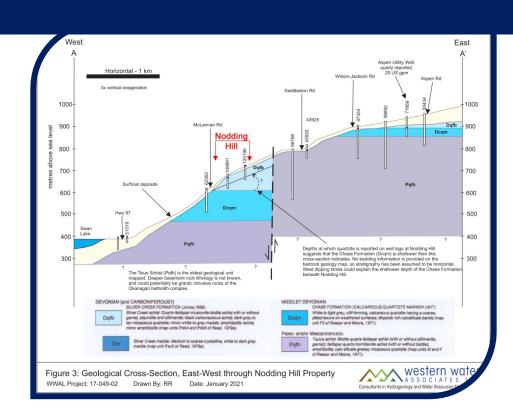


Nodding Hill Residential Development Phase 2 Groundwater Assessment

Prepared for:

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



October 2021

Project: 17-049-02VR



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

Nodding Hill Developments Ltd. 7601 McLennan Road Vernon, BC, VIB 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 I 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 I I 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.

R. M. RHODES #32839 Reviewed by:

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TABLE OF CONTENTS

Ι.	INTROD	UCTION	I
	1.1	PROJECT DESCRIPTION AND BACKGROUND	I
2.	REGULA	TORY REQUIREMENTS	2
3.	PROJEC [*]	Г А РРROACH	3
4.	SITE PH	YSIOGRPAHY AND CLIMATE	3
5 .	AREA W	/ATER SUPPLIES	4
6.	SURFICE	AL AND BEDROCK GEOLOGY	6
7 .	SUBJECT	WELL DESCRIPTIONS	8
8.	HYDRO	GEOLOGIC SETTING AND NEARBY WELLS	9
9.	P UMPIN	G TEST PROGRAM	13
10.	P UMPIN	G TEST RESULTS	14
	10.1	WPID 38544	15
	10.2	WPID 50399	16
	10.3	WPID 50395	16
	10.4	WPID 62012	16
	10.5	WPID 62008	16
	10.5.1	POTENTIAL FOR WELL INTERFERENCE AND WATER LEVEL RECOVERY	17
	10.5.2	2021 WEATHER AND REGIONAL GROUNDWATER LEVEL ASSESSMENT	18
П.	WATER	QUALITY ASSESSMENT	22
12.	SUMMAI	RY OF EXISTING ONSITE WATER SUPPLIES	24
13.	Discus	SION AND CONCLUSIONS	25
14.	RECOM	1ENDATIONS	29
REF	ERENCES	••••••	30

List of Figures

	_			_	
V۸	/i+	hir	٦,	exi	۲

List of Ta	ables	
Figure 10.2	Monitoring Well Hydrographs and Statistical Water Level Data for Okanagan Wells Completed in Bedrock Aquifers	
Figure 10.1	Weather and Climate Normal Data from Vernon Climate Stations	
Figure 8.2	Annual Statistical Hydrograph for Observation Well 311 – 2010-2020	12
Figure 8.1	Groundwater Hydrograph for Observation Well 311 – Complete Record	12
Figure 5.1	Subject Property, Cadastral Fabric and Greater Vernon Water Service Area	5

Table 4.1:	1981 - 2010 Climate Normal Data, Vernon North Climate Station (ID 1128583)	4
Table 5.1:	Summary of Reported Surface Water Licences within 2km East of Nodding Hill (lice	nces with
domestic p	urposes excluded from table)	6
Table 7.1:	Summary Well Construction Information for Nodding Hill Development Wells	9
Table 8.1:	Well Construction Details for Wells in the Nodding Hill Area,	11
Table 9.1:	Summary of 2020 Pumping Tests	13
Table 10.1:	Pumping Test Result Summaries	15
Table 10.2:	Summary of Measured Well Interference During 72-hour Test on WPID 62008,	17
Table 11.1:	2020 Groundwater Quality Summary	23
Table 12.1:	Summary of Existing Water Sources and Bylaw Conformance	24

List of Appendices

Pumping Test Graphs and Water Quality Results: WPID38544
Pumping Test Graphs and Water Quality Results: WPID50399
Pumping Test Graphs and Water Quality Results: WPID50395
Pumping Test Graphs and Water Quality Results: WPID62012
Pumping Test Graphs and Water Quality Results: WPID62008
Nodding Hill Well Logs

I. 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

I.I 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 \pm 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 m³/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 m³/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 m³/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 I and March I 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 m³/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 m³/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 m³/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.
- 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 I-2 hectare range, similar to what is being proposed at the subject property (Figures I and 4). To the north, east and south the property is adjacent to larger, mostly undeveloped holding properties. Approximately I km east and upslope of the site is the Keddleston Road area, which mostly consists of I 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.

						,				(-			
	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	52.2	25.2	28.7	29	46.3	49.6	35.4	31.9	32.7	41.5	57.5	57	487

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

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 I 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

(mm)

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.

17-049-02

Golfview SS Nodding Hill Development (Subject Property) Hwy 97 / Old Kamloops Rd SS Keddleston Road Goose Lake Building Goose Lake Greater Vernon Water Service Area Boundary Rugg Rd S Foothills PS Marmot Court SS Goose Lake PS 6198 Brookside Road B/O North BX #2 PS North BX #1 PS BX Park SS

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	Licence				Quantity (m³/day unless otherwise
Number	Status	Priority Date	Purpose Use	Source Name	noted)
				Schepel Spring /	
C063729	Current	June 30, 1969	00B - Waterworks (other than LP)	Deer Creek	11.4 m³/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 m³/day
C059406	Current	June 24, 1976	03B - Irrigation: Private	Woolliams Pond	28123.3 m³/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 (I-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.

West East Aspen Utility Well Horizontal - 1 km 20 US gpm 3x vertical exageration Keddleston Rd 1000 1000 37354 43925 Dafb 900 900 metres above sea level **Nodding** 800 800 700 700 Surficial deposits Pafh 600 600 Hwy 97 500 500 Lake 400 400 suggests that the Chase Formation (Dcgm) is shallower than this 300 300 cross-section indicates. No bedding information is provided on the bedrock geology map, so stratigraphy has been assumed to be horizontal. West dipping strata could explain the shallower depth of the Chase Formatic The Tsius Schist (Pqfh) is the oldest geological unit mapped. Deeper basement rock lithology is not know and could potentially be grantic intrusive rocks of the Okanagan batholith complex. DEVONIAN (and CARBONIFEROUS?)
SILVER CREEK FORMATION (Jones, 1959)
Silver Creek schist: Quartz-feldspar-muscovite-biolitis schist with or without
Dqfb

armet, staurolitie and sillimanies, black carbonaceous schist, dark-grey to MIDDLE? DEVONIAN CHASE FORMATION (CALCAREOUS QUARTZITE MARKER UNIT) White to light grey, cliff-forming, calcareous quartzite having a coarse, pitted texure on weathered surfaces; diopside rich calcaliloate bands (map unit F3 of Reesor and Moore, 1971). vession teriozon.
Taulus schlat: Blottle-quartz-faldspar schlat (with or without alillmanite, gamet; feldspar-quartz-hornblande schlat (with or without blottle); amphibolite; calc-allicate gneiss; micaceous quartzite (map units M and F of Reasor and Moore, 1971). Silver Creek marble: Medium to coarse crystalline, white to dark gray narble (map unit Psc5 of Read, 1979a).

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 I 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	WPID²	Depth of Borehole		_	Casing depth Static water (ft) Level (ft)		(ft)		Driller- Estimated Well yield (USgpm)	Notes
		ft	m	ft	m	ft	m			
									Originally flowing artesian @ 10	
Dec, 1981	WTN46392	210	64.0	10	3.0	29.8	9.1	50	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	
Avera	ge	291.2	88.7	38.1	11.6	61.7	18.8	22.3		
Minim	um	180.0	54.9	10.0	3.0	3.0	0.9	1.5		
Maxim	ium	460.0	140.2	100.0	30.5	180.0	54.9	100.0		
Medi	an	270.0	82.3	20.0	6.1	57.3	17.4	9.0		

Notes:

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 km²), 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

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.

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.

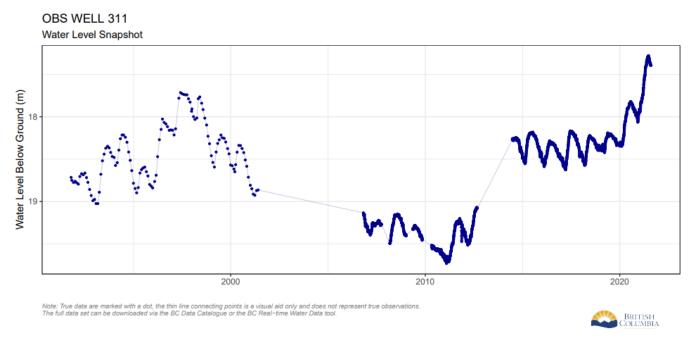
In summary, available well logs indicate that east and upslope of the mapped fault in the Keddleston area, the bedrock aquifer present in that area (interpreted to be hosted by the Tsius Schist) is less productive than areas west of the fault. Median values of driller-reported well yields are three to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

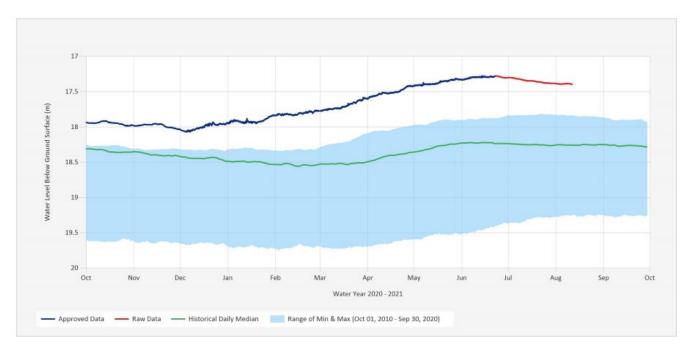
						to Geographical Area
	Finished Well Depth (ft)		Water Depth (ft)	Bedrock Depth (ft)	Well Yield (US gpm)	Street Address
East and Upslope o	f Nodding Hill (Keddleston a	ind Side Roads)				
47092	204		13	0	20	KEDDLESTON RD
62854	300	6.63	60		1.5	KEDDLESTON RD.
82400	400	6.63	49		1.5	KEDLESTON RD
53206	300			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	0.00	02	45	20	KEDDLESTON RD
43925	116		35	8	0.67	KEDDLESTON RD
119391	670	6	33	76	0.25	WILSON JACKSON ROAD
74439	180	0	126	70	13	HITCHCOCK ROAD
112890	840	6	120	114	Dry Hole	TITCHCOCK ROAD
37652	200	0		48		CH VED CTAD
					Dry Hole	SILVER STAR
59305	307			74	0.5	7685 KEDDLESTON RD.
53895	420		22	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 H						
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 Southwes	st of Nodding Hill (McLenna	n and Mountrid	ge 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	33	12	5	7566 MCLENNAN ROAD
114421	220	6	76	5	5	7566 MCLENNAN ROAD
49635	120	O	70	15	1	7500 MICLEMINAIN KUAD
		6.63	75			MT DIDCE DD
82448	205	6.63	75	35	12	MT RIDGE RD
36465	120			8	12	MOUNTRIDGE DD
49638	255		433	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
		6	20	8	6	7225 MOUNTRIDGE PLACE
104123	362	O				
104123 55452	362 345	0		8	3	MT RIDGE RD
		0		8	3	MT RIDGE RD 7225 MOUNTRIDGE PL
55452	345	6	28			

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:

- I) 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.

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

Table 9.1: Summary of 2020 Pumping Tests

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.

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

Table 10.1: Pumping Test Result Summaries

Note:

- I) 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 AI 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 I 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.

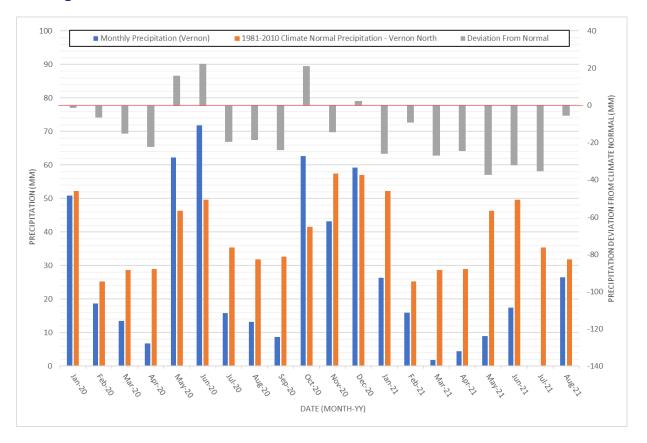


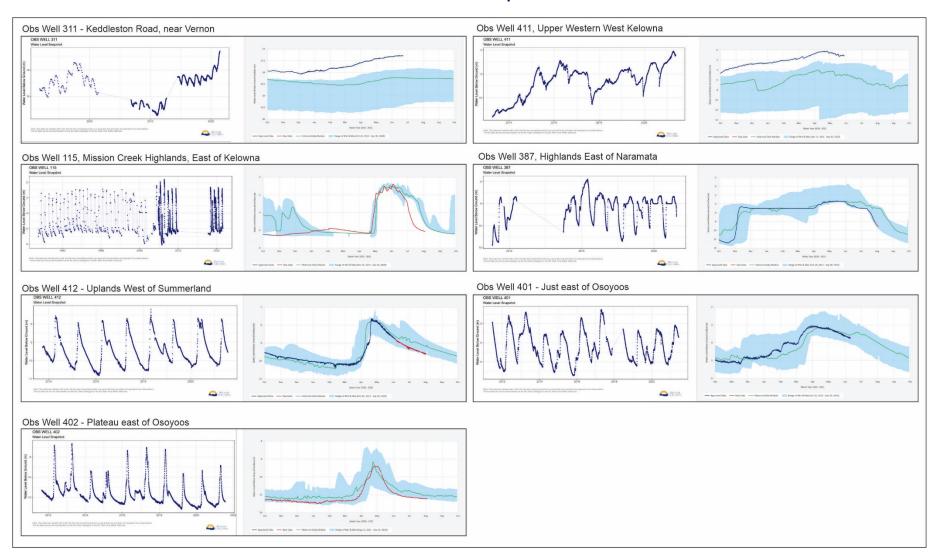
Figure 10.1 Weather and Climate Normal Data from Vernon Climate Stations

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



II. 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		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 I	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 M	letals					
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 Parameter	rs					
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?
NovDec., 1981	WTN46392	50			Yes
Sept, 2014	38541	13		October 10, 2014	Yes
Sept, 2014	38542	30	2017 - 72 hours at 5 US gpm 2017 - 67 hours at 3	October 10, 2014	Yes
Sept, 2014	38543	9	US gpm	October 10, 2014	Yes
Sept, 2014	38544	1.5	2020 - 72 hours at 1.25 US gpm	October 10, 2014 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:

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 metaquartzite 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 I 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 m³/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 m³/day, and typical household use in rural areas is well below 6.55 m³/day as evidenced by the widespread use of 2.27 m³/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

- RI 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.

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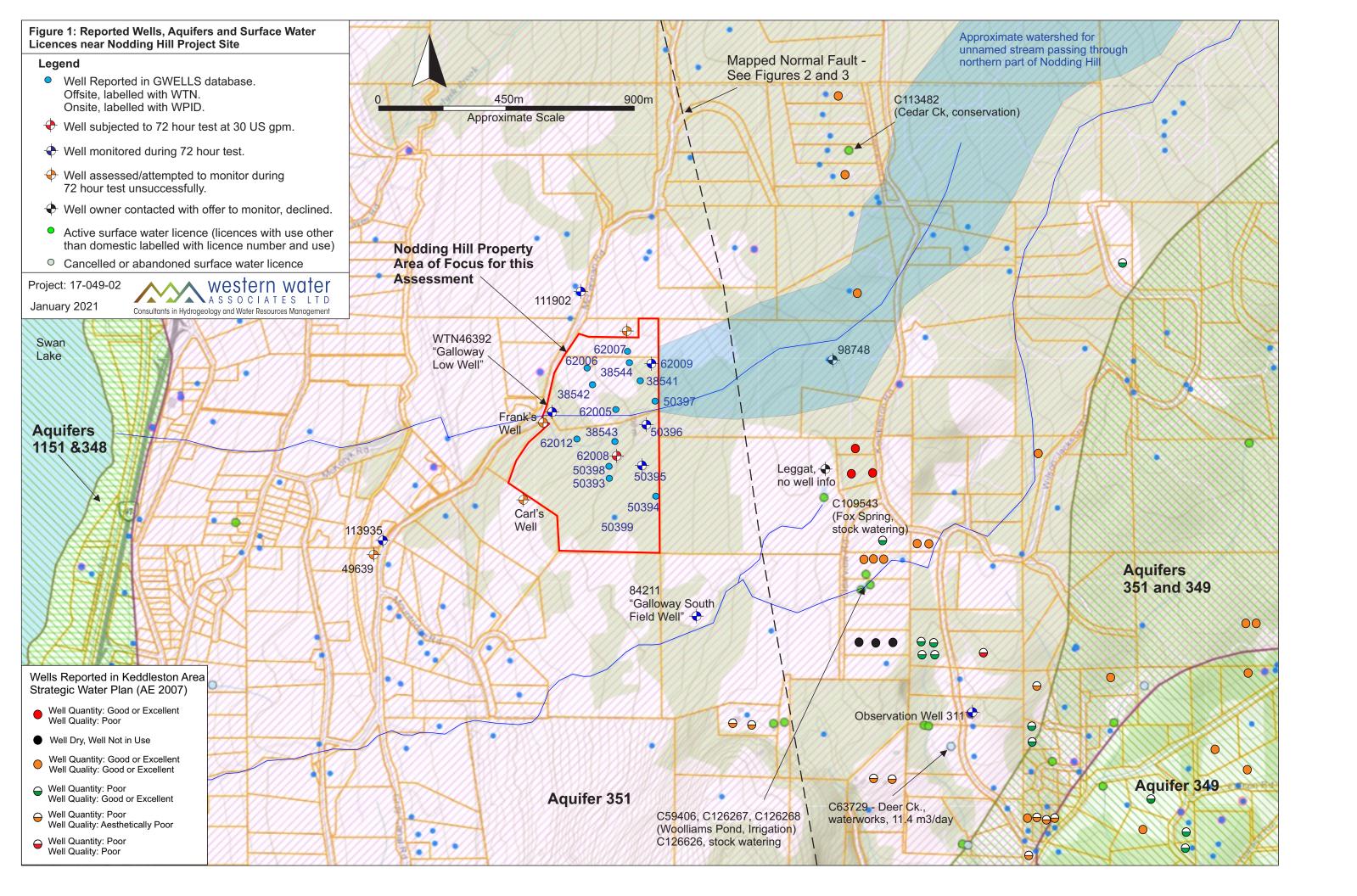
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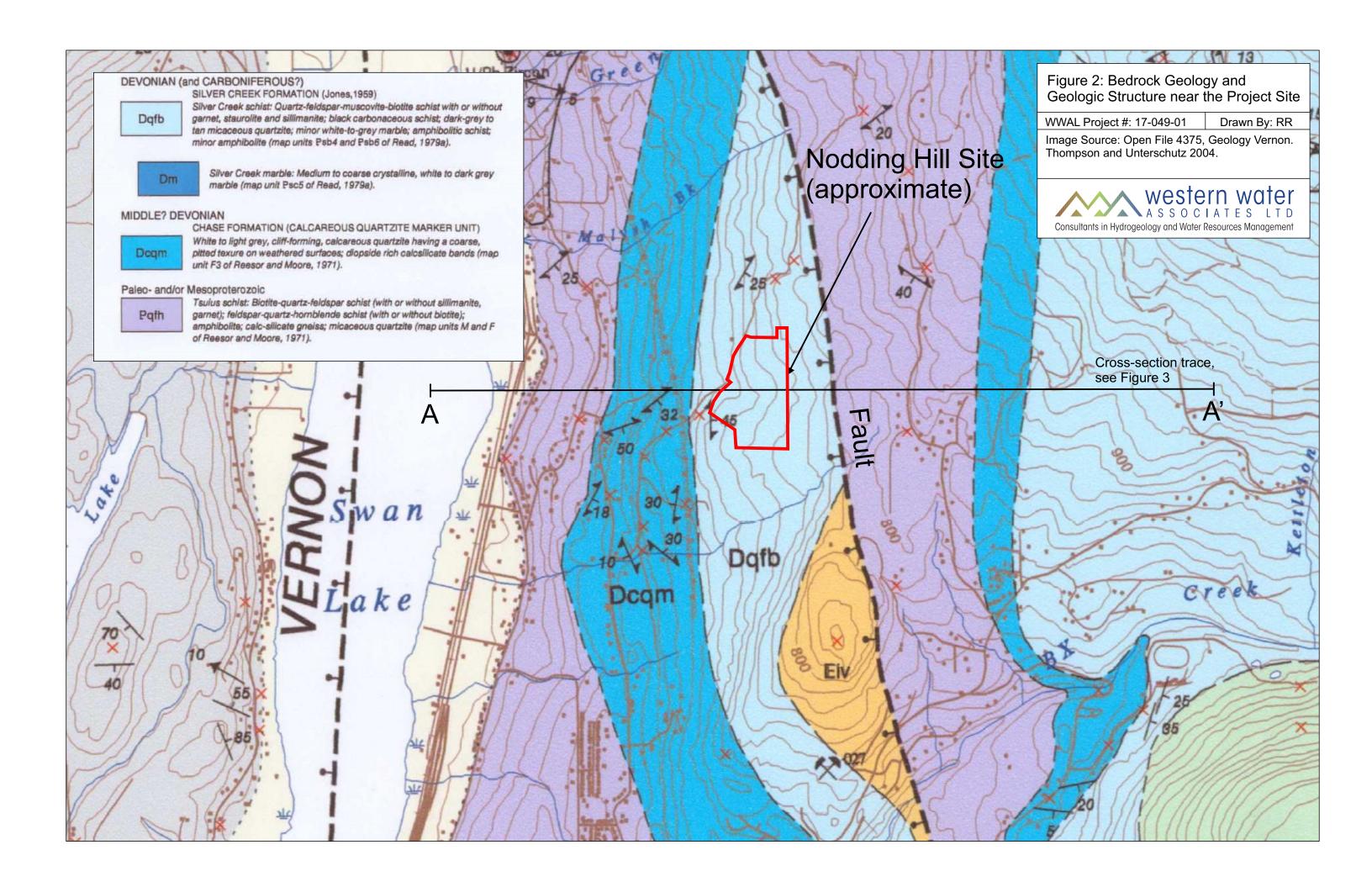
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FIGURES

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







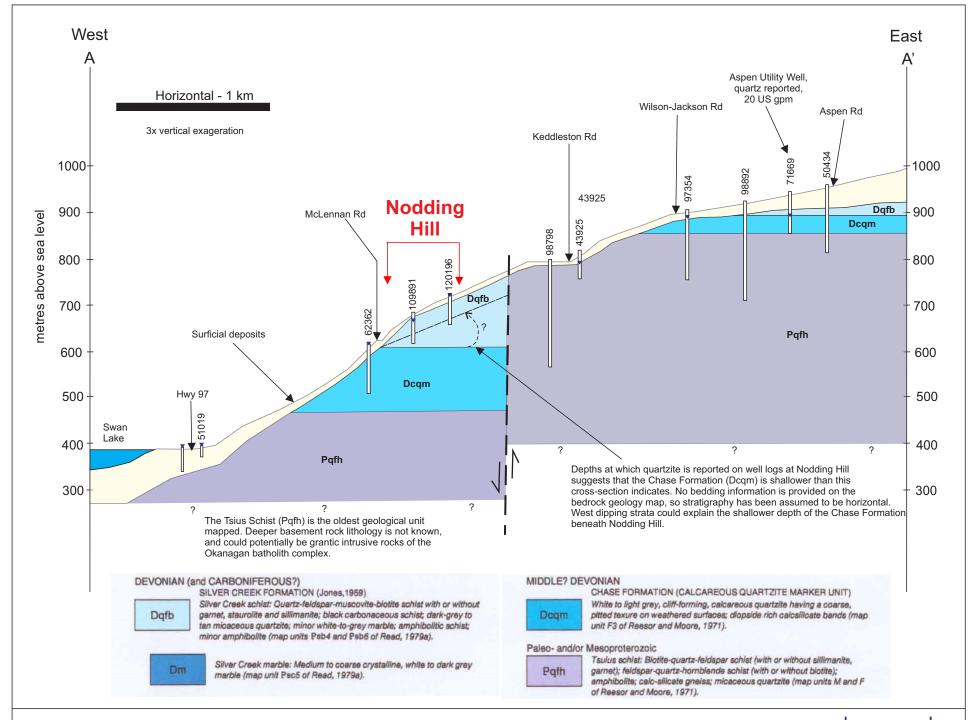


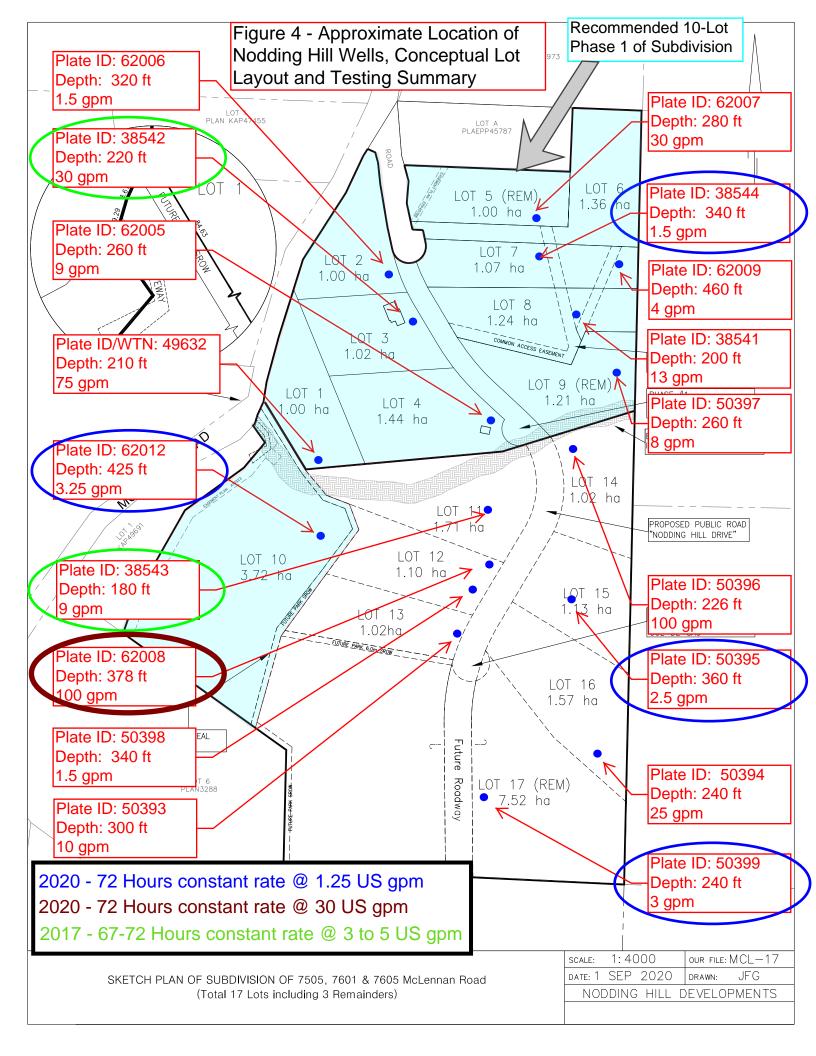
Figure 3: Conceptual Geological Cross-Section, East-West through Nodding Hill Property

