COLUMBIA The Best Place on Earth

Ministry of Environment

☒ Well Construction Report ☐ Well Closure Report ☐ Well Alteration Report

AQUA SOURCE DRILLING LTD
2307 - 39th Ave
Vernon, BC V1T 6J3
Bus: 250-275-0920
Stamp company name/address/ phone number here

Ministry Well ID Plate Number: 50395
Ministry Well Tag Number: _____
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Nadling Hill Development Ltd
Mailing address: 7601 McLennon Rd Town Vernon Prov. BC Postal Code V1B3S7
Well Location (see note 2): Address: Street no. _____ Street name _____ Town _____
(or) Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____
(or) PID: 010 991 352 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: 10 (see note 3) (and) UTM Easting: 119° 13.099 m (or) Latitude (see note 4): 50.32810 N
UTM Northing: 50° 19.686 m Longitude: 119.21832 W XHZ

Method of drilling: ☒ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify): _____
Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2356 ft (asl) Method (see note 5): GPS
Class of well (see note 6): Water Supply Sub-class of well: Domestic
*Water supply wells: indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material	Bedrock Material	Colour	Hardness	Water Content	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
		Clay, Silt, Till, Sand with clay/silt, Sand, fine-med, Sand, med-coarse, Sand with gravel	Siltstone/shale, Sandstone, Conglomerate, Limestone, Basalt, Volcanic, Crystalline, Other Surficial/ Bedrock	Red, Orange, Brown, Tan, Light Grey, Blue, Green, Dark Grey	Very Hard, Hard, Dense/Stiff, Loose	Dry, Moist, Wet, High Production, Lost circulation, Not Available	
0	10	Sand with clay/silt		Brown	Loose	Moist	
10	40	Sand, fine-med		Brown	Loose	Moist	
40	180	Sand, med-coarse		Brown	Loose	Moist	
180	260	Sand, med-coarse		Grey	Loose	Wet	Grey + white
260	320	Sand, med-coarse		Brown	Loose	Wet	Brown + white
320	362	Sand, med-coarse		Grey	Loose	Wet	Grey Brown white
							180 16 GPM
							220 1½ GPM
							320 2½ GPM

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	18	6	STEEL	.219	✓

Surface seal: Type: Bentonite Depth: 12 ft
Method of Installation: ☒ Poured ☐ Pumped Thickness: 2 in
Backfill: Type: _____ Depth: _____ ft
Liner: ☐ PVC ☐ Other (specify): _____
Diameter: _____ in Thickness: _____ in
From: ___ ft (bgl) To: ___ ft (bgl) Perforated: From: ___ ft (bgl) To: ___ ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____
Filter pack: From: _____ ft To: _____ ft Thickness: _____ in
Type and size of material: _____

Developed by:
☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
Other (specify): _____ Total duration: ½ hrs
Notes: _____

Well yield estimated by:
☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: 2½ USgpm Duration: ½ hrs
SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:
☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):
Name (first, last) (see note 19): Walter Howe
Registration no. (see note 20): 05081001
Consultant (if applicable; name and company): _____

Final well completion data:
Total depth drilled: 362 ft Finished well depth: 362 ft (bgl)
Final stick up: 24 in Depth to bedrock: 10 ft (bgl)
SWL: _____ ft (btoc) Estimated well yield: 2½ USgpm
Artesian flow: _____ USgpm or Artesian pressure: _____ ft
Type of well cap: Vented Well disinfected: ☒ Yes ☐ No
Where well ID plate is attached: To casing

Well closure information:
Reason for closure: _____
Method of closure: ☐ Poured ☐ Pumped
Sealant material: _____ Backfill material: _____
Details of closure (see note 16): _____

Date of work (YYYY/MM/DD):
Started: 2019 11 29 Completed: 2019 12 03
Comments: _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.
Signature of Driller Responsible _____

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet ____ of ____

4

BRITISH COLUMBIA The Best Place on Earth | Ministry of Environment

☒ Well Construction Report ☐ Well Closure Report ☐ Well Alteration Report

Ministry Well ID Plate Number: 50396

Ministry Well Tag Number: _____

☐ Confirmation/alternative specs. attached ☐ Original well construction report attached

Stamp company, name/address, phone/fax/email here, if desired.

AQUA SOURCE DRILLING LTD
2307 - 39th Ave.
Vernon, B.C. V1T 2P6

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Redding Hill Development Ltd

Mailing address: 7601 McLennan Rd Town Vernon Prov. BC Postal Code V1B 3S7

Well Location (see note 2): Address: Street no. _____ Street name _____ Town _____

(or) Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____

(or) PID: 010 991 352 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: Nad 83 (see note 3) (and) UTM Easting: 119° 10.084 m ← NOT ON PID - CORRECTED (or) Latitude (see note 4): 50.32937 N

UTM Northing: 50° 19.762 m Longitude: 119.21807 W

Method of drilling: ☒ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify): _____

Orientation of well: ☐ vertical ☐ horizontal Ground elevation: 2378 ft (asl) Method (see note 5): GPS

Class of well (see note 6): Water Supply Sub-class of well: Domestic

*Water supply wells: indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material: Clay	Silt	Till	Sand with clay/silt	Sand, fine-med	Sand, med-coarse	Sand with gravel	Bedrock Material: Siltstone/shale	Sandstone	Conglomerate	Limestone	Basalt	Volcanic	Crystalline	Other Surficial/ Bedrock	Colour: Red	Orange	Brown	Tan	Light Grey	Blue	Green	Dark Grey	Hardness: Very Hard	Hard	Dense/Stiff	Loose	Water Content: Dry	Moist	Wet	High Production	Lost circulation	Not Available	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	4				●																													
4	7		●																●															
7	30														●						●				●									
30	62														●			●										●							Large shattered rock
62	186														●										●									Grey & white
186	192														●													●							Black Large shattered
192	220														●						●				●									
220	226														●										●							●			White Large shattered
																																		180 ICPM
																																		226 ICC GPM

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	18	6	STEEL	.219	V

Surface seal: Type: Bentonite Depth: 17 ft

Method of installation: ☒ Poured ☐ Pumped Thickness: 2 in

Backfill: Type: _____ Depth: _____ ft

Liner: ☒ PVC ☐ Other (specify): _____

Diameter: 4 in Thickness: .250 in

From: 6 ft (bgl) To: 226 ft (bgl) Perforated: From: 206 ft (bgl) To: 226 ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☐ Telescope ☐ Pipe size

Screen material: ☐ Stainless steel ☒ Plastic ☐ Other (specify): _____

Screen opening: ☐ Continuous slot ☐ Slotted ☒ Perforated pipe

Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____

Filter pack: From: _____ ft To: _____ ft Thickness: _____ in

Type and size of material: _____

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

Other (specify): _____ Total duration: 1/2 hrs

Notes: _____

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____

Rate: 100 USgpm Duration: 1/2 hrs

SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Walter Howes

Registration no. (see note 20): 05081001

Consultant (if applicable; name and company): _____

Final well completion data:

Total depth drilled: 226 ft Finished well depth: 226 ft (bgl)

Final stick up: 18 in Depth to bedrock: 7 ft (bgl)

SWL: 3 ft (btoc) Estimated well yield: ICC USgpm

Artesian flow: _____ USgpm, or Artesian pressure: _____ ft

Type of well cap: Vented Well disinfected: ☒ Yes ☐ No

Where well ID plate is attached: To casing

Well closure information:

Reason for closure: _____

Method of closure: ☐ Poured ☐ Pumped

Sealant material: _____ Backfill material: _____

Details of closure (see note 16): _____

Date of work (YYYY/MM/DD):

Started: 2019 12 04 Completed: 2019 12 05

Comments: _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet _____ of _____

5

BRITISH COLUMBIA — The Best Place on Earth

Ministry of Environment

☒ Well Construction Report ☐ Well Closure Report ☐ Well Alteration Report

Stamp company name/address/ phone/fax/email here, if desired: AQUA SOURCE DRILLING LTD. 2507 - 30th Ave. Vernon, B.C. V1T 3B3 Fax: 250-275-2001

Ministry Well ID Plate Number: 50397

Ministry Well Tag Number: _____

☐ Confirmation/alternative specs. attached

☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Redding Hill Development Ltd

Mailing address: 7601 McLennan Rd Town Vernon Prov. BC Postal Code V1B 3S7

Well Location (see note 2): Address: Street no. _____ Street name _____ Town _____

(or) Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____

(or) PID: 029 832 896 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: Nad 83 (see note 3) (and) UTM Easting: 119° 13.062 m UTM Northing: 50° 19.806m m (or) Latitude (see note 4): 50.33010 N Longitude: 119.21770 W xnr

Method of drilling: ☒ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify): _____

Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2367 ft (asl) Method (see note 5): GPS

Class of well (see note 6): Water Supply Sub-class of well: Domestic.

*Water supply wells: Indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material: Clay	Silt	Till	Sand with clay/silt	Sand, fine-med	Sand, med-coarse	Sand with gravel	Bedrock Material: Siltstone/shale	Sandstone	Conglomerate	Limestone	Basalt	Volcanic	Gyrstalline	Other Surficial/ Bedrock	Colour: Red	Orange	Brown	Tan	Light Grey	Blue	Green	Dark Grey	Hardness: Very Hard	Hard	Dense/Stiff	Loose	Water Content: Dry	Moist	Wet	High Production	Lost circulation	Not Available	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	5				●														●									●						
5	8		●																●										●						
8	15	●																	●											●					
15	20							●											●											●					
20	21	●																		●										●					
21	190													●		●				●									●						Black + whits
190	220													●																					
220	230													●						●															Black + whites
230	260																																		140 3 1/4 GPM
																																		240 8 GPM.