Drawn By: RR Date: January 2021

WWAL Project: 17-049-02

Western water associates LTD

Consultants in Hydrogeology and Water Resources Management



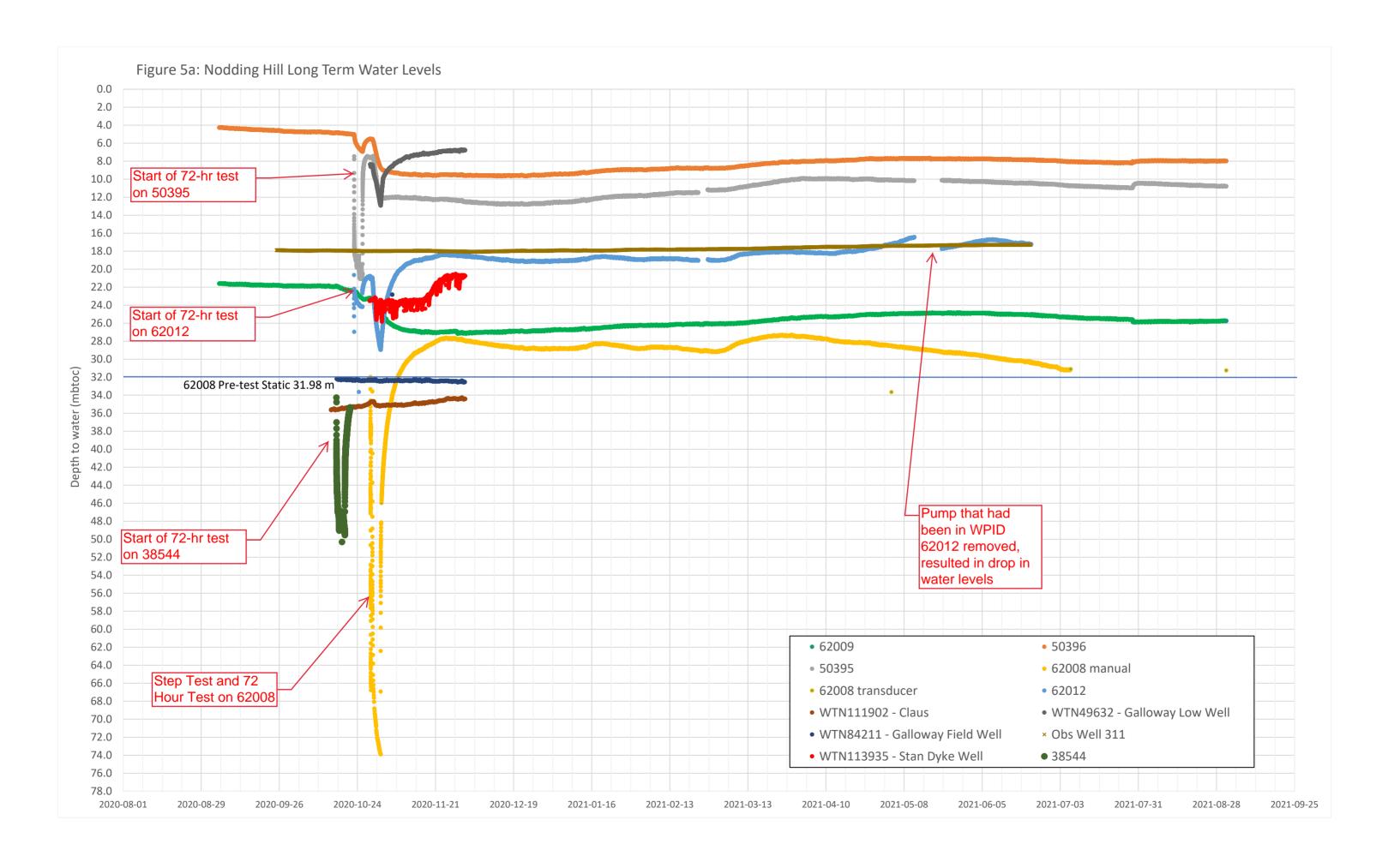
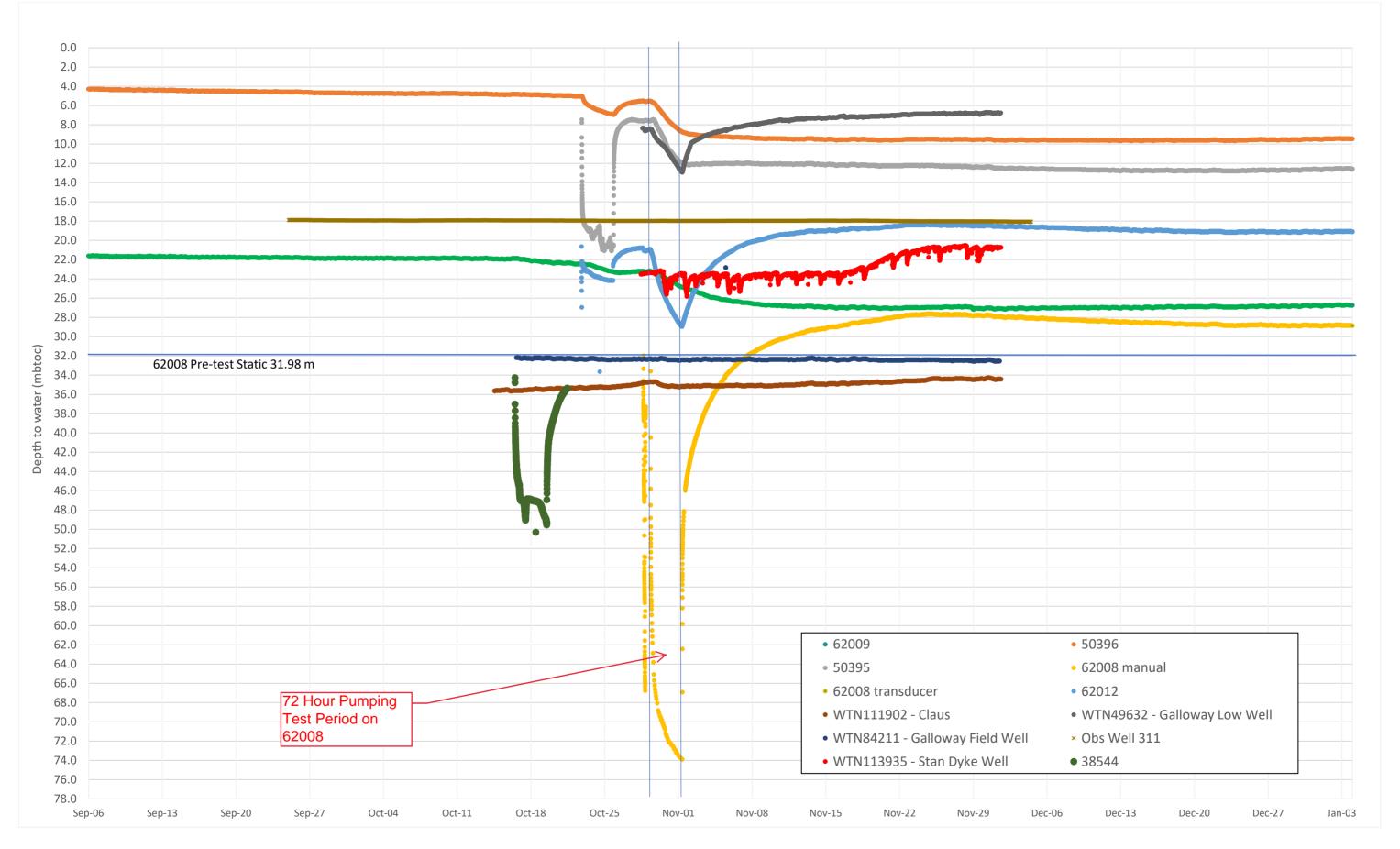


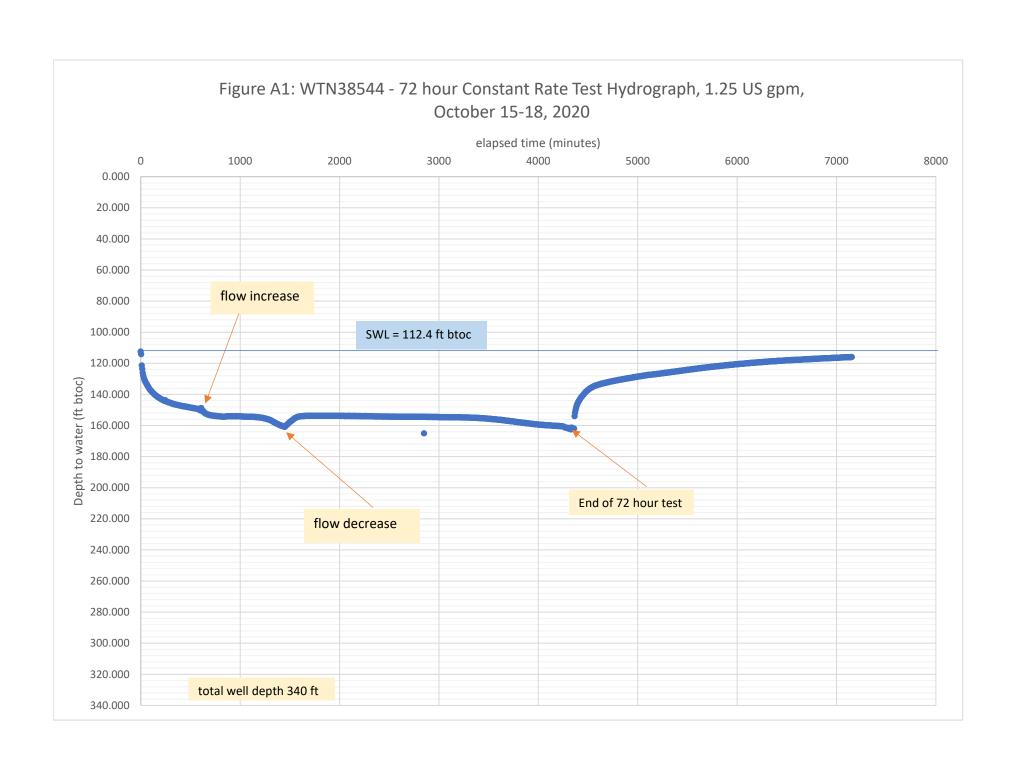
Figure 5b: Nodding Hill Long Term Water Levels (zoom in around pumping tests)

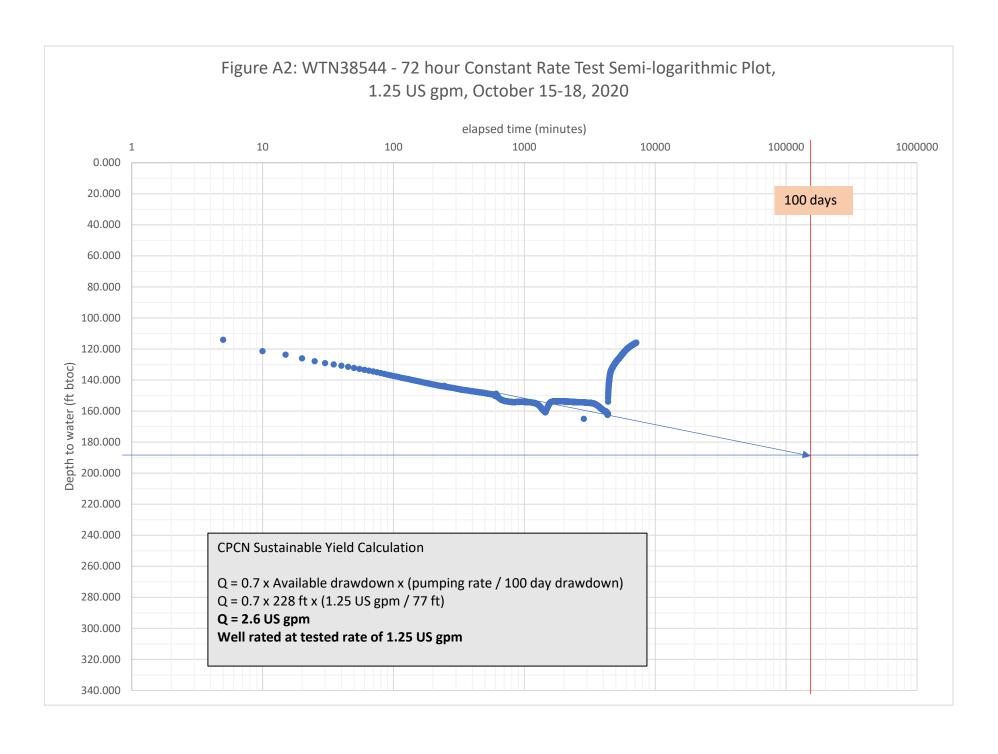


Appendix A Pumping Test Graphs and Water Quality Results: WPID 38544

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











CERTIFICATE OF ANALYSIS

REPORTED TO Western Water Associates Ltd

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.

106 - 5145 26th Street Vernon, BC V1T 8G4

ATTENTION Ryan Rhodes **WORK ORDER** 20J1737

PO NUMBER

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B91103 **PROJECT INFO COC NUMBER**

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Authorized By:

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

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						2020 10 2	7 16:59
		Result	Guideline	RL	Units	Analyzed	Qualifier
Aniono	Matrix: Water Sam	pled: 2020-10-19	09:30				
Anions							
Chloride		0.71	AO ≤ 250	0.10	mg/L	2020-10-20	
Fluoride		0.80	MAC = 1.5		mg/L	2020-10-20	
Nitrate (as N)		< 0.010	MAC = 10	0.010		2020-10-20	
Nitrite (as N)		< 0.010	MAC = 1	0.010		2020-10-20	
Sulfate		233	AO ≤ 500		mg/L	2020-10-20	
Calculated Parameters	s						
Hardness, Total (as C	aCO3)	473	None Required	0.500	mg/L	N/A	
Langelier Index		1.1	N/A	-5.0		2020-10-27	
Solids, Total Dissolve	d	610	AO ≤ 500	10.0	mg/L	N/A	
General Parameters							
Alkalinity, Total (as Ca	aCO3)	296	N/A	1.0	mg/L	2020-10-21	
Alkalinity, Phenolphth	· · · · · · · · · · · · · · · · · · ·	< 1.0	N/A	1.0	mg/L	2020-10-21	
Alkalinity, Bicarbonate		296	N/A		mg/L	2020-10-21	
Alkalinity, Carbonate	(as CaCO3)	< 1.0	N/A		mg/L	2020-10-21	
Alkalinity, Hydroxide ((as CaCO3)	< 1.0	N/A		mg/L	2020-10-21	
Colour, True	,	< 5.0	AO ≤ 15		CU	2020-10-20	
Conductivity (EC)		845	N/A		μS/cm	2020-10-21	
Cyanide, Total		< 0.0020	MAC = 0.2	0.0020	•	2020-10-21	
pH		8.13	7.0-10.5		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 Param	neters						
Coliforms, Total		≥ 2	MAC = 0	1	CFU/100 mL	2020-10-20	
Background Colonies		>200	N/A		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	ma/l	2020-10-27	
Antimony, total		< 0.00020	MAC = 0.006	0.00020		2020-10-27	
Arsenic, total		< 0.00050	MAC = 0.000	0.00050		2020-10-27	
Barium, total		0.0226	MAC = 2	0.0050		2020-10-27	
Boron, total		< 0.0500	MAC = 5	0.0500		2020-10-27	
Cadmium, total		0.000027	MAC = 0.005	0.000010		2020-10-27	
Calcium, total		100	None Required		mg/L	2020-10-27	
Chromium, total		< 0.00050	MAC = 0.05	0.00050		2020-10-27	
Cobalt, total		0.00016	N/A	0.00010		2020-10-27	
Copper, total		< 0.00040	MAC = 2	0.00040		2020-10-27	
Iron, total		0.637	AO ≤ 0.3	0.010		2020-10-27	
Lead, total		0.00070	MAC = 0.005	0.00020		2020-10-27	
Magnesium, total		54.2	None Required	0.010		2020-10-27	
Manganese, total		0.0730	MAC = 0.12	0.00020		2020-10-27	



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PROJECT 17-049-02

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0.0040 mg/L

20J1737

2020-10-27

2020-10-27 16:59

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
38544 (20J1737-01) Matrix: Wat	er 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	

Sample Qualifiers:

Zinc, total

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

AO ≤ 5

0.290



APPENDIX 1: SUPPORTING INFORMATION

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PROJECT 17-049-02

WORK ORDER REPORTED 20J1737

ED 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 Amperomet	ry ✓	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

 $\begin{array}{lll} \text{NTU} & \text{Nephelometric Turbidity Units} \\ \text{OG} & \text{Operational Guideline (treated water)} \\ \text{pH units} & \text{pH < 7 = acidic, ph > 7 = basic} \\ \text{\mu S/cm} & \text{Microsiemens per centimetre} \\ \text{ASTM} & \text{ASTM International Test Methods} \\ \end{array}$

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

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PROJECT 17-049-02

WORK ORDER REPORTED 20J1737

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 <u>not</u> 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.



REPORTED TO Western Water Associates Ltd

PROJECT 17-049-02

WORK ORDER REPORTED

20J1737 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.

nalyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
ons, Batch B0J1795									
ank (B0J1795-BLK1)			Prepared	l: 2020-10-2	20, Analyze	d: 2020-	10-20		
loride	< 0.10	0.10 mg/L							
oride	< 0.10	0.10 mg/L							
rate (as N)	< 0.010	0.010 mg/L							
rite (as N)	< 0.010	0.010 mg/L							
fate	< 1.0	1.0 mg/L							
S (B0J1795-BS1)			Prepared	l: 2020-10-2	20, Analyze	d: 2020-	10-20		
loride	16.1	0.10 mg/L	16.0		100	90-110			
oride	4.00	0.10 mg/L	4.00		100	88-108			
rate (as N)	4.03	0.010 mg/L	4.00		101	90-110			
rite (as N)	2.01	0.010 mg/L	2.00		100	85-115			
fate	15.9	1.0 mg/L	16.0		100	90-110			
ank (B0J1820-BLK1) bidity	< 0.10	0.10 NTU	Prepared	I: 2020-10-2	20, Analyze	d: 2020-	10-20		
S (B0J1820-BS1)			Prepared	l: 2020-10-2	20, Analyze	d: 2020-	10-20		
bidity	38.9	0.10 NTU	40.0		97	90-110			
neral Parameters, Batch B0J1856 ank (B0J1856-BLK1)	3		Prepared	I: 2020-10-2	21. Analvze	d: 2020-	10-21		
anide, Total	< 0.0020	0.0020 mg/L			, ,				
		<u> </u>	Prepared	I: 2020-10-2	21, Analyze	d: 2020-	10-21		
anide, Total	< 0.0020	0.0020 mg/L	,		, , ,				
S (B0J1856-BS1)			Prepared	l: 2020-10-2	21, Analyze	d: 2020-	10-21		
anide, Total	0.0206	0.0020 mg/L	0.0200		103	82-120			
S (B0J1856-BS2)			Prepared	I: 2020-10-2	21, Analyze	d: 2020-	10-21		
anide. Total	0.0195	0.0020 mg/L	0.0200		97	82-120			
ank (B0J1856-BLK2) anide, Total S (B0J1856-BS1) anide, Total	< 0.0020	0.0020 mg/L	Prepared		21, Analyze 103 21, Analyze	d: 2020- 82-120	10-21		



REPORTED TO PROJECT	Western Water Ass 17-049-02	ociates Ltd				WORK REPOR	ORDER RTED		737)-10-27	16:59
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameters	, Batch B0J1856, Col	ntinued								
LCS Dup (B0J1856-	·BSD1)			Prepared	: 2020-10-2	21, Analyze	ed: 2020-	10-21		
Cyanide, Total		0.0210	0.0020 mg/L	0.0200		105	82-120	2	10	
LCS Dup (B0J1856-	·BSD2)			Prepared	: 2020-10-2	21. Analyze	ed: 2020-	10-21		
Cyanide, Total		0.0191	0.0020 mg/L	0.0200		96	82-120	2	10	
General Parameters	, Batch B0J1874									
Blank (B0J1874-BL	K1)			Prepared	: 2020-10-2	20. Analyze	ed: 2020-	10-20		
Colour, True	,	< 5.0	5.0 CU			, · · · · · · · · · · · · · · · · · ·				
LCS (B0J1874-BS1)				Prepared	: 2020-10-2	20 Analyze	ed: 2020-	10-20		
Colour, True	<u> </u>	21	5.0 CU	20.0	0_ 0	107	85-115			
General Parameters	Batch B0.11982									
Blank (B0J1982-BL				Prepared	: 2020-10-2	21, Analyze	ed: 2020-	10-21		
Alkalinity, Total (as Cat	,	< 1.0	1.0 mg/L							
Alkalinity, Phenolphtha	lein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate	·	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (a	as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (a	is CaCO3)	< 1.0	1.0 mg/L							
Conductivity (EC)		< 2.0	2.0 µS/cm							
Blank (B0J1982-BL	K2)			Prepared	: 2020-10-2	21, Analyze	ed: 2020-	10-21		
Alkalinity, Total (as Cat	,	< 1.0	1.0 mg/L							
Alkalinity, Phenolphtha	, ,	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate	· ,	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (a		< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (a	is CaCO3)	< 1.0	1.0 mg/L							
Conductivity (EC)		< 2.0	2.0 µS/cm							
Blank (B0J1982-BL	K3)			Prepared	: 2020-10-2	21, Analyze	ed: 2020-	10-21		
Alkalinity, Total (as Cat		< 1.0	1.0 mg/L							
Alkalinity, Phenolphtha		< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate	· /	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (a		< 1.0	1.0 mg/L							
Alkalinity, Hydroxide (a	is CaCO3)	< 1.0	1.0 mg/L							
Conductivity (EC)		< 2.0	2.0 μS/cm							
LCS (B0J1982-BS1)				Prepared	: 2020-10-2	21, Analyze		10-21		
Alkalinity, Total (as Ca	CO3)	95.4	1.0 mg/L	100		95	80-120			
LCS (B0J1982-BS2)				Prepared	: 2020-10-2	21, Analyze	ed: 2020-	10-21		
Alkalinity, Total (as Ca	CO3)	96.0	1.0 mg/L	100		96	80-120			
LCS (B0J1982-BS3)				Prepared	: 2020-10-2	21, Analyze	ed: 2020-	10-21		
Alkalinity, Total (as Cat	CO3)	96.0	1.0 mg/L	100		96	80-120			
LCS (B0J1982-BS4))			Prepared	: 2020-10-2	21, Analyze	ed: 2020-	10-21		
Conductivity (EC)		1400	2.0 μS/cm	1410		99	95-104			
LCS (B0J1982-BS5))			Prepared	: 2020-10-2	21, Analyze	ed: 2020-	10-21		
Conductivity (EC)		1390	2.0 μS/cm	1410		99	95-104			
LCS (B0J1982-BS6))			Prepared	: 2020-10-2	21, Analyze	ed: 2020-	10-21		
Conductivity (EC)		1380	2.0 μS/cm	1410		98	95-104			
			•							7



REPORTED TO PROJECT	Western Water Asso 17-049-02	ociates Ltd				WORK REPOR	ORDER TED		737)-10-27	16:59
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameter	s, Batch B0J1982, Con	tinued								
Reference (B0J198	82-SRM1)			Prepared	l: 2020-10-2	1, Analyze	d: 2020-1	10-21		
pH	- ,	7.00	0.10 pH units	7.01		100	98-102			
Reference (B0J198	82-SRM2)			Prepared	l: 2020-10-2	1 Analyze	d: 2020-1	10-21		
pH	52 Grain2)	7.01	0.10 pH units	7.01	2020 10 2	100	98-102			
	22 CDM2)	-			. 2020 10 2	1 Apolyzo		IN 21		
Reference (B0J198	02-3RW3)	7.00	0.10 pH units	7.01	l: 2020-10-2	1, Analyze	98-102	10-21		
Microbiological Pa	rameters, Batch B0J17	99								
Blank (B0J1799-B				Prepared	l: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total	·	< 1	1 CFU/100 r	nL						
E. coli		< 1	1 CFU/100 r	nL						
Blank (B0J1799-B	LK2)			Prepared	l: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total		< 1	1 CFU/100 r							
E. coli		< 1	1 CFU/100 r	nL						
Blank (B0J1799-B	LK3)			Prepared	l: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total		< 1	1 CFU/100 r	nL						
E. coli		< 1	1 CFU/100 r	nL						
Blank (B0J1799-B	LK4)			Prepared	l: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total		< 1	1 CFU/100 r							
E. coli		< 1	1 CFU/100 r	nL						
Blank (B0J1799-B	LK5)			Prepared	l: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total		< 1	1 CFU/100 r							
E. coli		< 1	1 CFU/100 r	nL						
Blank (B0J1799-B	LK6)				l: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total		< 1	1 CFU/100 r							
E. coli		< 1	1 CFU/100 r							
Blank (B0J1799-B	LK7)			Prepared	: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total		< 1	1 CFU/100 r							
E. COII		< 1	1 CFU/100 r							
Blank (B0J1799-B	LK8)				l: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total E. coli		< 1 < 1	1 CFU/100 r 1 CFU/100 r							
Blank (B0J1799-B	ı ka)		1 01 0/1001		l: 2020-10-2	n Analyze	d· 2020-1	10-20		
Coliforms, Total	LINO)	< 1	1 CFU/100 r		1. 2020 10 2	.0, 7 triary 20	u. 2020	10 20		
E. coli		< 1	1 CFU/100 r							
Blank (B0J1799-B	LKA)			Prepared	l: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total		< 1	1 CFU/100 r							
E. coli		< 1	1 CFU/100 r	nL						
Blank (B0J1799-B	LKB)			Prepared	: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total		< 1	1 CFU/100 r							
E. coli		<1	1 CFU/100 r							
Blank (B0J1799-B	LKC)				: 2020-10-2	0, Analyze	d: 2020-1	10-20		
Coliforms, Total		< 1	1 CFU/100 r							
E. coli		< 1	1 CFU/100 r	IIL						



REPORTED TO PROJECT	Western Water / 17-049-02	Associates Ltd				WORK O			737 -10-27	16:59
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batc	h B0J2219									
Blank (B0J2219-B	LK1)			Prepared	: 2020-10-23	, Analyzed	l: 2020- 1	10-23		
Mercury, total		< 0.000010	0.000010 mg/L							
Blank (B0J2219-B	I K2)			Prenared	: 2020-10-23	Analyzed	l· 2020 <u>-</u> 1	In-23		
Mercury, total	LILL	< 0.000010	0.000010 mg/L	Tioparoa	. 2020 10 20	, raidiy200	. 2020	10 20		
					0000 40 00			10.00		
Matrix Spike (B0J	2219-WS1)		ource: 20J1737-01		: 2020-10-23			10-23		
Mercury, total		0.000222	0.000010 mg/L	0.000250	< 0.000010	89	70-130			
Reference (B0J22	19-SRM1)			Prepared	: 2020-10-23	, Analyzed	l: 2020-1	10-23		
Mercury, total		0.00567	0.000010 mg/L	0.00581		98	70-130			
Reference (B0J22	19-SRM2)			Prepared	: 2020-10-23	, Analyzed	l: 2020- 1	10-23		
Mercury, total	•	0.00563	0.000010 mg/L	0.00581		97	70-130			
Total Metals, Batc	h B0J2246		Ţ,							
Blank (B0J2246-B	LK1)			Prepared	: 2020-10-24	, Analyzed	l: 2020- 1	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 < 0.000010	0.0500 mg/L							
Cadmium, total Calcium, total		< 0.000	0.000010 mg/L 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 Potassium, total		< 0.00040 < 0.10	0.00040 mg/L							
Selenium, total		< 0.00050	0.10 mg/L 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-BS	1)			Prepared	: 2020-10-24	, Analyzed	l: 2020-1	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 Cadmium, total		< 0.0500 0.0205	0.0500 mg/L 0.000010 mg/L	0.0200		110 103	80-120 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			

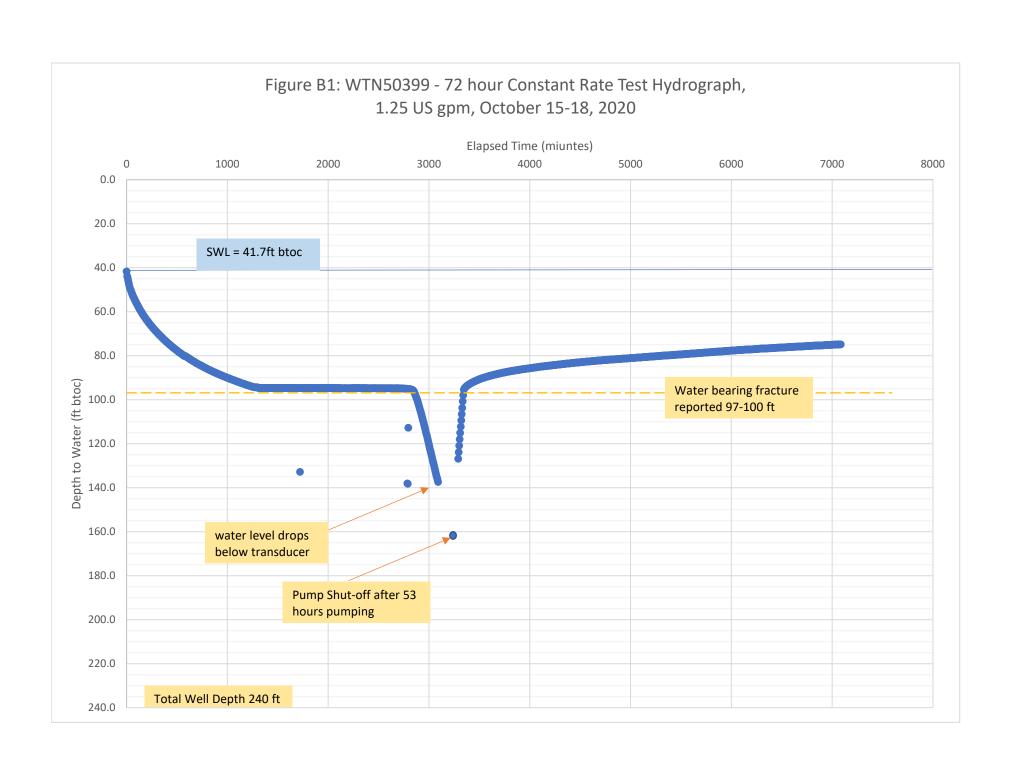


REPORTED TO PROJECT	Western Water Associa 17-049-02	ates Ltd					WORK REPOR	-		737 -10-27	16:59
Analyte		Result	RL	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Bato	h B0J2246, Continued										
LCS (B0J2246-BS	1), Continued				Prepared	: 2020-10-2	4, Analyze	d: 2020-1	10-27		
Nickel, total		0.0210	0.00040	ma/L	0.0200		105	80-120			
Potassium, total		2.02	0.10		2.02		100	80-120			
Selenium, total		0.0202	0.00050		0.0200		101	80-120			
Sodium, total		2.03	0.10		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 (B0J22	46-SRM1)				Prepared	: 2020-10-2	4, Analyze	d: 2020-1	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		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		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





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



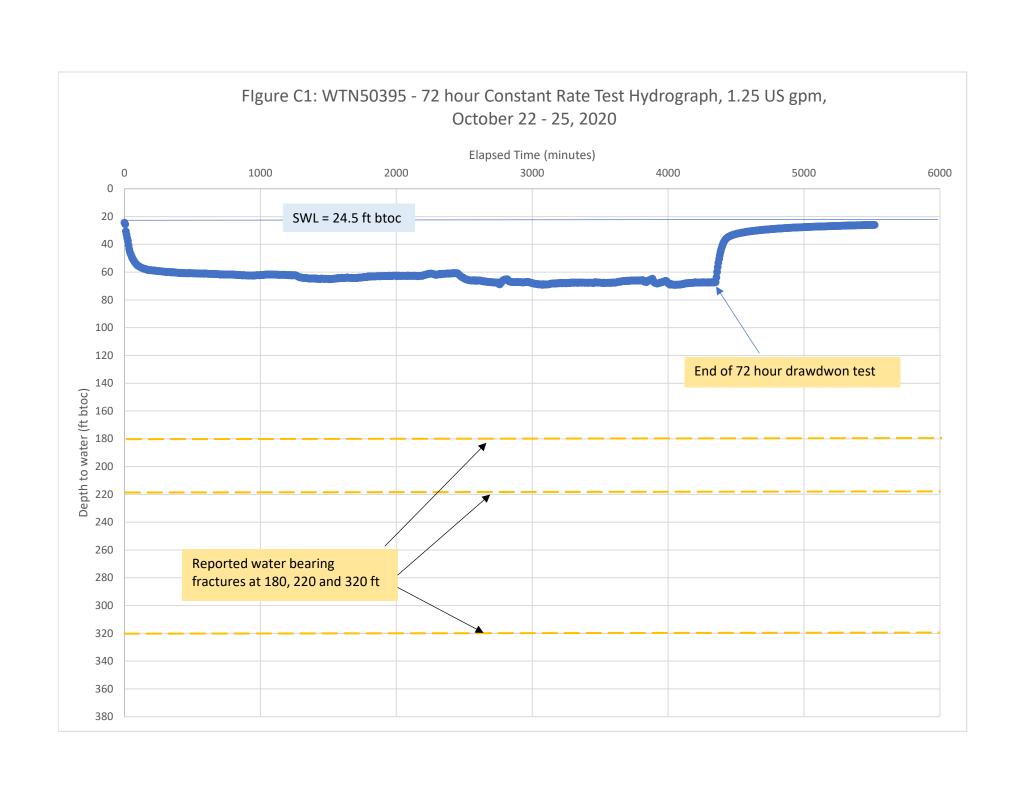


Figure C2: WTN50395 - 72 hour Constant Rate Test Semi-logarithmic Plot, 1.25 US gpm, October 22 - 25, 2020 Elapsed Time (minutes) Pumping Water levels stabilize for last 24 Depth to water (ft btoc) 140 220 220 hours of test. Well rated at tested rate of 1.25 US gpm. Reported water bearing fractures at 180, 220 and 320 ft total depth 360 ft





2020-10-26 14:30 / 5°C

CERTIFICATE OF ANALYSIS

REPORTED TO Western Water Associates Ltd

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.

106 - 5145 26th Street Vernon, BC V1T 8G4

ATTENTION Ryan Rhodes WORK ORDER 20J2505

PO NUMBER

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

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

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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

Sara Gulenchyn

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REPORTED TO PROJECT	Western Water Associa 17-049-02	tes Ltd			WORK ORDER REPORTED	20J2505 2020-11-0	2 17:12
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifier
62012 (20J2505-0	01) Matrix: Water Samp	oled: 2020-10-25	17:00				
Anions							
Chloride		14.1	AO ≤ 250	0.10	mg/L	2020-10-27	
Fluoride		1.13	MAC = 1.5		mg/L	2020-10-27	
Nitrate (as N)		< 0.010	MAC = 10	0.010		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 Parame	eters						
Hardness, Total (a	as CaCO3)	557	None Required	0.500	mg/L	N/A	
Langelier Index		1.3	N/A	-5.0		2020-11-02	
Solids, Total Disso	olved	742	AO ≤ 500	10.0	mg/L	N/A	
General Parameter	rs						
Alkalinity, Total (a:	s CaCO3)	378	N/A	1.0	mg/L	2020-10-28	
	ohthalein (as CaCO3)	< 1.0	N/A		mg/L	2020-10-28	
Alkalinity, Bicarbo	nate (as CaCO3)	378	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Carbon	ate (as CaCO3)	< 1.0	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Hydroxi	de (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	
pН		8.05	7.0-10.5	0.10	pH units	2020-10-28	HT2
Temperature, at p	Н	21.3	N/A		°C	2020-10-28	HT2
Turbidity		9.42	OG < 1	0.10	NTU	2020-10-27	
Microbiological Pa	rameters						
Coliforms, Total		< 1	MAC = 0	1	CFU/100 mL	2020-10-26	
Background Color	nies	>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		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		2020-11-01	
Manganese, total		0.326	MAC = 0.12	0.00020	mg/L	2020-11-01	



REPORTED TO Western 17-049-0	Water Associates Ltd 2				WORK ORDER REPORTED	20J2505 2020-11-	02 17:12
Analyte	Res	sult	Guideline	RL	Units	Analyzed	Qualifier
62012 (20J2505-01) Matrix:	Water Sampled: 2020-	10-25	17:00, Continued				
Total Metals, Continued							
Mercury, total	< 0.000	010	MAC = 0.001	0.000010	mg/L	2020-10-30	
Molybdenum, total	0.00	280	N/A	0.00010		2020-11-01	
Nickel, total	0.00	270	N/A	0.00040		2020-11-01	
Potassium, total		5.48	N/A		mg/L	2020-11-01	
Selenium, total	0.00	295	MAC = 0.05	0.00050		2020-11-01	
Sodium, total		56.7	AO ≤ 200	0.10	mg/L	2020-11-01	
Strontium, total		1.81	7	0.0010		2020-11-01	
Uranium, total	0.00	0635	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		mg/L	2020-10-27	
Nitrate (as N)		.010	MAC = 10	0.010		2020-10-27	
Nitrite (as N)		.010	MAC = 1	0.010		2020-10-27	
Sulfate	<u> </u>	345	AO ≤ 500		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		mg/L	2020-10-28	
Alkalinity, Bicarbonate (as CaC	<u> </u>	356	N/A	1.0	mg/L	2020-10-28	
Alkalinity, Carbonate (as CaCo	· · · · · · · · · · · · · · · · · · ·	: 1.0	N/A		mg/L	2020-10-28	
Alkalinity, Hydroxide (as CaCC	· ·	: 1.0	N/A		mg/L	2020-10-28	
Colour, True		5.0	AO ≤ 15		CU	2020-10-27	
Conductivity (EC)	1	1340	N/A	2.0	μS/cm	2020-10-28	
Cyanide, Total	< 0.0		MAC = 0.2	0.0020		2020-10-30	
pH		8.04	7.0-10.5		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		CFU/100 mL	2020-10-26	
Total Metals							
Aluminum, total	< 0.0	050	OG < 0.1	0.0050	ma/l	2020-11-01	
Antimony, total	< 0.00		MAC = 0.006	0.00020		2020-11-01	
,, 10101	. 5.00			0.00020	· <i>a</i> · =		Page 3 of



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PROJECT 17-049-02

WORK ORDER

20J2505

REPORTED 2020-11-02 17:12

Analyte	Result	Guideline	RL	Units	Analyzed	Qualifier
50395 (20J2505-02) Matrix: Wa	ter Sampled: 2020-10-2	5 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

PROJECT 17-049-02

WORK ORDER

20J2505

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 Amperomet	ry 🗸	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

 $\begin{array}{lll} \text{NTU} & \text{Nephelometric Turbidity Units} \\ \text{OG} & \text{Operational Guideline (treated water)} \\ \text{pH units} & \text{pH < 7 = acidic, ph > 7 = basic} \\ \text{\mu S/cm} & \text{Microsiemens per centimetre} \\ \text{ASTM} & \text{ASTM International Test Methods} \\ \end{array}$

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

PROJECT 17-049-02

WORK ORDER
REPORTED

20J2505

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 <u>not</u> 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.



REPORTED TO Western Water Associates Ltd

PROJECT 17-049-02

WORK ORDER REPORTED

20J2505 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	I: 2020-10-2	27, Analyze	d: 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	I: 2020-10-2	28, Analyze	d: 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	I: 2020-10-2	27, Analyze	d: 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	I: 2020-10-2	28, Analyze	d: 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

Plank (P0 12424 P1 K4)

		Fiepaieu. 202	0-10-21, Allaly26	u. 2020-10-21	
< 0.10	0.10 NTU				
		Prepared: 202	0-10-27, Analyze	ed: 2020-10-27	
41.2	0.10 NTU	40.0	103	90-110	
			< 0.10 0.10 NTU Prepared: 202	< 0.10 0.10 NTU Prepared: 2020-10-27, Analyze	Prepared: 2020-10-27, Analyzed: 2020-10-27

Propaged: 2020 10 27 Applyzod: 2020 10 27



REPORTED TO Western Water As PROJECT 17-049-02	sociates Ltd				_	WORK ORDER 20J2505 REPORTED 2020-11-02 17:				
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier	
General Parameters, Batch B0J2421, Co	ontinued									
Duplicate (B0J2421-DUP1)	Sourc	ce: 20J2505-01	Prepared	: 2020-10-2	27, Analyze	ed: 2020-	10-27			
Turbidity	9.31	0.10 NTU		9.42			1	15		
General Parameters, Batch B0J2472										
Blank (B0J2472-BLK1)			Prepared	: 2020-10-2	27, Analyze	ed: 2020-1	10-27			
Colour, True	< 5.0	5.0 CU			-					
LCS (B0J2472-BS1)			Prepared	: 2020-10-2	27, Analyze	ed: 2020-1	10-27			
Colour, True	21	5.0 CU	20.0		103	85-115				
General Parameters, Batch B0J2619										
Blank (B0J2619-BLK1)			Prepared	: 2020-10-2	28, Analyze	ed: 2020-1	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) Alkalinity, Hydroxide (as CaCO3)	< 1.0 < 1.0	1.0 mg/L 1.0 mg/L								
Conductivity (EC)	< 2.0	2.0 µS/cm								
Blank (B0J2619-BLK2)		·	Prepared	: 2020-10-2	28, Analyze	ed: 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	: 2020-10-2	28, Analyze	ed: 2020-	10-28			
Alkalinity, Total (as CaCO3)	< 1.0	1.0 mg/L								
Alkalinity, Phenolphthalein (as CaCO3) Alkalinity, Bicarbonate (as CaCO3)	< 1.0	1.0 mg/L								
Alkalinity, Carbonate (as CaCO3)	< 1.0 < 1.0	1.0 mg/L 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	: 2020-10-2	28, Analyze	ed: 2020-	10-28			
Alkalinity, Total (as CaCO3)	102	1.0 mg/L	100		102	80-120				
LCS (B0J2619-BS2)			Prepared	: 2020-10-2	28, Analyze	ed: 2020-	10-28			
Alkalinity, Total (as CaCO3)	102	1.0 mg/L	100		102	80-120				
LCS (B0J2619-BS3)			Prepared	: 2020-10-2	28, Analyze	ed: 2020-	10-28			
Alkalinity, Total (as CaCO3)	101	1.0 mg/L	100		101	80-120				
LCS (B0J2619-BS4)			Prepared	: 2020-10-2	28, Analyze	ed: 2020-	10-28			
Conductivity (EC)	1430	2.0 μS/cm	1410		101	95-104				
LCS (B0J2619-BS5)			Prepared	: 2020-10-2	28, Analyze	ed: 2020-	10-28			
Conductivity (EC)	1350	2.0 µS/cm	1410		96	95-104				
LCS (B0J2619-BS6)			Prepared	: 2020-10-2	28, Analyze	ed: 2020-	10-28			
Conductivity (EC)	1360	2.0 µS/cm	1410		96	95-104				
Reference (B0J2619-SRM1)			Prepared	: 2020-10-2	28, Analyze	ed: 2020-	10-28			
pH	6.98	0.10 pH units	7.01		100	98-102				
	0.00	p								



Copper, total

APPENDIX 2: QUALITY CONTROL RESULTS

REPORTED TO PROJECT	Western Water Associates Ltd 17-049-02				WORK (20J2 2020	505 -11-02	17:12
Analyte	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
General Parameter	s, Batch B0J2619, Continued								
Reference (B0J26	19-SRM2)		Prepared:	2020-10-28	, Analyzed	l: 2020-10	0-28		
pH	6.99	0.10 pH units	7.01		100	98-102			
Reference (B0J26	19-SRM3)	<u> </u>	Prenared:	2020-10-28	Analyzed	· 2020 <u>-</u> 10	1-28		
pH	6.98	0.10 pH units	7.01	2020-10-20	100	98-102	J-20		
General Parameter	s, Batch B0J2771								
Blank (B0J2771-B	LK1)		Prepared:	2020-10-30	. Analyzed	l: 2020 - 10	0-30		
Cyanide, Total	< 0.0020	0.0020 mg/L			, ,				
Blank (B0J2771-B	I K3)		Drenared:	2020-10-30	Analyzed	I: 2020_10	n_30		
Cyanide, Total	< 0.0020	0.0020 mg/L	гтератец.	2020-10-30	, Allalyzeu	1. 2020-10	J-30		
		0.0020 Hig/L		0000 10 00	A 1		2.00		
LCS (B0J2771-BS	•			2020-10-30			0-30		
Cyanide, Total	0.0203	0.0020 mg/L	0.0200		102	82-120			
LCS (B0J2771-BS	2)		Prepared:	2020-10-30	, Analyzed	l: 2020 - 10	0-30		
Cyanide, Total	0.0226	0.0020 mg/L	0.0200		113	82-120			
LCS Dup (B0J277	1-BSD1)		Prepared:	2020-10-30	, Analyzed	l: 2020-10	0-30		
Cyanide, Total	0.0209	0.0020 mg/L	0.0200		104	82-120	3	10	
LCS Dup (B0J277	1-BSD2)		Prepared:	2020-10-30	, Analyzed	l: 2020-10	0-30		
Cyanide, Total	0.0222	0.0020 mg/L	0.0200		111	82-120	2	10	
Microbiological Par Blank (B0J2341-B Coliforms, Total	rameters, Batch B0J2341 LK1) < 1	1 CFU/100 i		2020-10-26	, Analyzed	l: 2020-10	0-26		
E. coli	< 1	1 CFU/100 i							
Blank (B0J2341-B	LK2)		Prepared:	2020-10-26	. Analvzed	l: 2020 - 10	0-26		
Coliforms, Total	<1	1 CFU/100 i			<u>, , , , , , , , , , , , , , , , , , , </u>				
E. coli	< 1	1 CFU/100 i	mL						
Blank (B0J2341-B	LK3)		Prepared:	2020-10-26	, Analyzed	l: 2020-10	0-26		
Coliforms, Total	< 1	1 CFU/100 i	mL		· ·				
E. coli	< 1	1 CFU/100 i	nL						
Blank (B0J2341-B	LK4)		Prepared:	2020-10-26	, Analyzed	l: 2020-10	0-26		
Coliforms, Total	< 1	1 CFU/100 i	nL		-				
E. coli	< 1	1 CFU/100 i	mL						
Total Metals, Batch			Prenared	2020-10-29	Analyzed	I: 2020 <u>-</u> 11	1_01		
Blank (B0J2731-B	< 0.0050	0.0050 mg/L	i iopaicu.		, , widiy260	. 2020-11			
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 Cadmium, total	< 0.0500 < 0.000010	0.0500 mg/L 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							