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	25	6	STEEL	.219	✓

Surface seal: Type: Bentonite Depth: 15 ft

Method of installation: ☒ Poured ☐ Pumped Thickness: 2 in

Backfill: Type: _____ Depth: _____ ft

Liner: ☒ PVC ☐ Other (specify): _____

Diameter: 4 in Thickness: .250 in

From: 6 ft (bgl) To: 260 ft (bgl) Perforated: From: 240 ft (bgl) To: 260 ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☐ Telescope ☐ Pipe size

Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____

Screen opening: ☐ Continuous slot ☐ Slotted ☒ Perforated pipe

Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____

Filter pack: From: _____ ft To: _____ ft Thickness: _____ in

Type and size of material: _____

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

Other (specify): _____ Total duration: 1/2 hrs

Notes: _____

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____

Rate: 8 USgpm Duration: 1/2 hrs

SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Walter Howe

Registration no. (see note 20): 05081001

Consultant (if applicable; name and company): _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible: _____

Final well completion data:

Total depth drilled: 260 ft Finished well depth: 260 ft (bgl)

Final stick up: 18 in Depth to bedrock: 21 ft (bgl)

SWL: 12 ft (btoc) Estimated well yield: 8 USgpm

Artesian flow: _____ USgpm; or Artesian pressure: _____ ft

Type of well cap: Vented Well disinfected: ☒ Yes ☐ No

Where well ID plate is attached: To casing

Well closure information:

Reason for closure: _____

Method of closure: ☐ Poured ☐ Pumped

Sealant material: _____ Backfill material: _____

~~Details of closure~~ (see note 16): Ground water level is 5 feet

Date of work (YYYY/MM/DD):

Started: 2019 12 06 Completed: 2019 12 10

Comments: _____

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet ____ of ____

BRITISH COLUMBIA — The Best Place on Earth

Ministry of Environment

☒ Well Construction Report ☐ Well Closure Report ☐ Well Alteration Report

AQUA SOURCE DRILLING LTD.
Stamp company name/address, phone/fax/email here: 2204 30th Ave. Vernon, B.C. V1T 3B3

Ministry Well ID Plate Number: 50398
Ministry Well Tag Number: _____
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Redding Hill Development Ltd
Mailing address: 7608 McLennon Rd Town Vernon Prov. BC Postal Code V1B 3S7
Well Location (see note 2): Address: Street no. _____ Street name _____ Town _____
(or) Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____
(or) PID: 010 991 352 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: Nad 83 (see note 3) (and) UTM Easting: 119° 13. 187W m UTM Northing: 50° 19. 693N m (or) Latitude (see note 4): 50. 32805N and Longitude: 119. 21995 W

Method of drilling: ☒ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify): _____
Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2262 ft (asl) Method (see note 5): GPS
Class of well (see note 6): Water Supply Sub-class of well: Domestic
* Water supply wells: Indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material: Clay	Silt	Till	Sand with clay/silt	Sand, fine-med	Sand, med-coarse	Sand with gravel	Bedrock Material: Siltstone/shale	Sandstone	Conglomerate	Limestone	Basalt	Volcanic	Crystalline	Other Surficial/ Bedrock	Colour: Red	Orange	Brown	Tan	Light Grey	Blue	Green	Dark Grey	Hardness: Very Hard	Hard	Dense/Stiff	Loose	Water Content: Dry	Moist	Wet	High Production	Lost circulation	Not Available	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	2		●																●										●						
2	16						●												●								●		●						
16	30												●								●						●		●						
30	60												●				●										●		●						
60	200												●											●											
200	220												●																						Black.
220	340												●											●											200' 1/2 GPM.
																																		300 1 GPM
																																		340 1 1/2 GPM.

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	18	6	STEEL	.219	Y

Surface seal: Type: Bentonite Depth: 16 ft
Method of installation: ☒ Poured ☐ Pumped Thickness: 2 in
Backfill: Type: _____ Depth: _____ ft
Liner: ☐ PVC ☐ Other (specify): _____
Diameter: _____ in Thickness: _____ in
From: ___ ft (bgl) To: ___ ft (bgl) Perforated: From: ___ ft (bgl) To: ___ ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____
Filter pack: From: _____ ft To: _____ ft Thickness: _____ in
Type and size of material: _____

Developed by:
☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
Other (specify): _____ Total duration: 1/2 hrs
Notes: _____

Well yield estimated by:
☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____
Rate: 1 1/2 USgpm Duration: 1/2 hrs
SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:
☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):
Name (first, last) (see note 19): Walter Howe
Registration no. (see note 20): 05081001
Consultant (if applicable; name and company): _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.
Signature of Driller Responsible _____