0.00040 mg/L

< 0.00040



Case	REPORTED TO PROJECT	Western Water Associates Ltd 17-049-02				WORK REPOR	ORDER TED		2 17:12		
Prepared: 2020-10-29, Analyzed: 2020-11-01 Prepared: 2020-11-01 Prepared	Analyte	Result	RL Units	-		% REC		% RPD	Qualifier		
Inch. plaid	Total Metals, Batca	h B0J2731, Continued									
Lead, total	Blank (B0J2731-B	LK1), Continued		Prepared	: 2020-10-2	9, Analyze	d: 2020-1	11-01			
Magnanese, total	Iron, total	< 0.010	0.010 mg/L								
Manganes, total	Lead, total	< 0.00020	0.00020 mg/L								
Molybadnum, total											
Nicket, Istalf											
Polassium, Inbal	•										
Selemin.total											
Sedium, total < 0.010											
Storatum, total < 0.0010 0.0010 mg/L											
Prepared: 2020-10-29, Analyzed: 2020-11-01	Uranium, total	< 0.000020	0.000020 mg/L								
Auminum, total	Zinc, total	< 0.0040	0.0040 mg/L								
Aurimony, total	LCS (B0J2731-BS	1)		Prepared	: 2020-10-2	9, Analyze	d: 2020-1	11-01			
Antimony, total 0,0205 0,00020 mg/L 0,0200 133 80-120 Arsenic, total 0,0207 0,00050 mg/L 0,0200 133 80-120 Barium, total 0,0207 0,00050 mg/L 0,0200 133 80-120 Barium, total 0,0203 0,0500 mg/L 0,0200 199 80-120 Boron, total 0,0204 0,000010 mg/L 0,0199 133 80-120 Calcium, total 1,93 0,200 mg/L 2,022 96 80-120 Calcium, total 1,93 0,200 mg/L 2,022 96 80-120 Calcium, total 0,0204 0,00050 mg/L 0,0199 105 80-120 Cobalt, total 0,0216 0,00050 mg/L 0,0199 105 80-120 Cobalt, total 0,0216 0,00040 mg/L 0,0199 105 80-120 Cobalt, total 0,0216 0,00040 mg/L 0,00090 mg/L 0,0199 105 80-120 Cobalt, total 0,0216 0,00040 mg/L 0,00090 mg/L 0,00		•	0.0050 mg/L	0.0199		88	80-120				
Barlum, total											
Boron, total	Arsenic, total	0.0207	0.00050 mg/L	0.0200		103	80-120				
Cadmim, total 0.0204 0.000010 mg/L 0.0199 103 80-120 Calcium, total 1.33 2.02 mg/L 2.02 96 80-120 Chromium, total 0.0288 0.00050 mg/L 0.0198 105 80-120 Cobati, total 0.0210 0.00010 mg/L 0.0199 105 80-120 Cobati, 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 Manybedenum, 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 Nickel, total 0.0213 0.00040 mg/L 0.0200 107 80-120 Selenium, total 0.20 0.10 mg/L 0.0200 107 80-120	Barium, total	0.0203	0.0050 mg/L	0.0198		103	80-120				
Calcium, total 1.93	Boron, total	< 0.0500		0.0200		109	80-120				
Chromium, total											
Cobalt, Ital 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, Iotal 2.02 0.010 mg/L 2.02 100 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 Molydenum, total 0.0199 0.00010 mg/L 0.0200 99 80-120 Mickel, total 0.0213 0.00040 mg/L 0.0200 107 80-120 Vickel, total 0.0213 0.00040 mg/L 2.02 99 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 0.0207 0.00050 mg/L 0.0200 102 80-120 Uranium, total 0.0208 0.000000 mg/L 0.0200 104 8											
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 Mickel, total 0.0213 0.00040 mg/L 0.0200 107 80-120 Potassium, total 2.02 0.10 mg/L 0.0200 107 80-120 Sclenium, total 0.0207 0.00050 mg/L 0.0200 104 80-120 Scolum, total 0.0204 0.0101 mg/L 0.0200 104 80-120 Uranium, total 0.0204 0.0101 mg/L 0.0200 104 80-120 Uranium, total 0.0218 0.00000 mg/L 0.0200 104 80-	· · · · · · · · · · · · · · · · · · ·										
Iron, total 2.02	· · · · · · · · · · · · · · · · · · ·										
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 Molybdenum, total 0.0290 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 Selenium, total 0.024 0.010 mg/L 0.0200 104 80-120 Strontium, total 0.024 0.0010 mg/L 0.0200 102 80-120 Uranium, total 0.028 0.00020 mg/L 0.0200 104 80-120 Reference (BOJ2731-SRM1) Prepared: 2020-10-29, Analyzed: 2020-11-01 Analyzed: 2020-10-29, Analyzed: 2020-11-01 Analyzed: 2020-10-29, Analyzed: 2020-11-01 <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			-								
Magnesium, total 2.11 0.010 mg/L 2.02 104 80-120 Manganese, total 0.0200 0.00000 mg/L 0.0199 101 80-120 Mickel, 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 0.0207 0.00050 mg/L 0.0200 104 80-120 Selenium, total 0.0207 0.00050 mg/L 0.0200 104 80-120 Scodium, total 2.04 0.10 mg/L 2.02 101 80-120 Strontium, total 0.0204 0.0010 mg/L 0.0200 104 80-120 Uranium, total 0.0208 0.000020 mg/L 0.0200 104 80-120 Reference (B0J2731-SRM1) Prepared: 2020-10-29, Analyzed: 2020-11-01 2020-11-01 10 80-120 Auminum, total 0.0514 0.0000 mg/L 0.299 98 70-130 Arsenic, total 0.127 0.00050 mg/L 0.0517	·										
Manganese, total 0.0200 0.00020 mg/L 0.0199 101 80-120 Molybdenum, total 0.0199 0.00010 mg/L 0.0200 197 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 0.00550 mg/L 0.0200 104 80-120 Selenium, total 0.0204 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 0.00020 mg/L 0.0200 104 80-120 Variant, total 0.0218 0.0040 mg/L 0.0200 104 80-120 Reference (BUJ2731-SRM1) Prepared: 2020-10-29, Analyzed: 2020-11-01 Prepared: 2020-11-29, Analyzed: 2020-11-01 Antimony, total 0.054 0.0050 mg/L 0.0299 98 70-130 Arsenic, total <											
Nickel, total 0.0213 0.00040 mg/L 0.0200 107 80-120 Potassium, total 0.00 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 104 80-120 Reference (B0J2731-SRM1) Prepared: 2020-10-29, Analyzed: 2020-11-01 Reference (B0J2731-SRM1) Prepared: 2020-10-29, Analyzed: 2020-11-01 Reference (B0J2731-SRM1) Prepared: 2020-10-29, Analyzed: 2020-11-01 Reference (B0J2731-SRM1) Prepared: 2020-10-29, Analyzed: 2020-11-01 Reference (B0J2731-SRM1) Prepared: 2020-10-29, Analyzed: 2020-11-01 Reference (B0J2731-SRM1) <td col<="" td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td>	<td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>										
Potassium, total 2.00	Molybdenum, total	0.0199	0.00010 mg/L	0.0200		99	80-120				
Selenium, total	Nickel, total	0.0213	0.00040 mg/L	0.0200		107	80-120				
Sodium, total 2.04 0.10 mg/L 2.02 101 80-120											
Strontium, total											
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 All minum, total 0.294 0.0050 mg/L 0.299 98 70-130 Antimony, total 0.0514 0.0000 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 Cadium, total 0.0510 0.00010 mg/L 0.5033 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											
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 Barium, total 4.06 0.0500 mg/L 0.801 101 70-130 Cadmium, total 4.06 0.0500 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 Chromium, total 0.266 0.00050 mg/L 0.250 106 70-130 Cobalt, total 0.527 0.00040 mg/L 0.487 108 70-130 Iron, tota	· · · · · · · · · · · · · · · · · · ·										
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 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>											
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 0.0510 0.00010 mg/L 4.11 99 70-130 Cadmium, total 0.0510 0.00010 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 0.299 0.00020 mg/L 0.278 108 70-130 Manganese, total 0.113 0.00020 mg/L 0.111 101 70-130 Molybdenum, total 0.263 0.00040 mg/L 0.196 104 70-130 Molybdenum, total 0.263 0.00040 mg/L 0.248 106 70-130 Selenium, total 0.124 0.00050 mg/L 0.248 106 70-130 Selenium, total 0.124 0.00050 mg/L 0.120 104 70-130 Selenium, total 0.124 0.00050 mg/L 0.120 104 70-130 Selenium, total 0.124 0.00050 mg/L 0.120 104 70-130	·		0.0040 Hig/L								
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 <td>•</td> <td>· · · · · · · · · · · · · · · · · · ·</td> <td></td> <td></td> <td>: 2020-10-2</td> <td></td> <td></td> <td>11-01</td> <td></td>	•	· · · · · · · · · · · · · · · · · · ·			: 2020-10-2			11-01			
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 Chromium, total 0.0414 0.00010 mg/L 0.0384 108 70-130 Cobalt, total 0.527 0.00040 mg/L 0.487 108 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 Molydenum, total 0.203 0.00010 mg/L 0.196 104	· · · · · · · · · · · · · · · · · · ·										
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 0.263 0.00040 mg/L 0.248 106 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 0.263 0.00010 mg/L 0.196 104 70-130 Nickel, total 0.263 0.00040 mg/L 0.248 106 70-130	· · · · · · · · · · · · · · · · · · ·										
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Sodium total 9.33 0.10 mg/l 8.71 10.7 70-13.0											
Page 10 of	Sodium, total	9.33	0.10 mg/L	8.71		107	70-130				

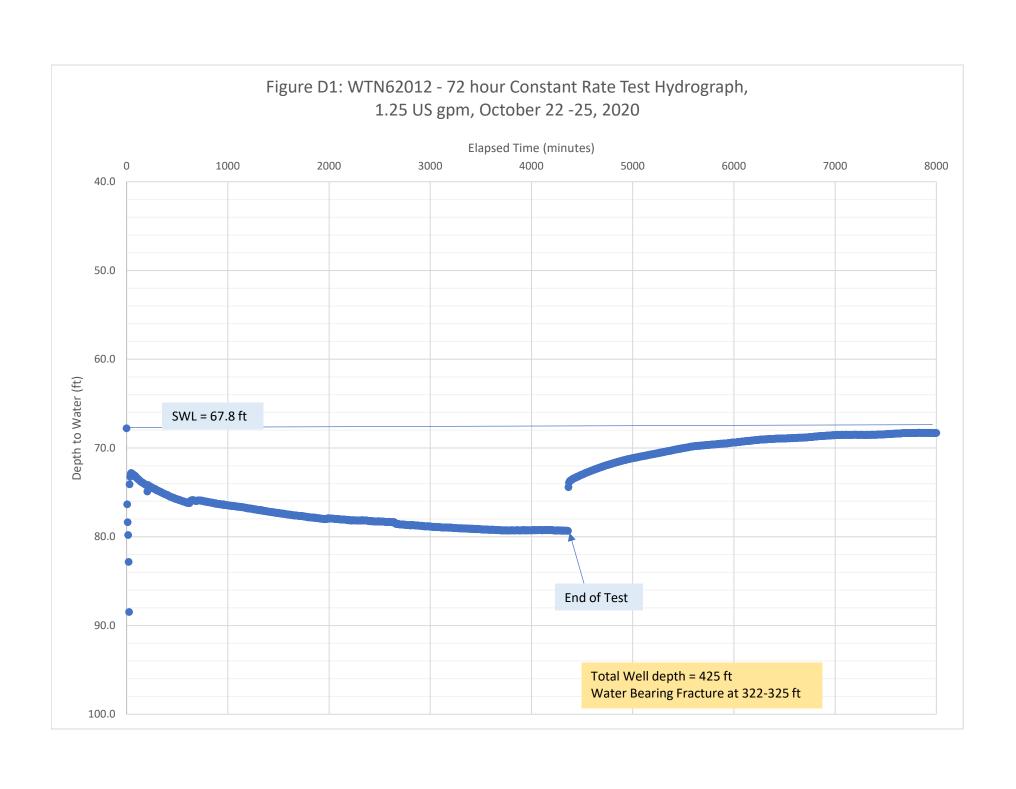


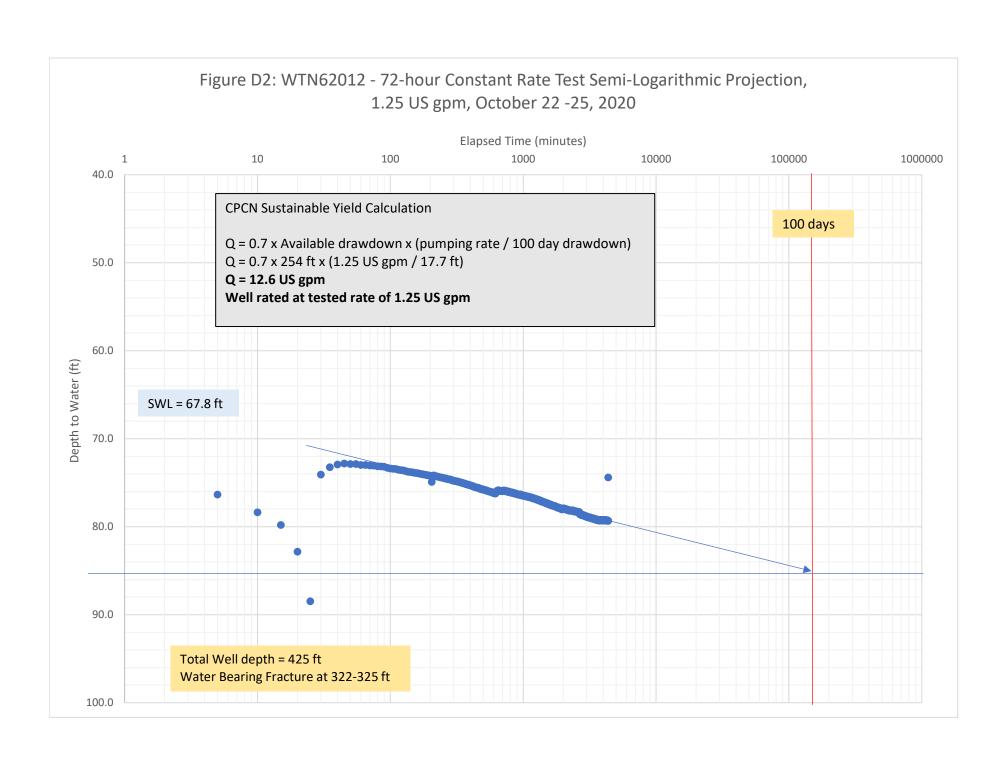
Western Water Ass 17-049-02	ociates Ltd								17:12
	Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
h B0J2731, Continued									
31-SRM1), Continued			Prepared	: 2020-10-2	9, Analyze	d: 2020-1	1-01		
	0.407	0.0010 mg/L	0.393		104	70-130			
	0.0356	0.000020 mg/L	0.0344		103	70-130			
	2.62	0.0040 mg/L	2.50		105	70-130			
h <i>B0J2876</i> LK1)			Prepared	: 2020-10-3	30, Analyze	ed: 2020-1	0-30		
	< 0.000010	0.000010 mg/L							
LK2)			Prepared	: 2020-10-3	30, Analyze	d: 2020-1	0-30		
	< 0.000010	0.000010 mg/L							
76-SRM1)			Prepared	: 2020-10-3	30, Analyze	ed: 2020-1	0-30		
	0.00571	0.000010 mg/L	0.00581		98	70-130			
76-SRM2)			Prepared	: 2020-10-3	30, Analyze	ed: 2020-1	0-30		
	0.00523	0.000010 mg/L	0.00581		90	70-130			
	17-049-02 th B0J2731, Continued 31-SRM1), Continued th B0J2876 LK1) LK2)	Result th B0J2731, Continued 31-SRM1), Continued 0.407 0.0356 2.62 th B0J2876 LK1) < 0.000010 LK2) < 0.000010 76-SRM1) 0.00571	Result RL Units ### B0J2731, Continued 31-SRM1), Continued 0.407	Result RL Units Spike Level	Result RL Units Spike Source Level Result	Result RL Units Spike Source Result REC	Result RL Units Spike Source Result REC Level Result REC Level Result REC Level Result REC Limit Result Result	Result RL Units Spike Source Result REC Limit RPD	Result RL Units Spike Source Result REC Limit N RPD RPD Limit Result Result

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







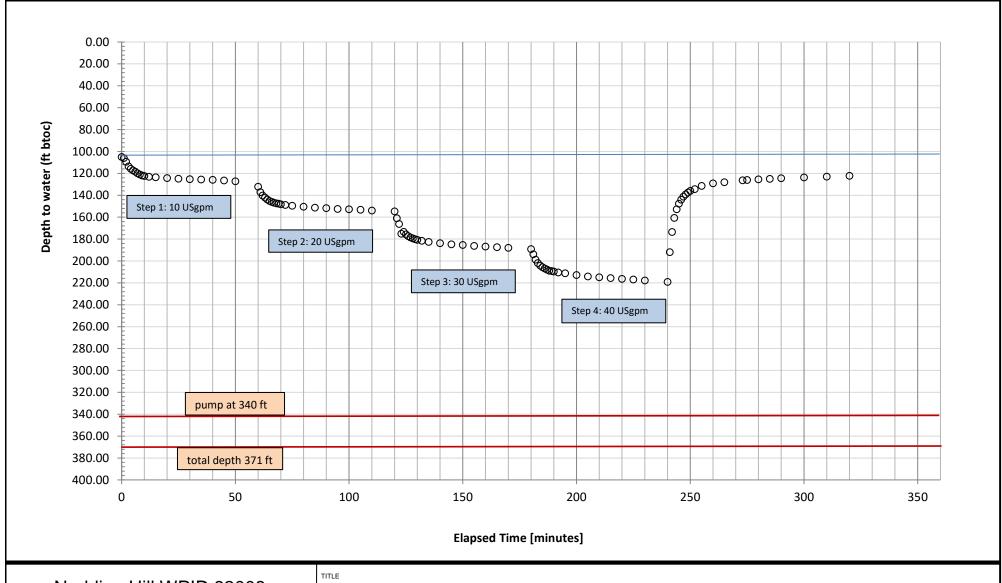
Appendix E Pumping Test Graphs and Water Quality Results: WPID 62008

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



Project N	o: 17-049-02, Table E1 - No	dding Hill WPID62008 S	tep Test, Od	ctober 28, 20	20.							
Well depth =	= 371 ft	Well diameter = 6 in		Measurement m	nethod =	Flow Meter		Pump Depth = 340 l	lt .			
			Time since								Specific	Capacity
	Comments	Real Time	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)		
	STATIC	16:30 Oct. 28, 2020	0	31.98	104.94		0.00	0.00	0.00	0.00	L/s/m	Usgpm/ft
			1	32.29	105.95 109.37	0.31	1.01	0.31	0.63	10	2.05	9.90
			3	33.33 34.61	113.55	1.04	4.43 8.61	1.35 2.62	0.63	10 10	0.47	2.26 1.16
			4	35.29	115.80 117.34	0.69 0.47	10.86 12.40	3.31 3.78	0.63	10	0.19	0.92
			5 6	35.76 36.09	118.42	0.33	13.48	4.11	0.63 0.63	10 10	0.17 0.15	0.81
			7 8	36.55 36.88	119.91 121.00	0.45	14.97 16.06	4.56 4.89	0.63	10 10	0.14	0.67
			9	37.15	121.88	0.27	16.94	5.16	0.63	10	0.12	0.59
			10 12	37.32 37.53	122.45 123.13	0.17 0.21	17.51 18.19	5.34 5.54	0.63	10 10	0.12	0.57 0.55
			15	37.66	123.55	0.13	18.61	5.67	0.63	10	0.11	0.54
			20 25	37.90 38.04	124.35 124.81	0.24	19.41 19.87	5.92 6.06	0.63	10 10	0.11	0.52 0.50
			30 35	38.19 38.29	125.31 125.64	0.15 0.10	20.37 20.70	6.21 6.31	0.63 0.63	10 10	0.10 0.10	0.49 0.48
			40	38.38	125.91	0.08	20.97	6.39	0.63	10	0.10	0.48
			45 50	38.56 38.75	126.50 127.15	0.18	21.56 22.21	6.57 6.77	0.63	10 10	0.10	0.46 0.45
			60	40.30	132.24	1.55	27.30	8.32	0.63	10	0.08	0.37
			61 62	41.82 42.75	137.20 140.26	1.51 0.93	32.26 35.32	9.83 10.77	1.26 1.26	20 20	0.13	0.62 0.57
			63	43.34	142.19	0.59 0.52	37.25	11.35	1.26	20	0.11	0.54
			64 65	43.86 44.25	143.90 145.17	0.39	38.96 40.23	11.87 12.26	1.26 1.26	20 20	0.11 0.10	0.51 0.50
			66 67	44.53 44.75	146.11 146.83	0.29 0.22	41.17 41.89	12.55 12.77	1.26 1.26	20 20	0.10 0.10	0.49 0.48
			68	44.93	147.40	0.17	42.46	12.94	1.26	20	0.10	0.47
			69 70	45.02 45.19	147.70 148.26	0.09	42.76 43.32	13.03 13.20	1.26 1.26	20 20	0.10 0.10	0.47
			72	45.38	148.90	0.20	43.96	13.40	1.26	20	0.09	0.45
			75 80	45.60 45.86	149.62 150.47	0.22	44.68 45.53	13.62 13.88	1.26 1.26	20 20	0.09	0.45 0.44
			85	46.12	151.32	0.26	46.38	14.14	1.26	20	0.09	0.43
			90 95	46.26 46.46	151.79 152.45	0.14	46.85 47.51	14.28 14.48	1.26 1.26	20 20	0.09	0.43
			100 105	46.56 46.72	152.76 153.28	0.09 0.16	47.82 48.34	14.57 14.73	1.26 1.26	20 20	0.09	0.42
			110	46.92	153.93	0.20	48.99	14.93	1.26	20	0.08	0.41
			120 121	47.16 49.05	154.73 160.93	0.24 1.89	49.79 55.99	15.18 17.06	1.26 1.89	20 30	0.08	0.40
			122	50.66	166.22	1.61	61.28	18.68	1.89	30	0.10	0.49
			123 124	53.37 52.85	175.10 173.40	2.71 -0.52	70.16 68.46	21.38 20.87	1.89	30 30	0.09	0.43
			125	53.58	175.80	0.73	70.86	21.60	1.89	30	0.09	0.42
			126 127	54.03 54.40	177.27 178.47	0.45 0.37	72.33 73.53	22.05 22.41	1.89	30 30	0.09	0.41 0.41
			128 129	54.67	179.37	0.27 0.22	74.43	22.69 22.91	1.89 1.89	30 30	0.08	0.40
			130	54.89 55.07	180.10 180.70	0.18	75.16 75.76	23.09	1.89	30	0.08	0.40
			132 135	55.36 55.67	181.65 182.65	0.29	76.71 77.71	23.38 23.68	1.89	30 30	0.08	0.39
			140	56.03	183.83	0.36	78.89	24.04	1.89	30	0.08	0.38
			145 150	56.31 56.51	184.74 185.40	0.28	79.80 80.46	24.32 24.52	1.89	30 30	0.08	0.38
			155 160	56.77 56.95	186.25 186.84	0.26 0.18	81.31 81.90	24.78 24.96	1.89 1.89	30 30	0.08	0.37 0.37
			165	57.13	187.45	0.18	82.51	25.15	1.89	30	0.08	0.36
			170 180	57.31 57.66	188.03 189.18	0.18 0.35	83.09 84.24	25.32 25.68	1.89	30 30	0.07	0.36
			181	59.07	193.82	1.41	88.88	27.09	1.89	30	0.07	0.34
			182 183	60.62 61.55	198.90 201.96	1.55 0.93	93.96 97.02	28.64 29.57	1.89	30 30	0.07	0.32
			184	62.23	204.17	0.67	99.23	30.24	1.89	30	0.06	0.30
			185 186	62.71 63.07	205.76 206.93	0.48	100.82 101.99	30.73 31.09	2.52 2.52	40 40	0.08	0.40
			187 188	63.35 63.66	207.86 208.86	0.28 0.30	102.91 103.91	31.37 31.67	2.52 2.52	40 40	0.08	0.39 0.38
			189	63.77	209.24	0.12	104.29	31.79	2.52	40	0.08	0.38
			190 192	63.90 64.15	209.64 210.47	0.12 0.25	104.69 105.52	31.91 32.16	2.52 2.52	40 40	0.08	0.38
			195	64.41	211.32	0.26	106.37	32.42	2.52	40	0.08	0.38
			200 205	64.87 65.27	212.83 214.16	0.46 0.41	107.88 109.21	32.88 33.29	2.52 2.52	40 40	0.08	0.37
			210 215	65.52 65.73	214.97 215.67	0.25 0.21	110.02 110.72	33.54 33.75	2.52 2.52	40 40	0.08	0.36 0.36
				00.73					2.52	40	0.07	0.36
			220	65.93	216.31	0.20	111.36	33.94				
			220 225	65.93 66.12 66.40	216.93	0.19	111.98	34.13	2.52	40	0.07	0.36
			220 225 230 240	66.12 66.40 66.78	216.93 217.85 219.10	0.19 0.28 0.38	111.98 112.90 114.15	34.13 34.41 34.79	2.52 2.52 2.52	40 40 40		
		recovery	220 225 230	66.12 66.40	216.93 217.85	0.19 0.28	111.98 112.90	34.13 34.41	2.52 2.52	40 40	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243	66.12 66.40 66.78 58.52 52.90 48.98	216.93 217.85 219.10 192.00 173.58 160.70	0.19 0.28 0.38 -8.26 -5.61 -3.93	111.98 112.90 114.15 87.06 68.64 55.76	34.13 34.41 34.79 26.53 20.92 16.99	2.52 2.52 2.52 0.00 0.00 0.00	40 40 40 0 0	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243 244 245	66.12 66.40 66.78 58.52 52.90 48.98 46.55 45.01	216.93 217.85 219.10 192.00 173.58 160.70 152.72 147.69	0.19 0.28 0.38 -8.26 -5.61 -3.93 -2.43 -1.53	111.98 112.90 114.15 87.06 68.64 55.76 47.78 42.75	34.13 34.41 34.79 26.53 20.92 16.99 14.56 13.03	2.52 2.52 2.52 0.00 0.00 0.00 0.00 0.00	40 40 40 0 0 0 0 0	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243 244	66.12 66.40 66.78 58.52 52.90 48.98 46.55	216.93 217.85 219.10 192.00 173.58 160.70 152.72	0.19 0.28 0.38 -8.26 -5.61 -3.93 -2.43	111.98 112.90 114.15 87.06 68.64 55.76 47.78	34.13 34.41 34.79 26.53 20.92 16.99 14.56 13.03	2.52 2.52 2.52 0.00 0.00 0.00 0.00	40 40 40 0 0 0	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243 244 245 246 247 248	66.12 66.40 66.78 58.52 52.90 48.98 46.55 45.01 43.89 43.04 42.41	216.93 217.85 219.10 192.00 173.58 160.70 152.72 147.69 144.00 141.21 139.16	0.19 0.28 0.38 -8.26 -5.61 -3.93 -2.43 -1.53 -1.12 -0.85 -0.62	111.98 112.90 114.15 87.06 68.64 55.76 47.78 42.75 39.06 36.27 34.22	34.13 34.41 34.79 26.53 20.92 16.99 14.56 13.03 11.90 11.05	2.52 2.52 2.52 0.00 0.00 0.00 0.00 0.00	40 40 40 0 0 0 0 0 0 0 0 0	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243 244 245 246 247 248 249 250	66.12 66.40 66.78 58.52 52.90 48.98 46.55 45.01 43.89 43.04 42.41 41.87 41.46	216.93 217.85 219.10 192.00 173.58 160.70 152.72 147.69 144.00 141.21 139.16 137.39 136.02	0.19 0.28 0.38 -8.26 -5.61 -3.93 -2.43 -1.15 -1.12 -0.85 -0.62 -0.54 -0.42	111.98 112.90 114.15 87.06 68.64 55.76 47.78 42.75 39.06 36.27 34.22 32.45 31.08	34.13 34.41 34.79 26.53 20.92 16.99 14.56 13.03 11.90 11.05 10.43 9.89 9.47	2.52 2.52 2.52 0.00 0.00 0.00 0.00 0.00	40 40 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243 244 245 246 247 248 249	66.12 66.40 66.78 58.52 52.90 48.98 46.55 45.01 43.89 43.04 42.41 41.87	216.93 217.85 219.10 192.00 173.58 160.70 152.72 147.69 144.00 141.21 139.16	0.19 0.28 0.38 -8.26 -5.61 -3.93 -2.43 -1.53 -1.12 -0.85 -0.62 -0.54	111.98 112.90 114.15 87.06 68.64 55.76 47.78 42.75 39.06 36.27 34.22 32.45	34.13 34.41 34.79 26.53 20.92 16.99 14.56 13.03 11.90 11.05 10.43 9.89	2.52 2.52 2.52 0.00 0.00 0.00 0.00 0.00	40 40 0 0 0 0 0 0 0 0 0 0	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243 244 245 246 247 248 249 250 252 255 260	66.12 66.40 66.78 58.52 52.90 48.98 46.55 45.01 43.89 43.04 42.41 41.87 41.46 40.96 40.08 39.35	216.93 217.85 219.10 192.00 173.58 160.70 152.72 147.69 144.00 141.21 139.16 137.39 136.02 134.40 131.50	0.19 0.28 0.38 -8.26 -5.61 -3.93 -2.43 -1.53 -1.12 -0.85 -0.62 -0.54 -0.42 -0.49 -0.88 -0.73	111.98 112.90 114.15 87.06 68.64 55.76 42.75 39.06 36.27 34.22 32.45 31.08 29.46 24.16	34.13 34.41 34.79 26.53 20.92 16.99 14.56 11.05 11.05 10.43 9.89 9.47 8.98 8.98	2.52 2.52 0.00 0.00 0.00 0.00 0.00 0.00	40 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243 244 245 246 247 248 250 250 252 260 265 273	66.12 66.40 66.78 58.52 52.90 48.98 46.55 45.01 43.89 43.04 42.41 41.87 41.46 40.96 40.08 39.35 39.04 38.49	216.93 217.85 219.10 192.00 152.72 147.69 144.00 141.21 139.16 137.39 136.02 134.40 131.50 128.08	0.19 0.28 0.38 -8.26 -5.61 -3.93 -2.43 -1.53 -1.12 -0.85 -0.62 -0.54 -0.42 -0.49 -0.88 -0.73 -0.31 -0.54	111.98 112.90 114.15 87.06 68.64 42.75 39.06 36.27 34.22 32.45 31.08 29.46 26.56 24.16 23.14 21.36	34.13 34.41 34.79 26.53 26.53 16.99 14.56 13.03 11.90 11.05 10.43 9.89 9.47 8.98 8.10 7.36 7.05	2.52 2.52 2.52 0.00 0.00 0.00 0.00 0.00	40 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243 244 245 246 247 248 249 250 252 255 260 263 273 275 280	66.12 66.40 66.78 58.52 52.90 48.98 46.55 45.01 43.89 43.04 42.41 41.87 41.46 40.96 40.08 39.35 39.04 38.43 38.43	216.93 217.85 219.10 192.00 173.58 160.70 152.72 147.69 144.00 137.39 136.02 134.40 137.39 129.10 128.08 128.08 126.30 126.10	0.19 0.28 0.38 -8.26 -5.61 -3.93 -2.43 -1.53 -1.152 -0.85 -0.62 -0.54 -0.42 -0.49 -0.88 -0.73 -0.54 -0.06 -0.18	111.98 112.90 114.15 87.06 68.64 45.76 47.78 42.75 39.06 39.06 32.45 32.	34.13 34.41 34.79 26.53 20.92 16.99 14.56 13.03 11.90 11.05 10.43 9.89 8.10 7.36 6.51 6.45	2.52 2.52 2.52 0.00 0.00 0.00 0.00 0.00	40 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243 244 245 246 247 248 249 250 252 255 260 265 273 275	66.12 66.40 66.78 58.52 52.90 48.98 46.55 45.01 43.89 43.04 42.41 41.87 41.46 40.08 39.35 39.04 38.49 38.49	216.93 217.85 219.10 192.00 173.58 160.70 152.72 147.69 144.00 141.21 139.16 137.39 136.02 134.40 131.50 128.08 128.08	0.19 0.28 0.38 -8.26 -5.61 -3.93 -2.43 -1.12 -0.85 -0.62 -0.54 -0.42 -0.49 -0.88 -0.73 -0.31 -0.54 -0.06	111.98 112.90 114.15 87.06 68.64 55.76 47.78 42.75 39.06 36.27 34.22 32.45 31.08 29.46 26.56 24.16 23.14 21.36	34.13 34.41 34.79 26.53 20.92 16.99 14.56 13.03 11.90 10.43 9.89 9.47 8.98 9.47 7.36 7.05 6.51	2.52 2.52 2.52 0.00 0.00 0.00 0.00 0.00	40 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.07 0.07	0.36 0.35
		recovery	220 225 230 240 241 242 243 244 245 246 249 250 252 252 265 260 265 273 275 280	66.12 66.40 66.78 58.52 52.90 46.55 43.04 42.41 41.87 41.46 40.06 40.08 39.04 38.43 38.26 38.10	216.93 217.85 219.10 192.00 173.58 160.70 144.00 144.00 144.00 144.00 133.916 137.39 136.02 134.40 131.50 128.08 128.08 128.00 128.10 128.08	0.19 0.28 0.38 -8.26 -5.61 -3.93 -1.53 -1.12 -0.85 -0.62 -0.54 -0.42 -0.49 -0.88 -0.73 -0.31 -0.54 -0.06 -0.18 -0.06	111.98 112.90 114.15 87.06 68.64 47.78 42.75 39.06 36.27 34.22 32.45 31.08 29.46 26.56 24.16 23.14 21.16 20.58	34.13 34.41 34.79 26.53 20.92 16.99 14.56 13.03 11.90 11.05 10.43 9.89 9.47 8.98 8.10 7.36 6.51 6.51 6.45 6.27 6.11	2.52 2.52 2.52 0.00 0.00 0.00 0.00 0.00	40 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.07 0.07	0.36 0.35





Nodding Hill WPID 62008

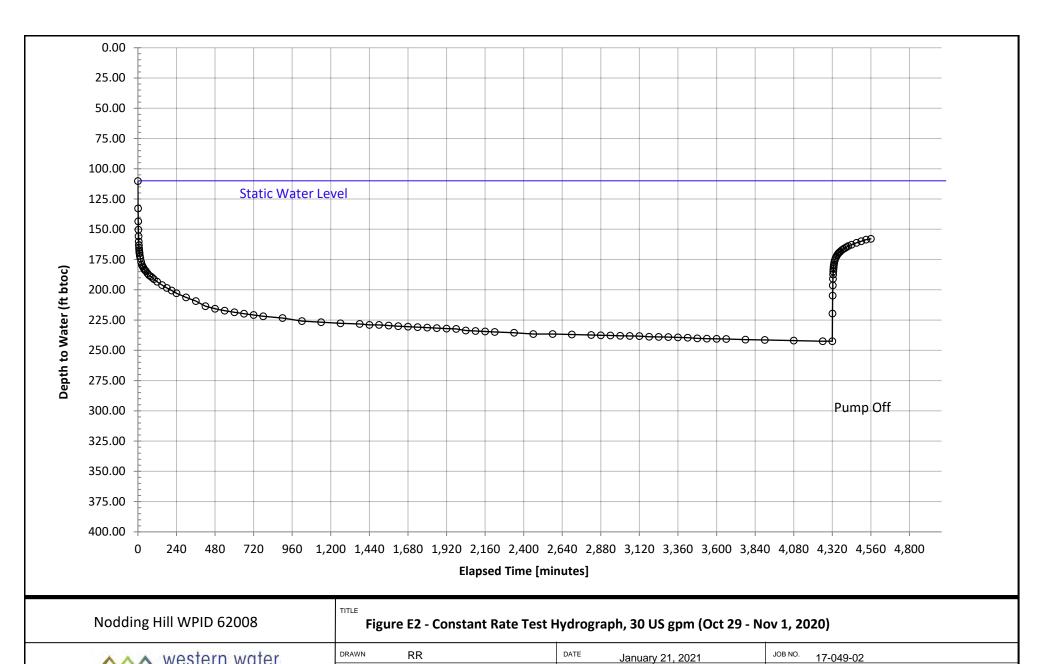
Figure E1 - Variable Rate Step Test Hydrograph



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 - N	lodding Hill WPID62008, Consta	nt Rate Tes	st, October 2	9 - Novembe	r 1, 2020						
Well depth = 371 ft	Well diameter = 6 in		Measurement n	nethod =	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
STATIC	2020-10-29 9:00 AM	0	33.59 40.47	110.21 132.78	 6.88	0.00 22.57	0.00 6.88	0.0	0 30	L/s/m 0.27	Usgpm/ft 1.33
		2	43.72 45.82	143.43 150.32	3.25 2.10	33.22 40.11	10.12 12.22	1.9	30	0.19 0.15	0.90 0.75
		4 5	47.50 48.82	155.84 160.19	1.68 1.33	45.63 49.98	13.91 15.23	1.9	30 30	0.14 0.12	0.66 0.60
		6 7	49.73 50.44	163.15 165.51	0.90 0.72	52.94 55.30	16.14 16.85	1.9 1.9	30 30	0.12 0.11	0.57 0.54
		8 9	50.99 51.44	167.3 168.79	0.55 0.45	57.09 58.58	17.40 17.85	1.9 1.9	30 30	0.11 0.11	0.53 0.51
		10	51.81 52.39	169.99 171.89	0.37 0.58	59.78 61.68	18.22 18.80	1.9	30	0.10 0.10	0.50 0.49
		15 20	53.00 53.91	173.88 176.89	0.61 0.92	63.67 66.68	19.41 20.32	1.9	30	0.10 0.09	0.47 0.45
		25 30	54.68 55.09	179.4 180.74	0.77	69.19 70.53	21.09 21.50	1.9	30	0.09	0.43 0.43
		35 40	55.46 55.81	181.98 183.12	0.38 0.35	71.77 72.91	21.87 22.22	1.9	30 30	0.09	0.42
		45 50	56.05 56.28	183.91 184.67	0.24	73.70 74.46	22.46 22.69	1.9 1.9	30 30	0.08	0.41
		60 70	56.81 57.31	186.39 188.04	0.52 0.50	76.18 77.83	23.22	1.9	30 30	0.08	0.39
		80 90	57.60 57.93	189 190.08	0.29 0.33	78.79 79.87	24.01 24.34	1.9	30 30	0.08	0.38 0.38
		100 120	58.30 58.91	191.27 193.3	0.36 0.62	81.06 83.09	24.71 25.32	1.9 1.9	30 30	0.08 0.07	0.37 0.36
		150 180	59.75 60.50	196.05 198.51	0.84 0.75	85.84 88.30	26.16 26.91	1.9	30 30	0.07 0.07	0.35 0.34
		210 240	61.16 61.81	200.65	0.65 0.66	90.44 92.59	27.56 28.22	1.9	30 30	0.07	0.33 0.32
		300 360	62.87 63.82	206.27	1.06 0.95	96.06 99.18	29.28	1.9	30 30	0.06 0.06	0.31 0.30
		420 480	65.09 65.71	213.55 215.61	1.27 0.63	103.33 105.39	31.50 32.12	1.9	30 30	0.06 0.06	0.29 0.28
		540 600	66.21 66.64	217.25 218.63	0.50 0.42	107.03 108.41	32.62 33.04	1.9	30 30	0.06 0.06	0.28 0.28
		660 720	66.97 67.32	219.72 220.89	0.33	109.50 110.67	33.38 33.73	1.9	30 30	0.06 0.06	0.27 0.27
		780 900	67.62 68.07	221.85 223.35	0.29 0.46	111.63 113.13	34.03 34.48	1.9 1.9	30 30	0.06 0.05	0.27 0.27
Recovery		1020 1140	68.82 69.11	225.80 226.76	0.75 0.29	115.58 116.54	35.23 35.52	1.9 1.9	30 30	0.05 0.05	0.26 0.26
		1260 1380	69.40 69.57	227.70 228.27	0.29 0.17	117.48 118.05	35.81 35.98	1.9 1.9	30 30	0.05 0.05	0.26 0.25
		1440 1500	69.82 69.82	229.07 229.07	0.24 0.00	118.85 118.85	36.23 36.23	1.9 1.9	30 30	0.05 0.05	0.25 0.25
		1560 1620	69.95 70.11	229.51 230.04	0.13 0.16	119.29 119.82	36.36 36.52	1.9 1.9	30 30	0.05 0.05	0.25 0.25
		1680 1740	70.23 70.35	230.43 230.82	0.12 0.40	120.21 120.60	36.64 36.76	1.9 1.9	30 30	0.05 0.05	0.25 0.25
		1800 1860	70.47 70.60	231.21 231.65	0.12 0.13	120.99 121.43	36.88 37.01	1.9 1.9	30 30	0.05 0.05	0.25 0.25
		1920 1980	70.71 70.80	232.00 232.28	0.11 0.09	121.78 122.06	37.12 37.21	1.9 1.9	30 30	0.05 0.05	0.25 0.25
		2040	71.21 71.32	233.65	0.42	123.43 123.78	37.62 37.73	1.9	30	0.05	0.24
		2160 2220 2340	71.45 71.56 71.79	234.43 234.80 235.53	0.13 0.11 0.22	124.21 124.58 125.31	37.86 37.97 38.20	1.9 1.9 1.9	30 30 30	0.05 0.05	0.24 0.24 0.24
		2460 2580	71.79 72.11 72.11	236.60 236.60	0.22 0.33 0.00	126.38 126.38	38.52 38.52 38.52	1.9 1.9 1.9	30 30	0.05 0.05 0.05	0.24 0.24 0.24
		2700 2820	72.22 72.36	236.96 237.40	0.11 0.13	126.74 127.18	38.63 38.77	1.9 1.9	30	0.05 0.05	0.24 0.24 0.24
		2880 2940	72.42 72.46	237.60	0.06	127.38 127.53	38.83 38.87	1.9	30	0.05 0.05	0.24 0.24 0.24
		3000 3060	72.52 72.57	237.95 238.10	0.06 0.05	127.73 127.88	38.93 38.98	1.9	30 30	0.05 0.05	0.23 0.23
		3120 3180	72.64 72.80	238.32 238.85	0.07 0.16	128.10 128.63	39.05 39.21	1.9 1.9	30 30	0.05 0.05	0.23 0.23
		3240 3300	72.84 72.87	238.98 239.10	0.04 0.04	128.76 128.88	39.25 39.28	1.9 1.9	30 30	0.05 0.05	0.23 0.23
		3360 3420	72.94 73.02	239.30 239.58	0.06 0.09	129.08 129.36	39.34 39.43	1.9 1.9	30 30	0.05 0.05	0.23 0.23
		3480 3540	73.18 73.27	240.11 240.41	0.16 0.09	129.89 130.19	39.59 39.68	1.9 1.9	30 30	0.05 0.05	0.23 0.23
		3600 3660	73.29 73.35	240.46 240.67	0.02 0.06	130.24 130.45	39.70 39.76	1.9 1.9	30 30	0.05 0.05	0.23 0.23
		3780 3900	73.50 73.61	241.16 241.50	0.15 0.10	130.94 131.28	39.91 40.02	1.9 1.9	30 30	0.05 0.05	0.23 0.23
		4080 4260	73.74 73.90	241.95 242.45	0.14 0.15	131.73 132.23	40.15 40.30	1.9 1.9	30 30	0.05 0.05	0.23 0.23
Recovery		4320 4321	73.90 66.93	242.48	0.01 -6.98	132.26 109.37	40.31 33.34	1.9	30	0.05	0.23
		4322 4323	62.44 59.83	204.85 196.31	-4.49 -2.60	94.64 86.10	28.84				
		4324 4325	58.20 57.10	190.94 187.33	-1.64 -1.10	80.73 77.12	24.61 23.51				
		4326 4327 4328	56.34 55.75 55.29	184.84 182.90 181.40	-0.76 -0.59 -0.46	74.63 72.69 71.19	22.75 22.15 21.70				
		4328 4329 4330	55.29 54.91 54.60	181.40 180.16 179.15	-0.46 -0.38 -0.31	71.19 69.95 68.94	21.70 21.32 21.01				
		4332 4335	54.12 53.61	179.15 177.58 175.89	-0.48 -0.52	67.37 65.68	20.53				
		4340 4345	53.01 52.58	173.91 172.51	-0.60 -0.43	63.70 62.30	19.41 18.99				
		4350 4355	52.24 51.97	171.41 170.51	-0.43 -0.34 -0.27	61.20	18.65 18.38				
		4360 4365	51.73 51.51	169.71 169.01	-0.24 -0.21	59.50 58.80	18.13 17.92				
		4370 4380	51.33 50.96	168.40 167.21	-0.19 -0.36	58.19 57.00	17.74 17.37				
		4390 4400	50.67 50.42	166.25 165.44	-0.29 -0.25	56.04 55.23	17.08 16.83				
		4410 4420	50.19 49.96	164.67 163.91	-0.23 -0.23	54.46 53.70	16.60 16.37				
		4440 4470	49.60 49.14	162.73 161.23	-0.36 -0.46	52.52 51.02	16.01 15.55				
		4500 4530	48.73 48.32	159.89 158.55	-0.41 -0.41	49.68 48.34	15.14 14.73				
		4560	48.14	157.95	-0.18	47.74	14.55				





SCALE

FILE NO.

na

DWG. NO.

FIGURE NO.

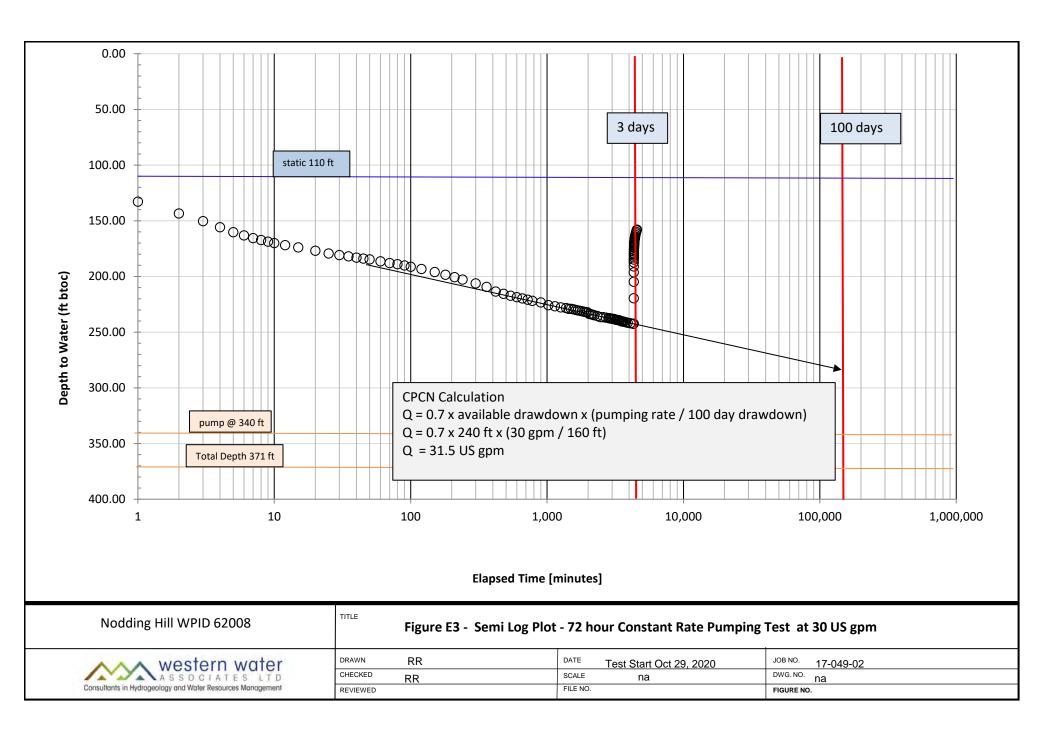
na

CHECKED

REVIEWED

Consultants in Hydrogeology and Water Resources Management

RR







2020-10-30 14:30 / 10°C

CERTIFICATE OF ANALYSIS

REPORTED TO Western Water Associates Ltd

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.

106 - 5145 26th Street Vernon, BC V1T 8G4

ATTENTION Ryan Rhodes **WORK ORDER** 20J3166

PO NUMBER

17-049-02 **REPORTED** 2020-11-09 14:19 **PROJECT**

B64009 **PROJECT INFO COC NUMBER**

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

We've Got Chemistry

opportunities to support you.

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

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

Ahead of the Curve

RECEIVED / TEMP

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

1-888-311-8846 | www.caro.ca



TEST RESULTS

REPORTED TO PROJECT	Western Water Associa 17-049-02	ates Ltd			WORK ORDER REPORTED	20J3166 2020-11-0	9 14:19
Analyte		Result	Guideline	RL	Units	Analyzed	Qualifier
62008 (20J3166-0	1) Matrix: Water Sam	pled: 2020-10-30	10:00				
Anions							
Chloride		3.19	AO ≤ 250	0.10	mg/L	2020-10-31	
Fluoride		1.40	MAC = 1.5		mg/L	2020-10-31	
Nitrate (as N)		< 0.010	MAC = 10	0.010		2020-10-31	
Nitrite (as N)		< 0.010	MAC = 1	0.010		2020-10-31	
Sulfate		275	AO ≤ 500		mg/L	2020-10-31	
Calculated Paramet	ters						
Hardness, Total (a	s CaCO3)	438	None Required	0.500	mg/L	N/A	
Langelier Index		0.9	N/A	-5.0		2020-11-09	
Solids, Total Disso	lved	705	AO ≤ 500	10.0	mg/L	N/A	
General Parameters	s						
Alkalinity, Total (as	CaCO3)	334	N/A	1.0	mg/L	2020-11-03	
	hthalein (as CaCO3)	< 1.0	N/A		mg/L	2020-11-03	
Alkalinity, Bicarbor		334	N/A		mg/L	2020-11-03	
Alkalinity, Carbona		< 1.0	N/A		mg/L	2020-11-03	
Alkalinity, Hydroxic	de (as CaCO3)	< 1.0	N/A		mg/L	2020-11-03	
Colour, True	,	< 5.0	AO ≤ 15		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	· · · · · · · · · · · · · · · · · · ·	2020-11-02	
pH		7.96	7.0-10.5		pH units	2020-11-03	HT2
Temperature, at pl	1	20.0	N/A		°C	2020-11-03	HT2
Turbidity		0.72	OG < 1	0.10	NTU	2020-10-31	
Microbiological Par	rameters						
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	ma/l	2020-11-07	
Antimony, total		< 0.0007	MAC = 0.006	0.00020		2020-11-07	
Arsenic, total		< 0.00050	MAC = 0.01	0.00050		2020-11-07	
Barium, total		0.0150	MAC = 2	0.0050		2020-11-07	
Boron, total		0.0610	MAC = 5	0.0500		2020-11-07	
Cadmium, total		< 0.00010	MAC = 0.005	0.000010		2020-11-07	
Calcium, total		76.4	None Required		mg/L	2020-11-07	
Chromium, total		< 0.00050	MAC = 0.05	0.00050		2020-11-07	
Cobalt, total		0.00035	N/A	0.00030		2020-11-07	
Copper, total		0.00254	MAC = 2	0.00010		2020-11-07	
Iron, total		0.328	AO ≤ 0.3	0.00040		2020-11-07	
Lead, total		0.00037	MAC = 0.005	0.00020		2020-11-07	
				0.00020			
Magnesium, total		60.1	None Required MAC = 0.12	0.00020		2020-11-07	
Manganese, total		0.0394		0.00020			
Mercury, total		< 0.000010	MAC = 0.001	0.000010	mg/L	2020-11-04	



TEST RESULTS

REPORTED TO Western Water Associates Ltd

PROJECT 17-049-02

WORK ORDER

20J3166

REPORTED 2020-11-09 14:19

Analyte	Result	Guideline	RL Units	Analyzed Qualifier
62008 (20J3166-01) Matrix: Wa	ater Sampled: 2020-10-30 1	0:00, 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

PROJECT 17-049-02

WORK ORDER REPORTED 20J3166

ORTED 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 Amperometr	ry 🗸	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 $\mu S/cm$ 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



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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 <u>not</u> 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.



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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	l: 2020-10-3	31, Analyze	d: 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	l: 2020-10-3	31, Analyze	d: 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	l: 2020-10-3	31, Analyze	d: 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	l: 2020-10-3	31, Analyze	d: 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	l: 2020-10-3	31, Analyze	d: 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	l: 2020-10-3	31, Analyze	d: 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			



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Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Anions, Batch B0J2	2895, Continued									
LCS (B0J2895-BS3)), Continued			Prepared	l: 2020-10-3	31, Analyze	d: 2020-1	0-31		
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-BL	K1)			Prepared	1: 2020-10-3	31, Analyze	d: 2020-1	0-31		
Colour, True		< 5.0	5.0 CU							
Blank (B0J2892-BL	K2)			Prepared	l: 2020-11-0	3, Analyze	d: 2020-1	1-03		
Colour, True		< 5.0	5.0 CU	· · · · · · · · · · · · · · · · · · ·						
LCS (B0J2892-BS1)			Prepared	l: 2020-10-3	31. Analyze	d: 2020-1	0-31		
Colour, True	/	20	5.0 CU	20.0	. 2020 10 0	102	85-115			
,	1				I. 2020 44 0			1 02		
LCS (B0J2892-BS2))	04	5.0 CU		l: 2020-11-0			1-03		
Colour, True		21	5.0 CO	20.0		103	85-115			
General Parameters	, Batch B0J2893									
Blank (B0J2893-BL	K1)			Prepared	1: 2020-10-3	31, Analyze	d: 2020-1	0-31		
Turbidity		< 0.10	0.10 NTU							
Blank (B0J2893-BL	K2)			Prepared	l: 2020-10-3	31, Analyze	d: 2020-1	0-31		
Turbidity	•	< 0.10	0.10 NTU	,		•				
LCS (B0J2893-BS1))			Prepared	l: 2020-10-3	31, Analyze	d: 2020-1	0-31		
Turbidity	,	38.7	0.10 NTU	40.0		97	90-110			
LCS (B0J2893-BS2	1			Prepared	l: 2020-10-3	31 Analyze	d: 2020-1	0-31		
Turbidity)	38.6	0.10 NTU	40.0	. 2020 10 0	96	90-110			
General Parameters	, Batch B0K0042									
Blank (B0K0042-BL	.K1)			Prepared	l: 2020-11-0	2, Analyze	d: 2020-1	1-02		
Cyanide, Total	-	< 0.0020	0.0020 mg/L							
LCS (B0K0042-BS1)			Prepared	l: 2020-11-0)2, Analyze	d: 2020-1	1-02		
Cyanide, Total	,	0.0192	0.0020 mg/L	0.0200		96	82-120			
LCS Dup (B0K0042	-BSD1)			Prepared	l: 2020-11-0)2, Analyze	d: 2020-1	1-02		
Cyanide, Total	,	0.0193	0.0020 mg/L	0.0200		96	82-120	< 1	10	
General Parameters	, Batch B0K0127									
Blank (B0K0127-BL	.K1)			Prepared	l: 2020-11-0	3, Analyze	d: 2020-1	1-03		
Alkalinity, Total (as Ca	CO3)	< 1.0	1.0 mg/L							
Alkalinity, Phenolphtha		< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate	· ,	< 1.0	1.0 mg/L							
Alkalinity, Carbonate (a Alkalinity, Hydroxide (a		< 1.0 < 1.0	1.0 mg/L 1.0 mg/L							
Conductivity (EC)	.c 54000j	< 2.0	2.0 µS/cm							
Blank (B0K0127-BL	K2)	-	1	Prepared	l: 2020-11-0	13 Analyza	d. 2020 1	1-03		
Alkalinity, Total (as Car	•	< 1.0	1.0 mg/L	Fiepaieu	i. 2020-11-0	o, Analyze	u. 2020-1	1-03		
Airaining, Total (as Cal	000)	\ 1.0	1.0 mg/L							