Final well completion data:
Total depth drilled: 340 ft Finished well depth: 340 ft (bgl)
Final stick up: 18 in Depth to bedrock: 16 ft (bgl)
SWL: 66 ft (btoc) Estimated well yield: 1 1/2 USgpm
Artesian flow: _____ USgpm, or Artesian pressure: _____ ft
Type of well cap: Vented Well disinfected: ☒ Yes ☐ No
Where well ID plate is attached: To Casing

Well closure information:
Reason for closure: _____
Method of closure: ☐ Poured ☐ Pumped
Sealant material: _____ Backfill material: _____
Details of closure (see note 16): _____

Date of work (YYYY/MM/DD):
Started: 2019 12 11 Completed: 2019 12 13
Comments: _____

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet ____ of ____

BRITISH COLUMBIA — The Best Place on Earth

Ministry of Environment

☑ Well Construction Report ☐ Well Closure Report ☐ Well Alteration Report

AQUA SOURCE DRILLING LTD
2307 - 30th Ave
Vernon, B.C. V1T 3B8

Ministry Well ID Plate Number: 50399
Ministry Well Tag Number:
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name: Nadina Hill Development Ltd

Mailing address: 7601 Mt Ienner Rd Town Vernon Prov. BC Postal Code V1B 3S7

Well Location (see note 2): Address: Street no. _____ Street name _____ Town _____

(or) Legal description: Lot _____ Plan _____ D.L. _____ Block _____ Sec. _____ Twp. _____ Rg. _____ Land District _____

(or) PID: 010 991 352 (and) Description of well location (attach sketch, if nec.): _____

NAD 83: Zone: N 103 (see note 3) (and) UTM Easting: 119° 13. 181 W m UTM Northing: 50° 19. 579 N m (or) Latitude (see note 4): 50. 32645 N Longitude: 119. 21968 W

Method of drilling: ☒ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify): _____

Orientation of well: ☒ vertical ☐ horizontal Ground elevation: 2301 ft (asl) Method (see note 5): GPS

Class of well (see note 6): Water Supply Sub-class of well: Domestic

*Water supply wells: indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify): _____

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material: Clay	Silt	Till	Sand with clay/silt	Sand, fine-med	Sand, med-coarse	Sand with gravel	Bedrock Material: Siltstone/shale	Sandstone	Conglomerate	Limestone	Basalt	Volcanic	Crystalline	Other Surficial/ Bedrock	Colour: Red	Orange	Brown	Tan	Light Grey	Blue	Green	Dark Grey	Hardness: Very Hard	Hard	Dense/Stiff	Loose	Water Content: Dry	Moist	Wet	High Production	Lost circulation	Not Available	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	3		●																●									●							
3	6		●																●									●							
6	18							●																											
18	20													●																					
20	21													●			●											●							
21	97													●										●		●									
97	100													●							●			●		●									36PM Fractured
100	190													●										●		●									
190	240													●							●					●									

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	22	6	STEEL	.219	V

Surface seal: Type: Bentonite Depth: 20 ft

Method of installation: ☒ Poured ☐ Pumped Thickness: 2 in

Backfill: Type: _____ Depth: _____ ft

Liner: ☒ PVC ☐ Other (specify): _____

Diameter: 4 in Thickness: .256 in

From: 6 ft (bgl) To: 240 ft (bgl) Perforated: From: 220 ft (bgl) To: 240 ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☐ Telescope ☐ Pipe size

Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify): _____

Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe

Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify): _____

Filter pack: From: _____ ft To: _____ ft Thickness: _____ in

Type and size of material: _____

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

Other (specify): _____ Total duration: 1/2 hrs

Notes: _____

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify): _____

Rate: 3 USgpm Duration: 1/2 hrs

SWL before test: _____ ft (btoc) Pumping water level: _____ ft (btoc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: _____ Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Walter Howe

Registration no. (see note 20): 05081001

Consultant (if applicable; name and company): _____

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible: _____

Final well completion data:

Total depth drilled: 240 ft Finished well depth: 240 ft (bgl)

Final stick up: 18 in Depth to bedrock: 1.8 ft (bgl)

SWL: 62.5 ft (btoc) Estimated well yield: 3 USgpm

Artesian flow: _____ USgpm, or Artesian pressure: _____ ft

Type of well cap: Vented Well disinfected: ☒ Yes ☐ No

Where well ID plate is attached: To casing

Well closure information:

Reason for closure: _____

Method of closure: ☐ Poured ☐ Pumped

Sealant material: _____ Backfill material: _____

Details of closure (see note 16): _____

Shale trap at 65'

Date of work (YYYY/MM/DD):

Started: 2019 12 17 Completed: 2019 12 19

Comments: _____

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet _____ of _____

Original well construction report attached

Plate ID 62005

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name:

Mailing address: Town Prov. Postal Code

Well Location (see note 2): Address: Street no. Street name Town

(or) Legal description: Lot Plan D.L Block Sec. Twp. Rg Land District

(or) PID: (and) Description of well location (attach sketch, if nec.):

NAD 83: Zone: (see note 3) (and) UTM Easting: m UTM Northing: m (or) Latitude (see note 4): Longitude:

Method of drilling: ☒ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify):

Orientation of well: ☒ vertical ☐ horizontal Ground elevation: ft (asl) Method (see note 5):

Class of well (see note 6): Water Supply Sub-class of well: Domest.