PROJECT	17-049-02	ssociates Ltd				WORK REPOR	ORDER TED	20J3166 2020-11-09 14:1		
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifie
General Parameter	s, Batch B0K0127, C	Continued								
Blank (B0K0127-B	LK2), Continued			Prepared	I: 2020-11-0	3, Analyze	d: 2020-1	1-03		
Alkalinity, Phenolphth	nalein (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Bicarbonate	e (as CaCO3)	< 1.0	1.0 mg/L							
Alkalinity, Carbonate	,	< 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-BS	1)			Prepared	I: 2020-11-0	3, Analyze	d: 2020-1	1-03		
Alkalinity, Total (as Ca	aCO3)	105	1.0 mg/L	100		105	80-120			
LCS (B0K0127-BS	2)			Prepared	I: 2020-11-0	3, Analyze	d: 2020-1	1-03		
Alkalinity, Total (as Ca	aCO3)	106	1.0 mg/L	100		106	80-120			
LCS (B0K0127-BS	3)			Prepared	I: 2020-11-0	3, Analyze	d: 2020-1	1-03		
Conductivity (EC)	•	1420	2.0 µS/cm	1410		100	95-104			
LCS (B0K0127-BS	4)			Prepared	I: 2020-11-0	3, Analyze	d: 2020-1	1-03		
Conductivity (EC)	•	1400	2.0 µS/cm	1410		99	95-104			
Reference (B0K01	27-SRM1)			Prepared	I: 2020-11-0	3, Analyze	d: 2020-1	1-03		
pH	•	6.99	0.10 pH units	7.01		100	98-102			
•				_	. 0000 44 0	A l	4. 2020 4	1 02		
Poforonco (POKO1	27 CDM2\			Dranarac						
pH	27-SRM2) rameters, Batch B0J	6.99 7 2823	0.10 pH units	Prepared 7.01	I: 2020-11-0	100	98-102	1-03		
Reference (B0K01 pH Microbiological Par Blank (B0J2823-B Coliforms, Total	rameters, Batch B0J	<1	1 CFU/100	7.01 Prepared	I: 2020-11-0	100	98-102			
pH <i>Microbiological Pa</i> Blank (B0J2823-B	rameters, Batch B0J	72823	·	7.01 Prepared		100	98-102			
pH Microbiological Pal Blank (B0J2823-B) Coliforms, Total	rameters, Batch B0J LK1)	<1	1 CFU/100	7.01 Prepared mL mL		100 80, Analyze	98-102 d: 2020-	0-30		
pH Microbiological Pa Blank (B0J2823-B) Coliforms, Total E. coli	rameters, Batch B0J LK1)	<pre><1 < 1 < 1 < 1</pre>	1 CFU/100 1 CFU/100 1 CFU/100	7.01 Prepared mL mL Prepared mL Prepared	l: 2020-10-3	100 80, Analyze	98-102 d: 2020-	0-30		
pH Microbiological Par Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B)	rameters, Batch B0J LK1)	<1 <1 <1	1 CFU/100	7.01 Prepared mL mL Prepared mL Prepared	l: 2020-10-3	100 80, Analyze	98-102 d: 2020-	0-30		
pH Microbiological Par Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B) Coliforms, Total	rameters, Batch B0J LK1) LK2)	<pre><1 < 1 < 1 < 1</pre>	1 CFU/100 1 CFU/100 1 CFU/100	7.01 Prepared mL Prepared o mL Prepared o mL o mL	l: 2020-10-3	100 30, Analyze 30, Analyze	98-102 d: 2020-1	0-30		
pH Microbiological Par Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B) Coliforms, Total E. coli	rameters, Batch B0J LK1) LK2)	<pre><1 <1 <1 <1</pre>	1 CFU/100 1 CFU/100 1 CFU/100	7.01 Prepared) mL Prepared) mL Prepared) mL Prepared	l: 2020-10-3 l: 2020-10-3	100 30, Analyze 30, Analyze	98-102 d: 2020-1	0-30		
pH Microbiological Para Blank (B0J2823-B Coliforms, Total E. coli Blank (B0J2823-B Coliforms, Total E. coli E. coli Blank (B0J2823-B	rameters, Batch B0J LK1) LK2)	<1 <1 <1 <1 <1 <1 <1	1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100	Prepared O mL Prepared O mL Prepared O mL Prepared O mL O mL	l: 2020-10-3 l: 2020-10-3	100 30, Analyze 30, Analyze	98-102 d: 2020-1	0-30		
pH Microbiological Pa Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B) Coliforms, Total E. coli Coliforms, Total E. coli	rameters, Batch B0J LK1) LK2) LK3)	<pre><1 <1 <</pre>	1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100	Prepared O mL Prepared O mL O mL Prepared O mL O mL O mL O mL O mL	l: 2020-10-3 l: 2020-10-3 l: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1	0-30		
pH Microbiological Pa Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B)	rameters, Batch B0J LK1) LK2) LK3)	<pre><1 <1 <1 <1 </pre> <1 <1 <1 <1	1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100	Prepared O mL Prepared O mL Prepared O mL O mL Prepared O mL Prepared O mL Prepared	l: 2020-10-3 l: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1	0-30		
pH Microbiological Pa Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B) Coliforms, Total E. coli Coliforms, Total E. coli	rameters, Batch B0J LK1) LK2) LK3)	<pre><1 <1 <</pre>	1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100	Prepared O mL O mL O mL	l: 2020-10-3 l: 2020-10-3 l: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1	0-30		
pH Microbiological Para Blank (B0J2823-B) Coliforms, Total E. coli	rameters, Batch B0J LK1) LK2) LK3)	<pre><1</pre>	1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100	Prepared O mL Prepared O mL Prepared O mL Prepared O mL O mL Prepared O mL O mL O mL O mL	l: 2020-10-3 l: 2020-10-3 l: 2020-10-3	100 80, Analyze 80, Analyze 80, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1	10-30 10-30 10-30		
pH Microbiological Para Blank (B0J2823-B) Coliforms, Total E. coli	rameters, Batch B0J LK1) LK2) LK3)	<pre><1</pre>	1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100 1 CFU/100	Prepared O mL Prepared O mL Prepared O mL Prepared O mL O mL Prepared O mL Prepared O mL Prepared	I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3	100 80, Analyze 80, Analyze 80, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1	10-30 10-30 10-30		
pH Microbiological Pal Blank (B0J2823-B Coliforms, Total E. coli Blank (B0J2823-B	rameters, Batch B0J LK1) LK2) LK3)	<pre><1 <1 <</pre>	1 CFU/100	Prepared O mL O mL	I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3	100 80, Analyze 80, Analyze 80, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1	10-30 10-30 10-30		
pH Microbiological Pa. Blank (B0J2823-B Coliforms, Total E. coli Coliforms, Total Coliforms, Total Coliforms, Total	rameters, Batch B0J LK1) LK2) LK3) LK4)	<pre><1 <1 <</pre>	1 CFU/100	Prepared O mL Prepared O mL Prepared O mL Prepared O mL O mL Prepared O mL O mL Prepared O mL O mL O mL O mL O mL	I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1 d: 2020-1	0-30 0-30 0-30		
pH Microbiological Parallel Blank (B0J2823-B) Coliforms, Total E. coli Coliforms, Total E. coli	rameters, Batch B0J LK1) LK2) LK3) LK4)	<pre><1 <1 <</pre>	1 CFU/100	Prepared O mL Prepared	I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1 d: 2020-1	0-30 0-30 0-30		
pH Microbiological Parallel Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B)	rameters, Batch B0J LK1) LK2) LK3) LK4)	<pre><1 <1 <</pre>	1 CFU/100	Prepared O mL Prepared	I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1 d: 2020-1	0-30 0-30 0-30		
pH Microbiological Para Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B) Coliforms, Total Coliforms, Total	rameters, Batch B0J LK1) LK2) LK3) LK4) LK5)	<pre><1 <1 <</pre>	1 CFU/100	Prepared O mL O mL Prepared O mL O mL O mL O mL O mL	I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1 d: 2020-1	10-30 10-30 10-30 10-30		
pH Microbiological Pa. Blank (B0J2823-B) Coliforms, Total E. coli	rameters, Batch B0J LK1) LK2) LK3) LK4) LK5)	<pre><1 <1 <</pre>	1 CFU/100	Prepared O mL Prepared	I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1 d: 2020-1	10-30 10-30 10-30 10-30		
pH Microbiological Para Blank (B0J2823-B) Coliforms, Total E. coli Blank (B0J2823-B)	rameters, Batch B0J LK1) LK2) LK3) LK4) LK5)	<pre><1 <1 <</pre>	1 CFU/100	Prepared O mL O mL Prepared O mL O mL Prepared	I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1 d: 2020-1	10-30 10-30 10-30 10-30		
pH Microbiological Pa Blank (B0J2823-B Coliforms, Total E. coli Blank (B0J2823-B Coliforms, Total E. coli	rameters, Batch B0J LK1) LK2) LK3) LK4) LK5)	<pre><1 <1 <</pre>	1 CFU/100	Prepared O mL Prepared O mL O mL O mL Prepared O mL	I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1 d: 2020-1 d: 2020-1	10-30 10-30 10-30 10-30		
pH Microbiological Para Blank (B0J2823-B) Coliforms, Total E. coli	rameters, Batch B0J LK1) LK2) LK3) LK4) LK5)	<pre><1 <1 <</pre>	1 CFU/100	Prepared O mL O mL Prepared	I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3 I: 2020-10-3	100 30, Analyze 30, Analyze 30, Analyze 30, Analyze 30, Analyze 30, Analyze	98-102 d: 2020-1 d: 2020-1 d: 2020-1 d: 2020-1 d: 2020-1	10-30 10-30 10-30 10-30		



REPORTED TO PROJECT	17-049-02					WORK REPOR	20J3166 2020-11-09 14:19			
Analyte	Result	RL I	Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batc	h B0K0216									
Blank (B0K0216-B	BLK1)			Prepared:	2020-11-0	3, Analyze	d: 2020-1	1-07		
Aluminum, total	< 0.0050	0.0050 r	mg/L	-						
Antimony, total	< 0.00020	0.00020 r								
Arsenic, total	< 0.00050	0.00050 r	ng/L							
Barium, total	< 0.0050	0.0050 r								
Boron, total	< 0.0500	0.0500 r								
Cadmium, total	< 0.000010	0.000010 r								
Calcium, total	< 0.20	0.20 r								
Chromium, total Cobalt, total	< 0.00050 < 0.00010	0.00050 r 0.00010 r								
Copper, total	< 0.00010	0.00010 1								
Iron, total	< 0.010	0.010 r								
Lead, total	< 0.00020	0.00020 r								
Magnesium, total	< 0.010	0.010 r								
Manganese, total	< 0.00020	0.00020 r								
Molybdenum, total	< 0.00010	0.00010 r	ng/L							
Nickel, total	< 0.00040	0.00040 r								
Potassium, total	< 0.10	0.10 r	mg/L							
Selenium, total	< 0.00050	0.00050 r								
Sodium, total	< 0.10	0.10 r								
Strontium, total	< 0.0010	0.0010 r								
Uranium, total	< 0.000020	0.000020 r								
Zinc, total	< 0.0040	0.0040 r	ng/L							
LCS (B0K0216-BS	31)			Prepared:	2020-11-0	3, Analyze	d: 2020-1	1-07		
Aluminum, total	0.0238	0.0050 r	mg/L	0.0199		119	80-120			
Antimony, total	0.0208	0.00020 r		0.0200		104	80-120			
Arsenic, total	0.0206	0.00050 1	mg/L	0.0200		103	80-120			
Barium, total	0.0205	0.0050 r	mg/L	0.0198		104	80-120			
Boron, total	< 0.0500	0.0500 ı	mg/L	0.0200		107	80-120			
Cadmium, total	0.0207	0.000010 r		0.0199		104	80-120			
Calcium, total	1.93	0.20 1		2.02		96	80-120			
Chromium, total	0.0204	0.00050 r		0.0198		103	80-120			
Cobalt, total	0.0209	0.00010 1		0.0199		105	80-120			
Copper, total	0.0204	0.00040 1		0.0200		102	80-120			
Iron, total Lead, total	2.12 0.0209	1 010.0 1 02000.0		2.02 0.0199		105 105	80-120 80-120			
Magnesium, total	2.06	1 010.0		2.02		103	80-120			
Manganese, total	0.0202	0.0000 1		0.0199		102	80-120			
Molybdenum, total	0.0203	0.00010 1		0.0200		102	80-120			
Nickel, total	0.0210	0.00040 r		0.0200		105	80-120			
Potassium, total	1.93	0.10 r		2.02		96	80-120			
Selenium, total	0.0216	0.00050 1	mg/L	0.0200		108	80-120			
Sodium, total	1.94	0.10 r	mg/L	2.02		96	80-120			
Strontium, total	0.0204	0.0010 r	mg/L	0.0200		102	80-120			
Uranium, total	0.0209	0.000020 1		0.0200		104	80-120			
Zinc, total	0.0217	0.0040 r	mg/L	0.0200		108	80-120			
Reference (B0K02	16-SRM1)			Prepared:	2020-11-0	3, Analyze	d: 2020-1	1-07		
Aluminum, total	0.322	0.0050 r		0.299		108	70-130			
Antimony, total	0.0528	0.00020 r		0.0517		102	70-130			
Arsenic, total	0.127	0.00050 r		0.119		107	70-130			
Barium, total	0.819	0.0050 r		0.801		102	70-130			
Boron, total	4.20	0.0500 r		4.11		102	70-130			
Cadmium, total	0.0527	0.000010 r		0.0503		105	70-130			
Calcium, total	10.3	0.20 r		10.7		96	70-130			
Chromium, total Cobalt, total	0.259 0.0418	0.00050 r 0.00010 r		0.250 0.0384		104 109	70-130 70-130			
Copail, Iolai	0.0418	0.00010 1	119/L	0.0004		108	10-100		Pa	age 9 of 1



Mercury, total

APPENDIX 2: QUALITY CONTROL RESULTS

0.00564

0.000010 mg/L

0.00581

70-130

REPORTED TO PROJECT	Western Water Asso 17-049-02	ciates Ltd				WORK REPOR	ORDER TED	20J3 2020	166 -11-09	14:19
Analyte		Result	RL Units	Spike Level	Source Result	% REC	REC Limit	% RPD	RPD Limit	Qualifier
Total Metals, Batch	h B0K0216, Continued									
Reference (B0K02	16-SRM1), Continued			Prepared	: 2020-11-0	3, Analyze	d: 2020-1	1-07		
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				Prepared	: 2020-11-0	4, Analyze	d: 2020-1	1-04		
Mercury, total	·	< 0.000010	0.000010 mg/L							
Reference (B0K02	74-SRM1)			Prepared	: 2020-11-0	4, Analyze	d: 2020-1	1-04		

Appendix F Nodding Hill Well Logs

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





Well Construction Report

Stamp company name/address/ phone/fax/email here, if desired. ☐ Well Closure Report Ministry of ☐ Well Closure Report Environment ☐ Well Alteration Report

Ministry	Well	ID Plate N	lumber:	62	01	2
Ministry	Well	Tag Numb	er:			
☐ Confin	matic	on/alternat	ive spec	s atta	chad	

Red let	tering in	dicates mi	nimum ma	andatory info	rmation. Se	e reverse fo	or notes & d	efinitions o	of abbreviati	Original ons.	well construction repo	ort attached	
Owner n	ame: /	7601	g Hil	1 Deve	beman	nt L	12			2			
Well Loc	ation (se	e note 2):	Address:	Street no.	Street	Tow	VERNO	n			Postal Code	VIB 357	
(or) Legal	descrip	tion: Lot	F	Plan	D.L.		Block	Sec	Town		RgLand D	ALLES AND ADDRESS OF THE ADDRESS OF	
OF PID:	510-	9913	52 and [escription of	well location	on (attach s	ketch, if ne	c.):	Twp		HgLand D	istrict	
NAD 83:	Zone:	nad 83	3	UTM Eastin	1190	13.24) 44 m	1.	Alburda (ana				
(see note			and	UTM North	ing: 50°	19.680	N - m		ngitude:	note 4):			
Method o	of drilling	air ro	tary 🗆 du	al rotary 🗆	cable tool	mud rotan	/ □ auger	☐ driving	□ jetting 1	other	(specify):		
Orientati	on of we	II: N vertic	al h	rizontal Gro	ound elevation	on: 225:	ft (asl)	Method (se	e note 5):	SPS			
Class of	well (see	note 6):	Walti	suppl.	4		Sub-	class of we	II: Don	resti	(.		
Water sup	oply wells	s: indicate ir	ntended wa	ter use: 🖼 priv	ate domestic	☐ water supp	ly system □ ir	rrigation 🗆 c	ommercial or i	ndustrial	other (specify):		
Litholog	jic desc			8-13) or clo	sure desc	ription (se	e notes 14	and 15)					
1			Material	Bedrock		Co	olour	Hardness	Water Co	ntent	Observati		
			ly/silt ed oarse avel	Sitstone/shale Sandstone Conglomerate Limestone	79	7 5 0		110	-		(e.g. other geologic (e.g. boulders), est.		
		0 0	ne-m ned-c	e/sha ine nerat	ne urficie	Red Orange Brown	ey	- ±	Dry Moist Wet High Production	ulatio	flow (USgpm), or cl	osure details)	
From	To	a = -	nd, fi	tston ndsto nglon nesto	salt Icanic rstalli rer Su	d ange	Light Grey Blue Green Dark Grey	Very Hard Hard Dense/Stiff	ist ist	Lost circulati Not Available			
ft (bgl)	ft (bgl)	20 S E 6	Sa Sa	Sa Si	Cy Cy	Bro Tan	Lig Blu Gre Dar		Mo Wet	Los			
0	4	0000		00000	0000	0000	00000	0000	0000	00		•	
4.	16	0000	2000	00000		0000	0000	0000	0000	00	Very weath	5/12	
16	23	0.000		0000		0000	0000	0		00			
145	145	0000	2000	00000		0000				000			
322	325	0000	2000	00000		0000	8000	0000			311. / 2010		
325	400	0000	0000	00000		0000		0000	00000	000	314 6PM		
400	425	0000	2000	00000		0000		0000		00	01 41.4		
700	14)	0000	0000	00000		0000	00000	0000		00	The second of th	raight	
		0000	0000	00000	0000	0000	0000	0000		00	sulphidis	5_1	
0			noi - pe	1217-121	181-18					0.0	THE TO BELLI	2	
Casing		DI-					Screen	22381140					
ft (bgl)	ft (bgl)	Dia in	E STATE OF THE STA	aterial/Open Hol e note 17)	e Wall Thickness	Drive Shoe	ft (bgl)	To ft (bgl)	Dia in		Type (see note 18)	Slot Size	
		, ,	+	,	in	,							
0	16%	2 6	3/2	31	0219	V			(() a(i) (a(i) (a(i) (a(i) (a(i))) (a a				
(01)-1								,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		Trini meserine	eleteteteteseden jaman da anesa och an		
								1 	//	trarlei artetei arte			
Curtoss	ant Ton	5-	+	-,	D		Later to a second		F-0		=0		
		DEN			Depth: 14	-		Screen	□ Open bo		☐ Uncased hole		
		tion: 🗷 Pour	rea 🗆 Pu	mped in	ckness:	Zin			escope		astic	: A.	
Backfill: T		Other (spe	cifu):		Depth:						otted Perforated p		
Diameter	2.2			Thickness:	250	in		Action of France					
		-		ated: From: 40		-	Screen bottom: Bail Plug Plate Other (specify):ir						
	- 1-57		3,	***************************************		1-87		size of ma					
Davida	and hou									_			
Develop	1000	Curaina	□ lotting	□ Bums	oing □ Ba	iling		oth drilled:	tion data:	Einich	ned well depth: 42	ft (bgl	
Other (sp	-	Surging	☐ Jetting		ration:	hrs		k up: 2			n to bedrock:		
Notes:	ecity).			Total du	iration	1115	SWL:		ft (btoc)		nated well yield: 3	11	
	ld estin	nated by:					Artesian				om, or Artesian press		
	_	Air lifting		Other ((specify):			vell cap: V	Entsl	1000	disinfected: ₩ Yes □		
Rate:	711	,		Duration:		hrs				_	casing		
SWL befo	TABLE TO STATE OF			Pumping wate	r level:	ft (btoc)		sure info			,		
Obviou	s water	quality cl	haracteri	stics:			Reason	for closure:					
Fresh	□Sa	alty 🔊	Clear [☐ Cloudy	Sediment	☐ Gas	Method o	of closure: [□ Poured □	Pumpe	d		
Colour/or	dour:			Wat	ter sample c	collected:	Sealant	material:		Ba	ackfill material:		
		nt clearly):		11 11			Details o	f closure (se	ee note 16):				
Name (fi	rst, last)	(see note 1	19): 6	Iter H	ow(.								
				81001									
Consulta	nt (if appl	icable; name	and compar	ny):			211						
						-			YY/MM/DD				
DECLARAT	ON: Well co	onstruction, well	Il alteration or	well closure, as the and the Ground W	a case may be, hater Protection	nas been done Regulation.	Started:	2020	06 26	C	ompleted: 2020	0102	
Signatur	e of	11	M				Commer	nts:					
Driller R	esponsil	ole n	70	report describes t	ha warks and to	rdrngpologie -	editions at the time	o of construct	n alteration	name in a	Customer conv		
or closure, a	s the case	may be. Well y	ield, well perfo	report describes to ermance and water dition of the works,	quality are not	guaranteed as th	ney are influenced	d by a number of	of factors,	canary: pink:	Customer copy Driller copy Ministry copy She	et of	

Ы	Well	Consti	ruction	Repo

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

Ministry Well to Plate Number: 3554/ Ministry Well Tag Number: 1098/2
Manistry Well Tag Number: 10.9892
Confirmation/alternative specs. sittached
Cutobral well construction report attached

BRITIST COLUMBI Re Ba Rea so	A	inistry of wironmen	_	ilosure Report Literation Report		company nan axle-malt hen				nfirmation/alternative ap pinal well construction re	
Red lette	ering ind	icates mini	mum mandat	ory information.			Ş	ee reverse	for n	otes & definitions of	abbreviations
Owner no	mə:	phart	Gall	owa				-			
						Town_	Vari	100		Prov. /3C Posts	Code VIB 3
Woll Loca	tion: Ada	iresa: Stree	ano. 760	Street nerr	McL	enrun	RÀ		Toe	Prov. <u>BC</u> Poste m <u>Usanon</u> ·	
(or) Local	descripti	OS: Let	Dian	n i		Director.	e.	Ties		Do Lord Dietel	ы
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(ලියන සොරා ව) SONO: 11	4£_D2 (and Outsides	rohing: 450° 19	. 945 A	⊻m ⊻m	⊕	Longian (c	:	~% <u>-30 [7</u>	<u> 30.7°</u>
Method of	රාම්පාල:	Batr rotary	iood ektres 🔲 v	must rotary as	nger 🗆 dn	ing □ jetting		voting 🗀	other (specify):	
Orientatio	ନ ଫା ଓଲ୍ଲା	S vertical	☐ horizontal	Ground elevation:	2275	ft (ani)	Metho	d (see note	4¥ /	6P5	
Class of a	නට (හො අ	1000 B): <u>U</u>	10 90 5	s sply s	np-class	of words:	₩ <u>₹\$</u> 1	14		trital other (specily):_	
Water supp	y wells: Ind	icate intende	d water use: 🔀 p	rivete domestic 🔲 wa	ter supply e	estem 🗌 imba	icn □ c	ommercial o	indus	trial other (specilly):_	
				or closure des					oring		
From (R (bgf)	n (bgl)	Relativo Hardness	Cotour	Vaterial Description (U List in order of de	ee recommo creasino em	ended borns on cumt. If annibed	noverse.	Estimated (USgpr		Observations (e.g., transitions) well sorted, silly wash	
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	23	m	Brown	Coraus		11			2	. cassed o	10
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12.	115	14	Blacke	uhits					_		
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114	143	_/î_	Rug 12								
143	165	W	white		ston &			130	5P14	١.	<u>.</u> .
165	200	M	Bhck	reason uch	ł - <u></u>						
Casing	details		•	er Wall		Screen o	details				
From	To 1		sing Material / C	pen Hole Thickness		From	То	Dia i		Type (see note 18)	S1:01 St21
# (bgi)	R (bgl)		7.1	tn	Shoe	ft (bgil)	ft (bgl)	ln .			
0	49	6 :	57881		 						
-					 			 			-
		A. d.		Depth: 24	,		Г	70	•	Uncased hote	
			<u>Princed '</u>		/:R th	Screen type					
Backfill: Ty		:Ly Poureu	□ rumpeo	Depth:					***	DPlastic ☐ Otheir(sp	ecify):
_		Other (specia	Mt			S creen oper	nting: 🗆 (Continuous	etet (☐ Stotted ☐ Perforat	ed pipo
Diameter:	L	in		Thickness: 250	in	Scroen bottom: Ball Plug Plate Other (specify):					
From: 2/3	aft (bgl) To			omc <u> 16:0</u> 0 (bgl) To: <u>7</u>	(CG) (Cg)	Filter pack: From:ft To;ft Thickness: Typo and size of material:					
		20									
Develop	-					Final we					90A AA
<u> </u>		-	ing D.Pumpin	- •	1 .	Total depth Final atick u	. "		_n h	Finished well depth:	
Notes:	феску:_			Total duration:	<u> </u> hrs		0			Estimated well yield:	
	ald neth	nated by				Anesian Ro	×		USgp	ım, or Artesian pressure	-,
			∙ admod ☐ Other	(specify):		Type of wet	сар: <u>/</u> /	14/18	لے		cted: 🗆 Yes 🕜
Rate:	<u>.</u>	•	Sopm Durado	· · · · · · · · · · · · · · · · · · ·	hrs	Where well ID plate is attached: To easter a					
SWL befor	e test_2	<u></u>	oc) Pumping v	reter level:	_R (bloc)	Well closure information:					
			characte <u>ri</u> s			Reason for o Mothod of d		Donesod [۳۱۵۲	erod	 -
L'Al Fresh	∐ 8aliy	[□] Clear L	JCloudy ∐ S	ediment 🗆 Gas						Bockfill materielt	
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				rell closure, as the case The Water Act and the T	Ground	CONTRACTOR IN	·				
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PLEASE N editeration of number of	UTE: The li r closure, a actore, Incl	mormation rec s the case ma uting natural v	orded in Orls well y be. Well yield, v radability, human	report describes the war well performance and wa activities and condition	ncs and hydro iter quality ar of the works.	rgeologic conditi o not guarantee which may char	ons of the 1 as they a 1 pa over th	time of const we influenced no.	netion 1 by a	china Customer copy china Customer copy princ ministry copy	Structd

Agua Source Drilling Ltd

☐ Well Closure Report

Stamp company namara/dress/

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 Utinor Prov. BC Postal Code VIB 357
Well Location: Address: Street no. 76.01 Street name Mc.)	FANON Rd TOWN USKNON
(er) Legal description: Lot Plan D.L. (er) PID: D I U - 99 + 35 Jano Description of well location (attach ske	Block Sec. Twp. Rg. Land District
	*1
NAD 83; Zone: 14 5 5 and UTM Easting: 1/9° 13. 246 (see note 2) UTM Northing: 50° 19, 838	Latitude (see note 3): 50° 197 50, 28" Longitude: 119° 13′ 14, 76"
Method of drilling: ☑ air rotary ☐ cable too! ☐ mud rotary ☐ auger ☐ drivi	
Orientation of well: vertical horizontal Ground elevation: 2.3/2	ft (asl) Method (see note 4): 675
Class of well (see note 5): Lucts: Supply Sub-class o	well: Dout 157,
Water supply wells: indicate intended water use: 🔽 private domestic 🗀 water supply sys	
Lithologic description (see notes 7-14) or closure description From 1 To Relative Colour Material Description (Use recommer flat (bgl) Hardness List in order of decreasing amo	ded terms on reverse. Estimated Flow Observations (e.g., fractured, weathered,
0 4 5 Black 5111.	
4 78 m Brown Gravel 511	au
78 80 m Purply Brdrock	
80 92 m whitz.	
92 140 m Grish	
140 185 11 Black + white	26 pm Fractured
185 718 H Green + white marble	30 GPm
218 220 5 Blue Auhite Quarte	+ clay
Casing details From To Dia Casing Material / Open Hole Thickness Drive in Shoe C 80 6 5751	Screen details From To Dia Type (see note 18) Stot Size ft (bgt) ft (bgt) in
A 1 1	
Surface seal: Type: $\frac{1}{2} \frac{5}{5} \frac{1}{12} \frac$	Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole Screen type: ☐ Telescope ☐ Pipe size
Backfill: Type: Depth: ft	Screen material: Stainless steel Plastic Other (specify):
Liner: ☑ PVC ☐ Other (specify):	Screen opening: Continuous slot Slotted Perforated pipe
Diameter: 4 in Thickness: 250 in	Screen bottom: Bail Plug Plate Other (specify): Filter pack: From: ft To: ft Thickness: in
From: Z D ft (bgl) To: Z D ft (bgl) Perforated: From: / D ft (bgl) To: Z C ft (bgl)	Type and size of material:
Developed by:	Final well completion data:
☐ Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing	Total depth drilled: 220 ft Finished well depth: 220 ft (bgl)
Other (specify): Total duration: 7, hrs	Final stick up: 1.7 . in Depth to bedrock: 7.8 ft (bgl) SWL: 3.9 ft (bloc) Estimated well yield: 3.0 . USgpm
Notes:	Artesian flow: USgpm, or Artesian pressure: ft
Well yield estimated by: ☐ Pumping ☐ Air lifting ☐ Bailing ☐ Other (specify):	Type of well cap: Was ld 5cl. Capp. Well disinfected: ☐ Yes ☑ No
Rate: 30 USgpm Duration: 72 hrs	Where well ID plate is attached: To Casing.
SWL before test: 3 / ft (btoc) Pumping water level: ft (btoc)	Well closure information: Reason for closure:
Obvious water quality characteristics: ☑ Fresh ☐ Sally ☑ Clear ☐ Cloudy ☐ Sediment ☐ Gas	Method of closure: Poured Pumped
Colour/odour: Water sample collected:	Sealant material: Backfill material:
Well driller (print clearly): Name (first, last) (see note 19):	Details of closure (see note 17):
Registration no. (see note 20): C50 21001	Date of work (YYYY/MM/DD):
Consultant (if applicable; name and company):	Started: 2014 04 15 Completed: 2014 04 17
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	Comments:
PLEASE NOTE: The information recorded in this well report describes the works and hydro alteration or closure, as the case may be. Well yield, well performance and water quality are number of factors, including natural variability, human activities and condition of the works,	geologic conditions at the time of construction, including a construction, and guaranteed as they are influenced by a canany: Driller copy link: Ministry copy Winistry copy

BRITISH COLUMBIA
WINNER
Tar Bas Place on Lord

☑ Well Construction Report

c ☐ Well Closure Report

Ministry Well ID Plate Number: 38543
Ministry Well Tag Number: 09880

Confirmation/etternative spacs. attached

COLUMNIA Em	nistry or vironment	☐ Well A		np company nameraddre ne/fax/e-mail here, if desi		ginal well construction report of	
Red lettering indic	ates minimu	m mandate	ory information.	s	ee reverse for r	totes & definitions of abbr	eviations.
Comer namo:K	Robset	Gal	lowery		<u></u>		
Mailing address:					LM	Prov. <u>(3) (</u> Postal Cod	o <u>VIC 35</u> 7
Well Location: Addr			Street name_///\c	Learn Rd	Tox	M Usrnon	
@Logal desemption					c Twp	Rg Land District	
@ PID: <u>016 9</u>	9 1 352 (and) Descript	lon of wall location (attack	skotch, Wnoc.):	, , ,		
NAD 00: 7 41	1 00	1554 F	11.		Latherda (aca a	000 a): 50 79 743	- 32. V
NAD 83: Zone: 1/4 (see note 2)	14 212 (mg	OTEL EXS	thng: <u>119° 13 . 1 9</u> thlng: <u>50° 19 。 73</u>	<u>~~</u>	Longitudo: (1900 m Longitudo:	119°13'10.86	100
Method of drilling: (Bairnotary [cable tool	□ mudirotary □ aucar □	<u>,</u>	weiting □ other	(specify):	
						6P5.	
			pphy Sub-cles				
Water supply wells: indic	zate intended wa	ater use: 🔾 p	rivate domestic 🗌 weter supp	y øystem □lmigation □o	ommercial or Indus	strital other (spectly):	
			or closure descripti				
From To	Relative		noterial Description (Use recor	nmended terms on reverse.	Water-bearing Estimated Flow	Observations (e.g., fractured	, weathered, ;
fit(bgl) fit(bgl)	Hardness		List in order of decreasing	emount, if applicable)	(USgpm)	well sorted, etity wash), clo	sure details
0 3	5 1	Sicon	5,14		· •		
3 13			hitz Brd	ruc K		!	
13 15		red			-	Fuctored	
15 16		Blacks	6.14		 		
16 17.	ha l	rad	14. T.	- ,		Freetund	
			11.		<u> </u>	IMC CV) &	
17. 66		Stockd	uhi19			6 1 7	
60 66		V4c			7	Trastural	
66 130		Bak de	h 48	····			
130 134		Black			14,25	Fractural	
134 180	<u> 1</u> → [3 bet	duhita				
					Ì		
Casing details				Screen details			
	Dta Casing	Material / O	Well pan Hota i Thickness i Drive	From To	ı Dtaı	Typo (see note 18)	Stot Stze
R (bgf) R (bgf)	in '	-	in Shoe	R (bgl) R (bgl)	in		L
0 18	6 52	351	150 V				
l				ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا ا 			1
- 							
	<u> </u>						
Surface seel: Type:(Benton	+5	Depths 15	ntake:□Screen [Open bottom	Uncased hole	
Method of installation:			Phickness:	n Screen type: 🗆 Tele			
Backfill: Type:			Depth:	R Screen materiat:	Stainless steel (Pleastic Other (specify)	<u></u>
Unter: PVC C	Other (specify):_			· -		Slotted Perforated pk	
Dlameter:	m		,			Plate Other (specify):	
From:ft (bgf) To:	ft(bg/)P	enforated: Fr	om:ft(bgl) To:ft(b				ln
S1				. —			
Developed by:	_	_	_	Final well com	·	i; Finished well depth: <i>191</i> 0	^ a~-v
☑ Air lifting ☐ Sungi	ng 🗌 Jetting	☐ Pumping	G □ Belling	Total depth driked:/ Final stick up:/ ≶		Depth to bedrock 3	
			Total duration: 66 h	SWL: 49 >		Estimated well yield: 9.	
Notes:				Artesian Rowc		pm, or Artestan pressure:	
Well yield estin		Поп		Type of well cap: 1	م لمهارا ور	6.12 Well disinfected:	□Yes □ No
LiPumping LiAkrit Rate: 9	Xung LiBaMin USgr	g LiOther	(specify):h	- Whom unit ID obdo i			
SWL before test				" Wall alaques le			
Obvious water				Reason for closure:_			
☑ Fresh ☐ Salty [Method of closure: E			
			Water sample collected:			Backfill matorial:	
Well driller (print			· · · · · · · · · · · · · · · · · · ·	Deteris of Cicsure (See			
Kemo först levit f	севну); 300 раф 191•	Walta	+ Hows				
Registration no. (se			· · · · · · · · · · · · · · · · · · ·	_ Date of work (**************************************		
Consultant (if applica						Comptoted: 2014 C	921.
				Comments:			_
Water Protection Regula	ocurco wan ino N Sion.	colmicationics is	real closure, as the case may be the Weter Act and the Ground				
Signature of Driffe	r Responsibl	io	4700	understands on Wars of the			
elteration or closuro, as	the case may be	eo on pris well o. Well yteld, v	report describes the works and it well performance and water qual	y are not guerenteed as they	une of constructions influenced by 8	n, white: Customer copy century: Online copy pinc stinistry copy	1cf
markoer or factors, trichs	outh usuman Asap	ашчу, килтал	ecumates and condition of the wa	arra' eucou unerà cuentida casa, g	ma.	I have sensory only	

BRITISH
COLUMBIA
7L D. G

Well Construction Report

☐ Well Closure Report

Ministry Well ID Plate Number 3 Mindstry Well Tag Number: 10989 ☐ Confirmation/eiternative specs, ettached☐ Original well construction report attached

Red lettering indicates minimum mandatory information. Seamer name: Robert Gallows V	See reverse for notes & definitions of abbreviations.				
billing address:	Town Use Man Prov. BC Postal Code M.C. B.				
oil Location: Addross: Street no. 7601 Street name My 1	· / · · · · · · · · · · · · · · · · · ·				
r) Logal description: Let Ptan DT					
PID: O10 991 352 (and) Description of well location (ettern et					
	. ^				
AD 83: Zono: M. 483 and UTM Eneting: 1190 13.137 concto 2) UTM Morthing: \$00 19.878	(4) m (or Longitudo: 1) 9 13 8,22"				
offined of dirilling: 🗔 atmostary 🗌 cable tool 🗋 mudinotary 🗌 suger 🗋 diri					
normation of wolf: I vertical intertacental Ground elevation: 23.7	9 R (asi) Method (see note 4): 6P5.				
ass of woll (see note 5): Water Supply Sub-class of	d well: Domester				
ater copply wells: Indicate Intended water use: 🔾 private domestic 🗌 water cupply o	istem 🗆 linigation 🗆 commercial or industrial 🗆 other (specify):				
Lithologic description (see notes 7-14) or closure description	(see notes 15 and 16) Water-bearing				
	ended terms on reverse. Estimated Flow Observations (e.g., fractured, weathered				
0 6 m Grey sill grav	<i>l</i> .				
44 46 m white rock					
48 90 3 VSL Quartz, minse	uls + 482 slup.				
90 107 m Purpls					
02 123 M Light green.					
23 145 H Blackanhitz					
45 190 5 Grish + while Soup	estant,				
90 314 m Green black duhits					
14 340 H Black					
0 92 6 STAIL 250 V					
urfaco seat: Type: Depth: 180 R	intake: Screon Copen bottom Uncased hole				
ethod of installation: 🖫 Poured 🗌 Pumped - Thickness:	Screen type: Telescope Ptpo stzo				
ackfilt Typo; Depth: ft	Screen material: Staintess eteel Plastic Other (specify):				
ner. PVC Other (spedly):	Scroen opening: Continuous stot Stotted Perforated pipe				
ameter: in Thickness: in	Screen bottom: Bed Plug Plete Other (specify):				
om:fi(bgl) To:fi(bgl) Perforehed: From:fi(bgl) To:fi(bgl)	Filter pack: From:ft To:ft Thickness:				
eveloped by:	Final well completion data:				
•					
Air Griting Surging Jetting Pumpting Betting Other (specify): Total duration: 7, hrs	Total depth drillod: \$40 ft Finished well depth: 340 ft (bgf Finel stick up: 150 ft (bgf ft Depth to bedrock: 350 ft (bgf				
otes:	SWL: 111 > fi (bitoc) Estimated well yield: 1 1/2 USgpr				
Vell yield estimated by:	Artesian flow: USgpm, or Artesian pressure:				
Pumping Air lifting Beilting Other (epecity):	Type of weat caps: Was larger Lang Well disinfected: Yea I i				
ote: 1/2 USopm Durodon: 2 hrs	Whore well ID plate is attached: To Casing				
A/L before testfi (bloc) Pumping water tevel:fi (bloc)	Well closure information:				
bylous water quality characteristics:	Reason for closuro: Method of closuro: Poured Pumped				
Fresh Sofly 🖸 Clear 🗆 Cloudy 🗆 Sediment 🗆 Gas	Scalent material: Back@ material:				
oleun/odour: Water sample collected:	Details of closure (see note 17):				
Well driller (print cloarly): esno (first, leet) (see note 19): Will fig a Hand					
	Date of work ovvvaguen.				
tegistretion no. (see note 20): 05081001.	Date of work (YYYYAAUDD); Startod: 3014 0934 Comploted: 2014 0979				
Registration no. (see note 20): <u>OSOS(LOO)</u> Consultant (il explicatie; name and company):	Spoulog: 3014 0 4 5 7 Combiggog: 5014 0 4 5 4				
tegistretion no. (see note 20): <u>05081001</u>	Secretod: 2014 0924 Completed: 2014 0929 Comments:				

Province of British Columbia Ministry of Environment

WATER

WELL

RECORD

Date 81 1/4/2 1

egal Description & Address	
descriptive Location melesten Rd- NA	ernon R.C.
wners Name & Address D. R. D. Holding	g INC. Wiek Gallovay Vernor 12.C.
VTS MAP ELE	
TYPE 1 New Well 2 Reconditions OF WORK 3 Deepened 4 Abandoned	9. CASING: 1 Steel 2 Galvanized 3 Wood Materials 4 Plastic 5 Concrete
WORK 1 Cable tool 2 Bored 3 Jetter 4 Rotary a mud b air c rever	ed
. WATER 1 Demestic 2 Municipal 3 Irriga WELL 4 Commercial 8 Industrial USE 5 Other	to ft
DRILLING ADDITIVES	Thickness Ins Weight Ib/ft
. MEASUREMENTS from 1 (9 ground level 2 1 top of co	casing Pitless unitft 1 above 2 below ground level
FROM TO 6. WELL LOG DESCRIPTION	SWL Perforations:
0 6 Rrown Till + Rock. Cra	
6 14 Dank. Phue Rock. Very Crae	Open hole, from to ft Diameter in
14 40 DACK. Blue With Hand	Grout :
40 90 Green Rock with whitel	IO. SCREEN: 1 Nominal 2 Pipe Size
90 130 Gracked Brewn Rock.	Type 1 Continuous Slot 2 Perforated 3 Louvre
with green Layers	Material 1 Stainless Steel 2 Plastic 3 Other
180 160 DARK. Phue Kock. with	Set from to ft below ground level
Chay Layere.	SCREEN & BLANKS . units
160 190 Breen + Blue Kock.	Length ft Diam, I D ins
190 210 Rad Ly Cracked WHITET	Slot Size ins
Brown Rock.	from ft
10 H. Qb" CASSing.	to ft
	Gravel Pack
Pumping 73 gypm. Ry Pir Lift.	4 Balling 5 Pumping 6 Other
	TIME in mins & DRAWDOWN in ft TIME in mins & RECOVERY in ft
Cherned + Developed.	mins WL mins WL mins WL mins WL
Flowing 10g.p.m.	
	13. RECOMMENDED PLMP TYPE RECOMMENDED PLMP SETTING RECOMMENDED PLMPING RAI
	14. WATER TYPE: 1 ☐ fresh 2 ☐ salty 3 ☐ clear 4 ☐ cloudy colour smell; gas 1 ☐ yes 2 ☐ no
	15. WATER ANALYSIS: 1 Hardness mg/
CONSULTANT	2 Iron mg/(3 Chloride mg/
Address	4 DH Field Date
B. WELL LOCATION SKETCH	SITE I D No B Lab Date 1 1 1 1
16	6. FINAL WELL COMPLETION DATA
	Well Depth 210 ft Water Flowing 10 USgpm
	Static Water Level Flourist Pressure Headft
	Back filled
	Well Head Completion
	SURNAME FIRST NAME
17	7. DRILLER VIGUEN GIANAME Signature Will Marie M
18	8. CONTRACTOR, Address
	Kixw. Dr. Hing LTD
	2 00
	3905-17 The Vernon B.C.
	Member, BCWWDA Dyes 19no;



 Well Construction Report ☐ Well Closure Report

AQUA SOURCE DRILLING LTAVell ID Plate Number: 50.59.3

Stamp company of the State o

Red lettering indicates minimum mandatory information. See reverse for n	otes & definitions of abbreviations.
Owner name: Nod Line Hill Drustopment Ltd	1/2 A B A B A B A B A B A B A B A B A B A
Mailing address: 7600 ML Lrnov Rd Town Town Well Location (see note 2): Address: Street no Street name	<u>Vernan</u> Prov. 136. Postal Code <u>V1B 357</u> ,
	Block Sec Twp RgLand District
@PID: 010 · 991 352 and Description of well location (attach sket	
NAD 83: Zone: Nac 83 and UTM Easting: 1/9° 13, 197	
(see note 3) UTM Northing: 30 / 1, 881 /	· · · · · · · · · · · · · · · · · · ·
77/2	□ auger □ driving □ jetting □ other (specify):
Orientation of well: A vertical Discretization Ground elevation: A vertical Class of well (see note 6): Well 1 Sept.	
Water supply wells: indicate intended water use: El private domestic	_
Wrater supply works. a fulcate timerided water use. Expinate contessor Exhibit supply o	Stein Bungaton Beonantical of medianal Bones (spany).
Lithologic description (see notes 8-13) or closure description (see	notes 14 and 15)
Surficial Material Bedrock Material Colou	r Hardness Water Content Observations
ceptal de la company de la com	e e (e.o. boulders), est, water bearing
Loop To Loop T	(e.g. boulders), est, water deaning flow (USgpm), or closure details)
Lines Ione Basatt Oyzstalline Oyzstalline Oyzstalline Oyzstalline Oystalline Oystalline Oystalline India Oystalline Oystalline India Oystalline India Oystalline India India India Oystalline India India	7 Harris (Aval.
ft (bgl) ft (bgl) 音 声音 表 表 表 表 表 表 音 音 音 音 音 音 音 音	No. Co. Co. Co. Co. Co. Co. Co. Co. Co. C
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000000000000000000000000000000000000000	000000000000120' 21/26PM.
	00000000000000000000000000000000000000
Centra datalla	Screen details
Casing details From To Dia Casing Material/Open Hole Wall Drive	
From To Dia Casing Material/Open Hole Wall Drive ft (bgl) ft (bgl) in (see note 17) Thickness Shoe	From To Dia Type Slot Size I ft (bgl) ft (bgl) in (see note 18)
in	
0 17 6 5/81 219 V	
Surface seal: Type: Dratonit Depth: 17. It	Intake: 🗆 Screen 🗀 Open bottom 🗀 Uncased hole
Method of installation: ☐ Poured ☐ Pumped Thickness:in	Screen type: ☐ Telescope ☐ Pipe size
Backfill: Type: Depth: ft	Screen material: Stainless steer S Plastic Other (specify):
Liner: 50 PVC □ Other (specify): Diameter: 4 in Thickness: 250 in	Screen opening: □ Continuous stot □ Stotted □ Renforated pipe Screen bottom: □ Ball □ Plug □ Plate □ Other (specify):
From: 10 II (bgl) To 300t (bgl) Perforated: From: 250t (bgl) To 300t (bgl)	Filter pack: From:ft To:ft Thickness:in
1 1000 1000 1000 1000 1000 1000 1000 1	Type and size of material:
O	
Developed by:	Final well completion data: Total depth drilled: 300 tt Finished well depth: 300 tt (bgl)
	Total depth drilled: 300 tr Finished well depth: 300 tr (bgl) Final stick up: 36 In Depth to bedrock: 6 fr (bgl)
., , , , , , , , , , , , , , , , , , ,	SWL: 64-35 it (btoc) Estimated well yield: O USgpm
Notes: Well yield estimated by:	Artesian flow: Usgpm.or Artesian pressure.
☐ Pumping	Type of well cap: VENTEL Well disinfected: BYes DNo
Rate: 10 USgpm Duration: hrs	Where well ID plete is attached: To Casing
SWL before test:ft (bloc) Pumping water level:ft (bloc)	Well closure information:
Obvious water quality characteristics:	Reason for closure:
RFresh □ Salty ☑ Clear □ Cloudy □ Sediment □ Gas	Method of closure: ☐ Poured ☐ Pumped
Colour/odour: Water sample collected: □	Sealant material: Backfilt material:
Well driller (print clearly):	Details of closure (see note 16):
Name (first, last) (see note 19): Wolfs, Hour	
Registration no. (see note 20): 0508100 1	
Consultant (if applicable; name and company):	
	Date of work (YYYY/MM/DD):
DECLARATION: Well construction well alteration or well cosure, as the case may be, has been done in accordance with the requirements in the style of and the Ground Water Protection Regulation.	Started: 2019 11 21 . Completed: 2019 11 25 Comments: 18' void at 275'
Signature of	Comments: 19 VOIC Q1 X13
PLEASE NOTE: The information recorded in this yiell report describes the works and hydrogeologic conditi	ons at the time of construction, alteration white: Customer copy
or dosure, so the case may by. Welly akt, well porformance and water quality are not guaranteed as they including natural variability, furnan activities and condition of the works, which may change over time.	are influenced by a number of factors, canary: Driller copy pick. Ministry copy Sheet of



Well Construction Report

□ Well Closure Report

AQUA SOURCE DRILLIN Ministry Well ID Plate Number: 503944
Stamp company paragradors IN Girls Hyvel Tag Number: 103944
phohetraverial Were 2016 pays. 12 Confirmation/alternative specs. attached V97non. B.C. V17 255 Original well construction report attached

The Best Micros Earth Environment Well Alteration Report	V917011, B.C. V1T 3B3 Original well construction report adacried
Red lettering Indicates minimum mandatory Information. See reverse for rowmer name: Nodelna Hill Dauslanment L	
Malling address: 7601 MeLs noon Rd Town	
Well Location (see note 2): Address: Street no Street name	•
OF Legal description: Lot Plan D.L	
PID:010 991 352 and Description of well location (attach ske	
IAD 83: Zone: 10 2 83 OUTM Easting: 119° 13, 058	ω m Latitude (see note 4): _50, 32710 Ν _ γ,
see note 3) UTM Northlag: 50° 19.626	M m G Longitude: 119.21765 W
Nethod of drilling: 12 air rotary dual rotary day cable tool dimud rotary	
Drientation of well: Divertical Chortzontal Ground elevation: 2388	ft (asl) Method (see note 5):6P5
Class of well (see note 6): Water Supply	Sub-class of well: Dom#5/1C.
Water supply wells: indicate intended water use: \$\frac{y}{2} \frac{y}{v} \rightarrow \frac{y}{v} \ri	
Lithologic description (see notes 8-13) or closure description (see	notes 14 and 15)
Surficial Material Bedrock Material Colo	ur Hardness Water Content Observations
	(e.g. other geological materials (e.g. boulders), est, water bearing
Lumin day (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	등은 의 flow (USgam), or closure details)
with mode to	h
Sand, the part of	Henry Markey Molist Wolst August Augu
© 3 00000000000000000000000000000000000	
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60 80 000000000000000000000000000000000	00000000000000000000000000000000000000
80 240 000000000000000000000000000000000	000000000000000000000000000000000000000
	000000000000000000000000000000000000000
	000000000000000000000000000000000000000
	000000000000180 41/26811.
	00000000000220 256PM.
000000000000000000000000000000000000000	
Casing details From To Dia Casing Material/Open Hole Wall Drive	Screen details From To Dia Type Slot Size
From To Dia Casing Material/Open Hole Wall Drive ft (bgl) tt (bgl) In (see note 17) Thickness Shoe	ft (bgl) in (see note 18)
0 13 6 5tss -219 V	
And the state of t	a was walling and a state of the state of th
	a contraction in the contraction of the contraction
Surface seal: Type: BEntunit Depth: 13. ft	Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
Method of installation: Poured Pumped Thickness: 2 In	Screen type: Telescope Pipe size
Backfill: Type: Depth: ft	Screen material: D Stainless-steel D Plastic D Other (specify):
Liner: DIPVC Other (specify):	Screen opening: Continuous slot CSlotted CPerforated pipe
Diameter:in Thickness:in	Screen bottom: □ Ball □ Plug □ Plate □ Other (specify):
From: 6 ft (bgl) To 240t (bgl) Perforated: From: 20t (bgl) To 240t (bgl)	Filter pack: From: ft To: tt Thickness: in
	Type and size of material:
Developed by:	Final well completion data:
☑ Air litting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bajiling	Total depth drilled: 240 ft Finished well depth: 240 ft (bgl)
Other (specify): Total duration: hrs	Final stick up: 20 in Depth to bedrock: 3 It (bgl)
Notes:	SWL: 57.25 ft (bloc) Estimated well yield: 25 USgpm
Well yield estimated by:	Artesian flow: USgpm; or Artesian pressure: 1
☐ Pumping ☐ Air lifting ☐ Bailing ☐ Other (specify):	Type of well cap: 1711 Well disinfected: ☐ Yes ☐ No
Rate: 25 USgpm Duration: 1/2. hrs	Where well ID plate is attached: To Casing
SWL before test:ft (bloc) Pumping water level:ft (bloc)	Well closure information:
Obvious water quality characteristics:	Reason for closure:
ছিFresh □ Salty ⊠ Clear □ Cloudy □ Sediment □ Gas	Method of closure: □ Poured □ Pumped
Colour/odour: Water sample collected: □	Sealant material: Backfill material;
Well driller (print clearly):	Details of closure (see note 16):
Name (first, last) (see note 19): welter Hows	
Registration no. (see note 20): 05.081.001	
Consultant (if applicable; name and company):	
Company (a appropriate transportation)	Date of work (YYYY/MM/DD):
DECLARATION: Well construction, well alteration or well closure, as the case may be, has been done	Started: 2019 11 26 Completed: 2019 1127
in accordance with the requirements in the Water Act and the Ground Water Protection Regulation.	Comments:
Signature of Priller Responsible	
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, them an activities and condition of the works, which may change over time.