Water supply wells: indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify):

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material: Clay	Silt	Till	Sand with clay/silt	Sand, fine-med	Sand, med-coarse	Sand with gravel	Bedrock Material: Shale/Mud	Sandstone	Conglomerate	Limestone	Basalt	Volcanic	Gyrocalcite	Other Surficial/Bedrock	Colour: Red	Orange	Brown	Tan	Light Grey	Blue	Green	Dark Grey	Hardness: Very Hard	Hard	Dense/Stiff	Loose	Water Content: Dry	Moist	Wet	High Production	Lost circulation	Not Available	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	20				●																							●							
20	25													●						●							●	●							Fractured / weathered
25	60													●									●			●									
60	90													●													●								white, loose fractured.
90	120													●											●										Black & white.
120	130													●												●									Green & white.
130	230													●												●									Black & white.
230	260													●												●									Green & white
																																			200' 2¼ GPM
																																			240 9 GPM

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	27	6	Steel	.219	✓

Surface seal: Type: Bentonite Depth: 18 ft

Method of installation: ☒ Poured ☐ Pumped Thickness: 4 in

Backfill: Type: Depth: ft

Liner: ☒ PVC ☐ Other (specify):

Diameter: 4 in Thickness: .250 in

From: 10 ft (bgl) To: 260 ft (bgl) Perforated: From 240 ft (bgl) To 260 ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☐ Telescope ☐ Pipe size

Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify):

Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe

Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify):

Filter pack: From: ft To: ft Thickness: in

Type and size of material:

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

Other (specify): Total duration: 1 hrs

Notes:

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify):

Rate: 9 USgpm Duration: 1 hrs

SWL before test: ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Walter Howe

Registration no. (see note 20): 05091001

Consultant (if applicable; name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements of the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible

Final well completion data:

Total depth drilled: 260 ft Finished well depth: 260 ft (bgl)

Final stick up: 30 in Depth to bedrock: 25' ft (bgl)

SWL: ft (btoc) Estimated well yield: 9 USgpm

Artesian flow: USgpm, or Artesian pressure: ft

Type of well cap: Vented Well disinfected: ☒ Yes ☐ No

Where well ID plate is attached: To casing

Well closure information:

Reason for closure:

Method of closure: ☐ Poured ☐ Pumped

Sealant material: Backfill material:

Details of closure (see note 16):

Shale Trap at 110 feet.

Date of work (YYYY/MM/DD):

Started: 20200603 Completed: 20200604

Comments:

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet of

BRITISH COLUMBIA — The Best Place on Earth

Ministry of Environment

☑ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

Stamp: company name/address/phone/fax/e-mail here, if desired

Ministry Well ID Plate Number: 62006
Ministry Well Tag Number:
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name:
Mailing address: Town: Prov.: Postal Code:
Well Location (see note 2): Address: Street no.: Street name: Town:
(or) Legal description: Lot: Plan: D.L.: Block: Sec.: Twp.: Rg.: Land District:
(or) PID: (and) Description of well location (attach sketch, if nec.):

NAD 83: Zone: Nad 83 (see note 3) (and) UTM Easting: m (or) Latitude (see note 4):
UTM Northing: m Longitude:
Method of drilling: ☑ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify):
Orientation of well: ☑ vertical ☐ horizontal Ground elevation: ft (asl) Method (see note 5):
Class of well (see note 6): Water Supply Sub-class of well: Domestic
Water supply wells: Indicate intended water use: ☑ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify)

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material: Clay, Silt, Till, Sand with clay/silt, Sand, fine-med, Sand, med-coarse, Sand with gravel	Bedrock Material: Shale/mudstone, Sandstone, Conglomerate, Limestone, Basalt, Volcanic, Granitoid, Other (specify), Bedrock	Colour: Red, Orange, Brown, Tan, Light Grey, Blue, Green, Dark Grey	Hardness: Very Hard, Hard, Moderate, Loose	Water Content: Dry, Moist, Wet, High Production, Lost circulation, Not Available	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	30			Red	Moderate	Dry	
30	42	Sand, fine-med		Brown	Loose	Wet	1 GPM.
42	53	Clay		Tan	Moderate	Moist	
53	57		Volcanic	Dark Grey	Moderate	Moist	Weathered.
57	105		Volcanic	Dark Grey	Moderate	Dry	
105	113		Volcanic	Dark Grey	Moderate	Dry	white 1 GPM.
113	280		Volcanic	Dark Grey	Moderate	Dry	+ white with mica.
280	300		Volcanic	Dark Grey	Moderate	Dry	Purple.
300	320		Volcanic	Dark Grey	Moderate	Dry	+ white with mica.
							1½ GPM.

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	53	STEEL	6"	.219	✓

Surface seal: Type: Bentonite Depth: 18 ft
Method of installation: ☑ Poured ☐ Pumped Thickness: 4 in
Backfill: Type: Depth: ft
Liner: ☐ PVC ☐ Other (specify):
Diameter: in Thickness: in
From: ft (bgl) To: ft (bgl) Perforated: From: ft (bgl) To: ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☑ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify):
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Bail ☐ Plug ☐ Plate ☐ Other (specify):
Filter pack: From: ft To: ft Thickness: in
Type and size of material:

Developed by:

☑ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
Other (specify): Total duration: ½ hrs
Notes:

Well yield estimated by:

☐ Pumping ☑ Air lifting ☐ Bailing ☐ Other (specify):
Rate: 1½ USgpm Duration: 1 hrs
SWL before test: ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☑ Fresh ☐ Salty ☑ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Walter Howe
Registration no. (see note 20): 05031001
Consultant (if applicable; name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible:

Final well completion data:

Total depth drilled: 320 ft Finished well depth: 320 ft (bgl)
Final stick up: 24 in Depth to bedrock: 53 ft (bgl)
SWL: 78 ft (btoc) Estimated well yield: USgpm
Artesian flow: USgpm, or Artesian pressure: ft
Type of well cap: Well disinfected: ☐ Yes ☐ No
Where well ID plate is attached:

Well closure information:

Reason for closure:
Method of closure: ☐ Poured ☐ Pumped
Sealant material: Backfill material:
Details of closure (see note 16):

Date of work (YYYY/MM/DD):
Started: 20200605 Completed: 20200610
Comments:

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet of

PRINTED IN B.C. 4500179868

BRITISH COLUMBIA — Ministry of Environment

☑ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

Drilling company name/address/phone/fax/email here, if desired.

Ministry Well ID Plate Number: 62007
Ministry Well Tag Number:
☐ Confirmation/alternative specs. attached
☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name:
Mailing address: Town: Prov.: Postal Code:
Well Location (see note 2): Address: Street no.: Street name: Town:
(or) Legal description: Lot: Plan: D.L.: Block: Sec.: Twp.: Rg.: Land District:
(or) PID: (and) Description of well location (attach sketch, if nec.):

NAD 83: Zone: Nad 83 (see note 3) (and) UTM Easting: m UTM Northing: m (or) Latitude (see note 4): Longitude:
Method of drilling: ☑ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify):
Orientation of well: ☑ vertical ☐ horizontal Ground elevation: ft (asl) Method (see note 5):
Class of well (see note 6): Water Supply Sub-class of well: Domestic
Water supply wells: indicate intended water use: ☑ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify):

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material	Bedrock Material	Colour	Hardness	Water Content	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
		Clay, Silt, Till, Sand with clay/silt, Sand, fine-med, Sand, med-coarse, Sand with gravel	Conglomerate, Sandstone, Conglomerate, Limestone, Basalt, Volcanic, Crystalline, Other Surficial/Bedrock	Red, Orange, Brown, Tan, Light Grey, Blue, Green, Dark Grey	Very Hard, Hard, Develop Slow, Loose	Dry, Moist, Wet, High Production, Lost circulation, Not Available	
0	3						Topsoil.
3	35						
35	42						Loose weathered Quartz (Iron).
42	93						
93	280						+ Quartz 120' 1 1/2 GPM 220' 4 GPM. 260' 6 GPM 280' 30 GPM.

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	100	6	STEEL	.219	☐

Surface seal: Type: Bentonite Depth: 60 ft
Method of installation: ☑ Poured ☐ Pumped Thickness: 2. in
Backfill: Type: Depth: ft
Liner: ☑ PVC ☐ Other (specify):
Diameter: 4 in Thickness: .250 in
From: 5 ft (bgl) To 280 ft (bgl) Perforated: From 260 ft (bgl) To 280 ft (bgl)

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Screen type: ☐ Telescope ☐ Pipe size
Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify):
Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify):
Filter pack: From: ft To: ft Thickness: in
Type and size of material:

Developed by:
☑ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing
Other (specify): Total duration: 1 hrs
Notes:

Well yield estimated by:
☐ Pumping ☑ Air lifting ☐ Bailing ☐ Other (specify):
Rate: 30 USgpm Duration: 1 hrs
SWL before test: ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:
☑ Fresh ☐ Salty ☑ Clear ☐ Cloudy ☐ Sediment ☐ Gas
Colour/odour: Water sample collected: ☐

Well driller (print clearly):
Name (first, last) (see note 19): Walter Howe
Registration no. (see note 20): 05081001
Consultant (if applicable; name and company):

DECLARATION: Well construction / well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.
Signature of Driller Responsible

Final well completion data:
Total depth drilled: 280 ft Finished well depth: 280 ft (bgl)
Final stick up: 12 in Depth to bedrock: 35 ft (bgl)
SWL: 117 ft (btoc) Estimated well yield: 30 USgpm
Artesian flow: USgpm, or Artesian pressure: ft
Type of well cap: Vented Well disinfected: ☑ Yes ☐ No
Where well ID plate is attached: To Casing.