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Shee! _____ cf ____



AQUA SOURCE DRILLING LTD Ministry Well ID Plate Number: 5039

Well Closure Report Stamp and Plate Number: 5039

Well Closure Report Stamp and Plate Number: 5039

Well Closure Report Press Stamp and Plate Number: 5039

Well Closure Report Stamp a

•	ldress:	1601-	MILS	nnon	Kd'	Town	VSFAC	· · · · · · · · · · · · · · · · · · ·	Prov. 13.	Pos	stal Code 🗸	11335
/ell Locat	tion (see	note 2): A	ddress: S	treet no	Street	name			Town			
DLegal o	descripti	on: Lot	Pi	an	D.L.		_ Block	Sec	Twp	Rg	_Land Distric	ય
or)PID: 🙋	10 99	11352	_ · (and) De	escription	of well locati	on (attach s	ketch, if nec	.):				
AD 02: 7	ana. IÌ	83 کے ہ		LITM For	ting: 1/9	0/3.00	74	l olit	 uda (see note	4) 50a	32810	<i>ম</i>
see note :		<u> </u>	and)	UTM Nor	thing: <u>50</u>	019.68	6 "	@ Lone	ude (see note gitude:	119	2 1832	W
		包 air rota	arv □ dua						 ⊒jetting ⊡ot			
rientatio	n of well	l: ⋤lvertica	ıl ⊟hor	rizontal C	Ground elevat	_{ion:} 235 (tt (asi) (Method (see	note 5): <u>C-P</u>	<u> </u>		
lass of w	vell (see	по(е 6): <u>(</u>	Ja191	امرن ک	14		Sub-c	lass of well	Domes	110		
Vater sup	ply wells:	indicate int	ended wat	ter use:,KDp					nmercial or indus		oecity):	· · ·
Malan		uluston (oc	o notos	0 13) 01 0	iosure des	orintion fee	o notoe 14	and 15)				
_itholog:	ic desci	•		-				Hardness	Water Conten		Observations	
		Surficial	1		ck Material	., 	uok IIIIIII		1 1 2 1	fen ott	ier geological n	naterials
		lis/x	ed .	<u>.</u>					Dry Mott Wet High Production Lost circulation	(e.g. boul	lders), est, wate	
			E 69 E	necat ne		3 6 6	<u> </u>	g #	an an an	를 IIOM (DSI	gpm), or closur	e delans)
From	To	20 + 2	5 5 5	ndstron nglo	asit Tan	dia d	14 a a 4	nd Ha	7 15 15 15 15 15 15 15 15 15 15 15 15 15	¥ ¥		
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 Well Construction Report ☐ Well Closure Report

Ministry Well ID Plate Number: 50396
State Conference of the Confe

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			Street name_					
						Twp	RgLand Distri	ct
@PID: <u><i>©10</i></u>	991.352	@Description o	of well location (attac					
NAD 63: Zone:	16-18-		ing: 119º 10°	084 6	NOT	N. PID-COR	Pett 50. 32°	27 x1
NAD 63: Zone: (see note 3)	1000	and UTM North	hing: <u>50° 19.</u>	762 nm	(@ Lon	altude: 119	21807W	L-27_/Y_
	ing: 5≣ air rotar	y ⊡duairotary D] cable tool □ mud,r				er (specify):	
	well: 🗆 vertical		iround elevation: <u> </u>					
		10ter Supp					<u>د</u>	
Water supply w	ells: indicate inte	nded water use: আঁ pr	ivale domestic water :	supply system 🗔 i	rrigation 🖂 co	mmercial or industri	al 🗆 other (specify):	
Lithologic de	scription (see	notes 8-13) or c	losure description	(see notes.14	4 and 15)			
	- Surficial M	laterial Bedroo	k Material	·Colour	Hardness	Water Content	Observations	
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Backfill: Type:	☐ Other (specif		_ Deptil:				Slotted D Perforated pipe	
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Developed b	v:			Final v	vell comple	tion data:		
Gi Air lifting	☐ Surging [□ Jetting □ Pur	mping Bailing				ished well depth: 226	
Other (specify)	·	Total	duration: 1/2	hrs Final sti	ick up: <u>/ </u>	j in De	pth to bedrock:	ft (b
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Registration no Consultant (if a	eli construction, well a		the case may be, has been of Water Protection Regulation	done Started n. Comme	1: <u>2019 1</u> ents:	2.04	Completed: <u>2019 1</u>	2 05

Well Construction Report

□ Well Closure Report

□ Well Alteration Report

□ Well Alteration Report

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Casing	details						S	creen	detalls					
From	То	Dia	i Casing M	/laterial/Open Hole	. Wali	Drive	1 1	From	То	Día	į	Тур	e	Slot Si
ft (bgl)	ft (bgl)	1n		ee note 17)	Thickness in			fl (bgĺ)	ft (bgl)	ln		(see not	te 18)	
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Surface s	eal: Type	Bint	enits		Depth:/	5	it li	ıtake: I	□ Screen	□ Open	bottom	□Unca	sed hole	
		ion: 🗗 Pour			kness:		n S	creen ty	/pe: ☐ Tel	escope_	□Pipe	size		
Backfill: 7	Гуре:				Depth:		ft S						Other (specify	
			cify):				. \$	creen o	pening: 🗆 (Continuou	s slot 🗆 S	lotted 13	Perforated pip	θ
Diameter				Thickness:					ottom: 🔲				Other (specify	
From: 6_	ft (bgl)	ro2 <u>60</u> ft (b	gl) Perfo	reted; From 240	2ft (bgl) To:	<u>८८</u> मो (७ <u>०</u>			k: From:			l Th	ickness:	
							T	ype and	size of ma	terial:				
Develo	oed by:					-			eil compl					
- M Air liftir		Surging	□ Jetting	J	ing □Ba	/							depth: 26	<u>Oft (</u>
Other (sp	ecify): _			Total dur	ration:	<u>/2</u> _h			k up: <i> 1</i> 5				rock: 2.1	ft (
Notes:	e . # 11 m = 2 m						-	WL:	12		•		ll yield: <i></i>	
		iated by:				, ' Y			flow:				tesian pressul	
□ Pumpi -	ng 🛭 رميے	Air lifting	□ Bailin		specify): ゾっ				vell cap:√2				ed: ØlYes □ N	10
Rate:			- 51	Duration:	/2	h			ell ID plate			451H	<u> </u>	
		ft (Pumping water	r level:	ft (bto			sure into		:			
		quality ch			50-4"				or closure:					
回 Fresh				-	3 Sediment				of closure:	⊏≀ ⊾ อศเสนี	_	ea Backlill ma	atorial:	
				wat	er sample o	onected:			naterial:	ee note 1			d watsi	<i>;</i>
	"	it clearly):		1.11-00	1		,	έταπ ο ο Σέγ	. CIUSURE (S	τεποι ε π 5 Κ) J	7	. <u> </u>	
		(see note 1		$\frac{\alpha 1 \cup 1}{\alpha 4 \cdot \alpha \alpha}$	uu1			-, (/	(' -		117	·		
				08100	•			,,,,,,,, ,,,						
Longuite	ınt (it appl	cable; name	and compa	any):				into of	work (Y)	/VV/K#K#1	DD1.	- ,		
Consulta								Jate Of	MOLK (1.1	T T/(VIIVI/	பபு:		100	
	ON: W-P	netruetion '	Laliantian -	rwell closums as the	rase may be	has hear o'r	ne c	tortani-	2010	12 01	. .	Cometete	d.2019 1	211
DECLARAT	TON: Well or se with the o	instruction, wei	l alteration o	r well closure, as the cl and the Ground W	case may be, l alor Protection	has been do Regulation.	ne S	Started: Commer	•	12.06	<u> </u>	Complete	d: <u>2019 1</u>	210



 Well Construction Report ☐ Well Closure Report

AQUA SQUIDCE POLL	Ministry Well to Plate Number: 50398 Wirts Well Tag Number: Confirmation/alternative specs. attached
Stamp company name/address	Minst Well Tag Number:
Vernon, B.C. Var o	☐ Contimation value of a trached ☐ Original well construction report attached

Box Nor on East Environment Well Alteration Report	Vernon, B.C. V1T3E3 Original well construction report attached
Red lettering indicates minimum mandatory information. See reverse for	notes a definitions of archraviations.
mername: Nadding Hill Dsuzlupmant Ltd	VYrner Prov. BC Postal Code VIB 35
-	•
Il Location (see note 2): Address: Street noStreet name Degal description: Lot Plan D.L	
PID: 010 991 352 and Description of well location (attach ske	
. · · · · · · · · · · · · · · · · · · ·	•
D 83: Zone: 119° 13. 18	7w m Latitude (see note 4): 50. 32805N
e note 3) UTM Northing: 3D 19.6 B	
thod of drilling: Bair rotary Daul rotary Daule tool. Dmud rotary	□ auger □ driving □ jetting □ other (specify):
lentation of well: 図vertical □ horizontal Ground elevation: 2262	
ater supply wells: Indicate intended water use: Sprivate domestic water supply	
thologic description (see notes 8-13) or closure description (see	•
Surficial Material Bedrock Material Col	our Hardness Water Content Observations (e.g. other geological materials
arass North Colonial Colonia Colonia Colonial Colonial Colonial Colonial Colonial Colonial Co	The boulders are under basis
to (lips) to (li	Tow (USppm), or closure details)
From To Same and the state of t	RKGn RKGn RS-73 BS BS B
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$arphi$ \mathcal{E} $arphi$ 000000000000000000000000000000000000	
	000000000000000 200' /2 6 PM.
00000000000000000	000000000000000000000000000000000000000
acing datalle	Screen details
asing details From : To Dia Casing Material/Open Hole; Wall : Drive	From To Dia Type Slot Size
tt (bgl) in (see note 17) Thickness Shoe	ft (bgl) ft (bgl) in (see note 18)
0 18 6 STEPL .219 V	
urlace seal: Type: Brn/cnits Depth: 16 ft	Intake: ☐ Screen ☐ Open bottom ☐ Uncased hole
ethod of installation: December 1 Pumped Thickness: 2 in	Screen type: ☐ Telescope ☐ Pipe size
ckfill: Type: Depth: ft	Screen material: ☐ Stainless steel ☐ Plastic ☐ Other (specity):
ner, DPVC Other (specify):	Screen opening: ☐ Continuous slot ☐ Slotted ☐ Perforated pipe
ameter:in Thicknoss:in	Screen bottom: Bail Plug Plate Other (specify):
om:ft (bgl) To:ft (bgl) Perforated: From:ft (bgl) To:ft (bgl)	Filter pack: From:tt To:tt Thickness:
	Type and size of material:
eveloped by:	Final well completion data:
Air lifting ☐ Surging ☐ Jetting ☐ Pumping ☐ Bailing	Total depth drilled: 340 ft Finished well depth: 346 ft (bg Final stick up: 15 in Depth to bedrock: 16 ft (bg
ther (specify): firs	1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 /
otes:	SWL: (26 ft (bloc) Estimated well yield: // 2 USgp Affesian flow: USgpm, or Artesian pressure: USgpm, or Artesian pressure:
Pumping SAir lifting DBailing DOther (specify):	Type of well cap: V5772 Well disinfected: 12 Yes 13 No
ate: 1/2 USgpm Duration: 2 hrs	Where well ID plate is attached: To Casing
WL before test:ft (bloc) Pumping water tevel:ft (btoc)	Well closure information:
byjous water quality characteristics:	Reason for closure:
Fresh 🗆 Salty 19 Clear 🗆 Cloudy 🗀 Sediment 🗅 Gas	Method of closure: □ Poured □ Pumped
olour/odour: Water sample collected: □	Sealant material: Backfill material:
/ell driller (print clearly):	Details of closure (see note 16):
ame (first, last) (see note 19): Waltsk Hows	
egistration no. (see note 20): 050 81001	
onsultant (if applicable; name and company):	
	Date of work (YYYY/MM/DD):
DECLARATION: Well construction, well alleration or well closure, as the case may be, has been done	Started: 2019 12 11 Completed: 2019 17 13
· // 19/	Comments:
accordance with the requirements in the Water Act and the Ground Water Protection Regulation in ignature of rillier Responsible LEASE NOTE: The Information recorded in this well report describes the works and hydrogeologic con-	



Ministry of Environment

☐ Well Alteration Report ~

□ Well Construction Report
□ Well Closure Report
□ Well Alteration Rep

				Usus!	R.T	Tow	Norn	ur	Prov.	5.0	Postal Code	/10 35
Well Loca	ation (see	note 2): Ac	ddress: 9	Street no	Street r	пате			Town			
@Legal	descript	ion: Lot	P/	ап	D.L		Block	Sec	Twp.		RgLand Dis	strict
@PID: <u>4</u>	010 9	11 357	, ᡂ⊳	escription of w	vell locatio	n (attach s	ketch, if nec	.):				· · · · · ·
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NAD 83: 7 (see note		<u> </u>	and)	UTM Northing	50	019 5	79 a m	@ Lan	tude (see n	ote 4):	119. 2191	62 1
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				8-13) or clos								
Litriosog I	jic uesc !		Vaterial	=			olour	Hardness	Water Cor	ntent I	Observatio	ins
		· · · · · · ·		bedrock tri	Total		1 1 1 1	Tiarune33	THE T	T. I	(e.g. other geologic	
	i	lls/ki	fine-med med-coarse with gravel	2 .	· 🙀					8	(e.g. boulders), est. v	
		5	5 5 E	nerat	2 E	**	8 8	₽ * } ***	t Production	t circulation Available	flow (USgpm), or clo	sure details
From	To	· ·	12 E \$	dsto glor alt	stall er St	_ § §	5 8 8 ¥	y Ha	15 L	Ava	•	
ft (bgl)	ft (bgl)	8 2 2	Sar	Silistone/shate Sandstonc Conglomerate Limestone	2 2 2 3	8 2 8	3 8 8 8	호호호	5 8 8 5	5 5		
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Casing	details						Screen	details				
From	. To	Dia	Casing M	aterial/Open Hole	Wall	Drive [From	To	Dia		Туре	Slot S
ft (bgl)	ft (bgl)	in	(se	e note 17)	Thickness in	Shoe	ft (bgl)	ft (bgl)	in		(see note 18)	
0	22	+	7	251	.719	V	-	╁				
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Surface s	eal: Type	: <u>155n</u> "	Turit	<u> </u>	Depth: 2 6	<u>0fl</u>	Intake:	□ Screen	☐ Open bo	ttom	Uncased hole	
Method o	f installat	ion: 🕅 Poure	ad □Pu	mped Thick	kness: Z	in	Screen ty	/pe: □Tele	scope l	⊒ Pipe s	ize	
Backfill;]	Гуре:				Depth:	ft	Screen m	naterial: 🗆 S	talnièss-ste	el □ Pla	stic 🗆 Other (speci	fy):
			ify):				Screen o	pening: 🗀 C	ontinuous s	lot D Sto	ited Perforated p	ipe
Diameter	: 4		in 1	Thickness: _ Z_	56	in	Screen b	ottom: 🗆 B	ail □ Piug	□ Pia	te Other (speci	ify):
		To 24 Cit (bc		ated: From:224		Z4Cft (bgl)		k: From:			Thickness:	-
	(-07	,	,,				-	size of male				
Develor	ned hv:				\$		Final w	ell comple	tion data:			
S Air (iftir		Surging	☐ Jetting	. Dempi	ng DÉBai	itina		th drilled: 2.4		Finich	ed well depth: 240	<u>ر</u>
	_		_ second	Total dura	1/2	ing Name		k up:/8			i to bedrock: 18	
Other (sp	есну):			lotal dura	auon: <u>/ /</u>	<u>- 22-4-</u> fira		62.5			ated well yield:	-
Notes: _	erofeliki n	<u>opierin</u> mente	Turning in April	a was protected to the	<u> </u>				ft (btoc)			
-		nated by:			or positi	1		flow:		USgp	m, of Arlesian, press	hite
D Pumpii	ng ∑i	•	☐ Balling	` ' <i>I</i>	pecify):	<u></u> ;		veli cap: 🛂			lisinfected: 🛭 Yes 🗆	
Rate:	د_		·	Duration:	12	hrs				100	asing	
SWL befo	ore test:	ft (b	otoc) i	Pumping water	level:	It (btoc)	: Well clo	sure infor	mation:			
Obviou	s water	quality cha	aracteri	stics:				or closure:			 	
🕒 Fresh	□Şa	ity 59°C	Jear I	□ Cloudy □	Sediment	☐ Gas	Method o	of closuré: 🗆	Poured 🗆	Pumped		
Colour/o	dour:			Wate	er sample o	ollected: 🗆	Sealant)	natérial:/	<u></u>	Ba	ckfill material:	
		nt clearly):					Details o	f closure (sc	o-note 16):			
		(see note 19	a). U /m	Hrv H	كانعان		54	1. tru	•	6.	5'	
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	or or anni	caute; name a	no compai	ıy):	· · · ·		Data of	MARK AAA	~ ALAIDO	۸.	2.1	
Registrat Consulta	ин (парри						Date of	work (YY)	T/MM/DD) -	2010	
Consulta			-144	and stars				7/10	17 17	_	////	17 10
Consulta	ICN: We1 co			well closure, as the d and the Ground Wa					7.17.	Co	mpleted: 2019	17 19
Consulta	ICN: WeI co			well closure, as the d and the Ground Wa			Started: Commer		7.17.	Ca	impleted: 2017	12 19



Ministry of Environment

₩ell Construction Report
 ₩ell Closure Report
 ₩ell Alteration Report

Stamp company name/antiess/ phono/les/oneil here, if desired Ministry Well ID Plate Nurrices 6200.6
Ministry Well Tag Nurrices

Confermation/alternative space, affactivity
Original well occasion/client report attached

Owner name:	Control Specific Francisco Parkette Control Specific Spec
Mailing address: Town Well Location (see note 2): Address: Street no. Street name	Prov Postal Code
C Legal description: Lot Pan DL	Diock Sec Ten Be Land Political
PID: (and Description of well location (attach sa	
NAD 83 Zone: Na d 83, Grap UTM Easting:	m Latitude (see note 4):
(see note 3) UTM Northing:	m (or) Longitude
Method of drilling: Si air rotary □ dual rotary □ cable tool □ mod rotary	□ auger □ driving □ jetting □ other (specify)
Orientation of well: Q vertical Chorizontal Ground elevation: Class of well (see note 6): U affr 5 401)	
	Sub-class of well: Downstic
Water supply wells: Indicate intended water use of private domestic. water supply	
Lithologic description (see notes 8-13) or closure description (see	notes 14 and 15)
Surficial Material Bedrock Material Col	our Hardness Water Content Observations
	(e.g. other geological materials (e.g. boulders), est, water bearing
0 2 2 0 0 2 2 2 2 2 2	E D T E S E Sow (USgom), or closure details)
From To H (bol) S R p S S S S S S S S S S S S S S S S S	Secondary and the secondary secondar
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Casing details	Screen details
From To Dia Casing Material/Open Hole Wall Drive ft (bgl) ft (bgl) In (see note 17) Thickness Shoe	From To Dia Type Slot So It (bgl) If (bgl) in (see note 18)
0 53 57881 6" 219 V	
Surface seat Type: Bentunity Depth: 18 ft Method of installation: N Poured D Pumped Thickness: 4 in Backfill: Type: Depth: ft Liner: CHRVQ D Other (specify): Diameter: in Thickness: in Thickness: in ft (bg) To: ft (bg) Perforated From ft (bg) To: ft (bg)	Intake: □ Screen □ Open bottom St Uncased hole Screen type: □ Telescope □ Pipe size Screen material: □ Stainless steel □ Piastic □ Other (specify): Screen opening: □ Continuous stot□ Stotled □ Perforated pipe Screen bottom: □ Bail □ Plug □ Plate □ Other (specify): Filter pack: From:tt
	Type and size of material:
Developed by:	Final well completion data:
Se Air lifting □ Surging □ Jetting □ Pumping □ Bailing	Total depth drilled 320 th Finished well depth 320 th
Other (specify): Total duration: /2 hrs	Final stick up: 24 in Depth to bedrock: 50 ft (SWL: 78 ft (btoc) Estimated well yield: US(
Notes:	SWL: / O It (beec) Estimated well yield: US(Artesian flow: USgpm. or Artesian pressure:
Well yield estimated by: □ Pumping □ Air lifting □ Bailing □ Other (specify):	Type of well cap: Well disinfected: [] Yes [] No
Rate: 11/2 USgpm Duration: 1 hrs	Where well ID plate is attached:
SWL before test: It (btoc) Pumping water level: It (btoc)	Well closure information:
Obvious water quality characteristics:	Reason for closure:
9 Fresh D Salty St Clear D Cloudy D Sediment D Gas	Method of closure: □ Poured □ Pumped
Colour/odour: Water sample collected: 🖸	Sealant material: Backfill material:
Well driller (print clearly):	Details of closure (see note 16):
Name (first, last) (see note 19): Walter Hows.	
Registration no. (see note 20): 050 31001	Manager and the second
Consultant (if applicable; name and company):	Date of work (YYYY/MM/DD):
The second secon	Started ZoZo & Completed ZoZoo610
DECLARATION. Well community well alteration or well coosers, as the case may be, has been done in accordance with the requirements in the plants of the Grazed Water Protection Regulation.	Comments:
Signature of	
Driller Responsible	Althoris at the time of construction, attending white. Cushinner copy or any influenced by a number of facture. Carety, Driber copy
LEASE PACIFE. The interestingly recorded is the self-report described the works and specialized as the case tips by "Wed just, well performance and water quality are tool gate wheel of course, as the case tips by "Wed just, which performance and water specially are tool gate wheel as the case tips by "Wed just, which can and works, which may change over lone, wholey personal variability element activities and condition of the works, which may change over lone.	sey are educated by a number of texasts. Gamery Driver Copy Street



Ministry of Environment

r≱ Well Construction Report

☐ Well Closure Report

☐ Well Closure Report

Snarry company symmetriderest prome faxional here. If thesiand

Ministry West Of Histor Heartons 62.007.
Ministry West Tag Number

Confirmation laternature spoces enacted
Original west construction report attached

ner ranne: Town	Prov. Postal Code.
Location (see note 2): Address: Street no. Street name	Town Rg Land District
Legal description: Lot Pan D.L B on Description of well location (ettach sketc	
PID: (and) Description of well location (alloch see	
163: Zorse: Na 53 and UTM Easting:	m Latitude (see note 4):
UTM Northing	m Longitude:
nod of drilling: Mair rotary 13 dual rotary (3 cable tool 12 mud rotary 13	h (ati) Mathod (see note 5):
intation of well: Diversical Dihorizontal Ground elevation	Substant of well Donestic
es of well (see note 6): Water Supply or supply wells: indicate intended water use: by private demestic. Cheater supply sys	stern Charagation Chomendecial or industrial Chother (specify):
er supply week. Process marrow, west of the state of the process o	otes 14 and 15)
hologic description (see notes 8-13) or closure description (see n	Hardness Water Content (e.g. other geological materials
Surficial Material Bedrock Material	(e.g. boolders), est water bearing
A particular and	now (USppm), or closure details)
The state of the s	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
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sing details	Screen details
from To Dia Casing Material/Open Hole Wall Drive (bgl) ft (bgl) in (see note 17) Thickness Shoe	from to the fit (bgf) in (see note 18)
0 100 6 5745/ 219 0	THE RESERVE THE PROPERTY OF TH
0 100 6 STATE 219 V.	
THE RESERVE OF THE PERSON OF T	Parallel State of Marie 1997
and the same of th	
rtace seal: Type: 102 ntonity Depth 60 h	Intake: D Somen D Open bottom D Uncased hole
ethod of installation: St Poured Pumped Thickness:in	Screen material: Stainless steel Pasto Other (specify):
ckfilt: Type: Depth: ft	Screen opening: ☐ Continuous stot ☐ Slotted ☐ Perforated pipe
ner: 18 PVC DOther (specify): ameter: 4 in Thickness: -250 in	Screen bottom: DBall DPlug DPlate DOther (specify):
om: 5 ft (bgf) To2 \$01 (bgf) Perforated: From260tt (bgf) To250 (bgf)	Filter pack: From:tt To:tt Thickness:
	Type and size of material:
	Final well completion data:
eveloped by:	Final well completion data: Total depth drilled 2 80 tt Finished well depth 2 80 tt
oveloped by: Air litting Surging Detting Pumping Bailing	Final well completion data: Total depth drilled 280 th Finished well depth-280 th Final stick up: 12 in Depth to bedrock: 35° th
oveloped by: Air litting Surging Setting Pumping Bailing ther (specify):	Final well completion data: Total depth drilled 280 th Finished well depth 280 th Finished well depth 280 th Final stick up: 12 in Depth to bedrock: 35 th SWL 117 th (btoc) Estimated well yield: 30 US
byeloped by: Air litting Surging Setting Pumping Bailing Total duration: hrs bites: ell yield estimated by:	Final well completion data: Total depth drilled 280 th Finished well depth 280 th Final stick up: 12 in Depth to bedrock: 35° th SWL 117 th (bloc) Estimated well yield: 30 US Artesian flow: USgpm, or Artesian pressure:
Air lifting Surging Jetting Pumping Bailing Total duration: hrs otes: ell yield estimated by: Pumping Wair lifting Bailing Other (specify):	Final well completion data: Total depth drilled 280 tt Finished well depth 280 tt Final stick up: 12 in Depth to bedrock: 35 tt SWL 117 tt (btoc) Estimated well yield: 30 US Artesian flow: Type of well cap: VENTEL Well disinfected: SY/es \(\text{NO} \) No
Air lifting Surging Jetting Pumping Bailing her (specify): Total duration: hrs stes: ell yield estimated by: Pumping Mair lifting Bailing Other (specify): hrs te: 30 USgpm Duration: 1 hrs	Final well completion data: Total depth drilled 280 th Finished well depth 280 th Final stick up: 12 in Depth to bedrock: 35 th SWL: 117 th (btoc) Estimated well yield: 30 US Artesian flow: Type of well cap: UEntil Well disinfected: SYes INO Where well ID plate is attached: To Casing.
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Plate ID 6200 9

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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

Environmental Assessment & Permitting

Applied Research

Rural Subdivision Services