Well closure information:
Reason for closure:
Method of closure: ☐ Poured ☐ Pumped
Sealant material: Backfill material:
Details of closure (see note 16):

Date of work (YYYY/MM/DD):
Started: 2020 06 10 Completed: 2020 06 16
Comments:

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy
canary: Driller copy
pink: Ministry copy

Sheet ____ of ____

PRINTED IN B.C.

The Best Place on Earth | Environment ☐ Well Alteration Report

☐ Original well construction report attached

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations

Plate ID 62008

Owner name:

Mailing address: Town Prov. Postal Code

Well Location (see note 2): Address: Street no. Street name Town

(or) Legal description: Lot Plan D.L. Block Sec. Twp. Rg. Land District

(or) PID: (and) Description of well location (attach sketch, if nec.):

NAD 83: Zone: Nad 83 (see note 3) (and) UTM Easting: m UTM Northing: m (or) Latitude (see note 4): Longitude:

Method of drilling: ☒ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify)

Orientation of well: ☒ vertical ☐ horizontal Ground elevation: ft (asl) Method (see note 5):

Class of well (see note 6): Water Supply Sub-class of well: Domestic

Water supply wells: indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify)

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material	Bedrock Material	Colour	Hardness	Water Content	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	12	Clay, Silt, Sand with gravel		Brown	Loose	Dry	
12	24		Volcanic	Dark Grey	Hard		
24	28		Volcanic	Orange	Loose		
28	300		Volcanic	Light Grey, Green	Hard		1 GPM 100'
300	320		Volcanic				Black + white
320	360						Quartz + Calcite
360	373		Volcanic	Light Grey, Green			100 GPM

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	18	6"	Steel	.219	✓

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Surface seal: Type: Bentonite Depth: 15 ft

Method of installation: ☒ Poured ☐ Pumped Thickness: 2. in

Backfill: Type: Depth: ft

Liner: ☒ PVC ☐ Other (specify):

Diameter: 4 in Thickness: .250 in

From: 0 ft (bgl) To: 373 ft (bgl) Perforated: From 353 ft (bgl) To 373 ft (bgl)

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☐ Telescope ☐ Pipe size

Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify):

Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe

Screen bottom: ☐ Bail ☐ Plug ☐ Plate ☐ Other (specify):

Filter pack: From: ft To: ft Thickness: in

Type and size of material:

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

Other (specify): Total duration: 1 hrs

Notes:

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify):

Rate: 100 USgpm Duration: 1 hrs

SWL before test: ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Walter Hous.

Registration no. (see note 20): 05081001

Consultant (if applicable: name and company):

Final well completion data:

Total depth drilled: 378 ft Finished well depth: 373. ft (bgl)

Final stick up: 12. in Depth to bedrock: 12 ft (bgl)

SWL: ft (btoc) Estimated well yield: 100 USgpm

Artesian flow: USgpm, or Artesian pressure: ft

Type of well cap: Vented Well disinfected: ☒ Yes ☐ No

Where well ID plate is attached: To casing

Well closure information:

Reason for closure:

Method of closure: ☐ Poured ☐ Pumped

Sealant material: Backfill material:

Details of closure (see note 16):

Date of work (YYYY/MM/DD):

Started: 20200622. Completed: 20200626

Comments:

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible: [signature]

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy canary: Driller copy pink: Ministry copy

Sheet of

Ministry of Environment

☐ Well Construction Report
☐ Well Closure Report
☐ Well Alteration Report

Plate ID 6200#9

Red lettering indicates minimum mandatory information. See reverse for notes & definitions of abbreviations.

Owner name:

Mailing address: Town Prov Postal Code

Well Location (see note 2): Address: Street no. Street name Town

(or) Legal description: Lot Plan D.L. Block Sec Twp Rg Land District

(or) PID: (and) Description of well location (attach sketch, if nec.):

NAD 83: Zone: Nad 83 (see note 3) (and) UTM Easting: m UTM Northing: m (or) Latitude (see note 4): Longitude:

Method of drilling: ☒ air rotary ☐ dual rotary ☐ cable tool ☐ mud rotary ☐ auger ☐ driving ☐ jetting ☐ other (specify)

Orientation of well: ☒ vertical ☐ horizontal Ground elevation: ft (asl) Method (see note 5):

Class of well (see note 6): Water Supply Sub-class of well: Domestic

Water supply wells: Indicate intended water use: ☒ private domestic ☐ water supply system ☐ irrigation ☐ commercial or industrial ☐ other (specify)

Lithologic description (see notes 8-13) or closure description (see notes 14 and 15)

From ft (bgl)	To ft (bgl)	Surficial Material: Clay	Silt	Till	Sand with clay/silt	Sand, fine-med	Sand, med-coarse	Sand with gravel	Bedrock Material: Sandstone/mud	Sandstone	Conglomerate	Limestone	Basalt	Volcanic	Crystalline	Other Surficial/Bedrock	Colour: Red	Orange	Brown	Tan	Light Grey	Blue	Green	Dark Grey	Hardness: Very Hard	Hard	Dense/Firm	Loose	Water Content: Dry	Moist	Wet	High Production	Lost circulation	Not Available	Observations (e.g. other geological materials (e.g. boulders), est. water bearing flow (USgpm), or closure details)
0	2																																	Black Top Soil.
2	38		●					●										●									●								
38	46							●										●									●			●					
46	82			●																			●			●									Cemented Gravel.
82	193														●				●						●										
193	240														●							●			●										
240	300														●				●							●									260' 1½GPM White
300	420														●																				
420	460														●								●			●									420' 3GPM 460 4GPM

Casing details

From ft (bgl)	To ft (bgl)	Dia in	Casing Material/Open Hole (see note 17)	Wall Thickness in	Drive Shoe
0	90	6	Steel	.219	✓

Screen details

From ft (bgl)	To ft (bgl)	Dia in	Type (see note 18)	Slot Size

Surface seal: Type: Bentonite Depth: 30 ft

Method of installation: ☒ Poured ☐ Pumped Thickness: 2. in

Backfill: Type: Depth: ft

Liner: ☒ PVC ☐ Other (specify):

Diameter: 4 in Thickness: .250 in

From: 9 ft (bgl) To: 460 ft (bgl) Perforated: From: 440 ft (bgl) To: 460 ft (bgl)

Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole

Screen type: ☐ Telescope ☐ Pipe size

Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specify):

Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe

Screen bottom: ☐ Ball ☐ Plug ☐ Plate ☐ Other (specify):

Filter pack: From: ft To: ft Thickness: in

Type and size of material:

Developed by:

☒ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing

Other (specify): Total duration: 1 hrs

Notes:

Well yield estimated by:

☐ Pumping ☒ Air lifting ☐ Bailing ☐ Other (specify):

Rate: 4 USgpm Duration: 1 hrs

SWL before test: ft (btoc) Pumping water level: ft (btoc)

Obvious water quality characteristics:

☒ Fresh ☐ Salty ☒ Clear ☐ Cloudy ☐ Sediment ☐ Gas

Colour/odour: Water sample collected: ☐

Well driller (print clearly):

Name (first, last) (see note 19): Walter Hows

Registration no. (see note 20): 05081001

Consultant (if applicable; name and company):

DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done in accordance with the requirements of the Water Act and the Ground Water Protection Regulation.

Signature of Driller Responsible:

Final well completion data:

Total depth drilled: 460 ft Finished well depth: 460 ft (bgl)

Final stick up: 12 in Depth to bedrock: 82. ft (bgl)

SWL: ft (btoc) Estimated well yield: 4. USgpm

Artesian flow: USgpm, or Artesian pressure: ft

Type of well cap: Vented Well disinfected: ☒ Yes ☐ No

Where well ID plate is attached: To Casing

Well closure information:

Reason for closure:

Method of closure: ☐ Poured ☐ Pumped

Sealant material: Backfill material:

Details of closure (see note 16):

Date of work (YYYY/MM/DD):

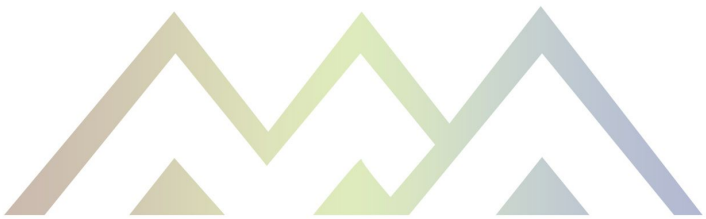
Started: 2020 06 17. Completed: 2020 06 22.

Comments:

PLEASE NOTE: The information recorded in this well report describes the works and hydrogeologic conditions at the time of construction, alteration or closure, as the case may be. Well yield, well performance and water quality are not guaranteed as they are influenced by a number of factors, including natural variability, human activities and condition of the works, which may change over time.

white: Customer copy canary: Driller copy pink: Ministry copy

Sheet of



Groundwater Supply Development and Management

Source Water Assessment and Protection

Well Monitoring & Maintenance

Environmental & Water Quality Monitoring

Storm & Wastewater Disposal to Ground

Groundwater Modeling

Aquifer Test Design and Analysis

Geothermal / Geoexchange Systems

Policy and Guideline Development

Applied Research

Rural Subdivision Services

Environmental Assessment & Permitting

| #106 – 5145 26th Street, Vernon, BC, Canada, V1T 8G4 | Prince George | Victoria | P:1.250.541.1030 | www.westernwater.ca |