
Appendix 5.3.5C

Water Supply Feasibility – Well Drilling and Completion Report

FINAL – Water Supply Feasibility - Well Drilling and Completion Report: Blackwater Mine Construction Camp Test Wells, Blackwater Gold Mine, B.C.

Prepared for:

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Prepared by:

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November 2013
Project: 13-019-01

November 8, 2013

New Gold Inc.
ATTN: Chiew Yeo, Engineering Manager
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Dear Mr. Chiew:

Re: Well Drilling and Completion Report – 150 mm Blackwater Construction Camp Test Wells TW13-01, TW13-02, TW13-03 and TW13-04 Blackwater Mining Camp B.C.

Western Water Associates Ltd. (WWAL) is pleased to provide this completion report for the New Gold Inc. Blackwater Mine Construction Camp source water testing program completed in August this year. Four new 150 mm diameter test wells have been drilled, developed and tested and the results are provided in this report.

Although four wells were drilled during the testing program we are interested in seeking approval of potable source for only two wells, TW13-01 and TW13-02. Well details, test pumping results and water quality data for TW13-03 and TW13-04 are provided here for report completion. A short discussion on the opportunity to source metallurgical plant process water from an aquifer discovered at TW13-03 is also provided. Note, the majority of this report focuses on TW13-01 and TW13-02, as these will be considered for further potable water supply production.

Both TW13-01 and TW13-02 are sourced from surficial aquifers either confined or semi-confined and both wells are artesian. TW13-02 is flowing artesian. Well hydraulic testing and water sampling occurred in August, which is interpreted to represent average seasonal groundwater conditions.

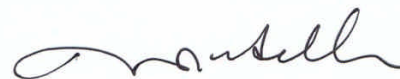
We trust that the professional opinions and advice presented in this document are sufficient for your current requirements. Should you have any questions, or if we can be of further assistance in this matter, please contact the undersigned.

WESTERN WATER ASSOCIATES LTD.

Reviewed by:




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1. INTRODUCTION	1
1.1 PROJECT BACKGROUND.....	1
1.2 SCOPE OF SERVICES.....	1
2. SITE DESCRIPTION AND HYDROGEOLOGIC SETTING	2
2.1 SITE DESCRIPTION.....	2
2.2 HYDROGEOLOGIC SETTING	2
2.3 GEOLOGIC SETTING	3
2.4 SITE GROUNDWATER USE AND NEARBY REPORTED WATER WELLS.....	3
2.5 SITE CLIMATE AND HYDROLOGY	4
2.5.1 CLIMATE.....	4
2.5.2 HYDROLOGY	5
3. WELL DRILLING.....	6
3.1 SUMMARY OF LITHOLOGY	6
3.2 WELL CONSTRUCTION DETAILS	6
3.3 WELL DEVELOPMENT.....	8
4. WELL TEST PUMPING METHODS	8
5. WELL TESTING RESULTS	9
5.1 EFFECT OF SEASON ON AQUIFER LEVELS DURING TESTING.....	9
5.2 TW13-01 TEST PUMPING RESULTS.....	9
5.3 TW13-02 TEST PUMPING RESULTS.....	9
5.4 TW13-03 AND TW13-04 TEST PUMPING RESULTS	10
5.5 AQUIFER PROPERTIES.....	10
5.6 WELL INTERFERENCE.....	10
5.7 LONG-TERM SUSTAINABLE YIELD ESTIMATES.....	11
6. WATER QUALITY	11
6.1 EXCEEDANCES OF DRINKING WATER GUIDELINES.....	12
7. PRILIMINARY SOURCE PROTECTION AND PRELIMINARY GWUDI ASSESSMENT	14
7.1 PRELIMINARY SOURCE PROTECTION CONSIDERATIONS	14
7.2 PRELIMINARY GWUDI ASSESSMENT	14
8. CONCLUSIONS.....	15
9. RECOMMENDATIONS	16
10. CLOSURE.....	17

List of Figures (following text)

Figure 1:	Site Location Map
Figure 2:	Blackwater – Year 1 of Mine
Figure 3:	Site Map
Figure 4:	Site Map, showing TW13-03

List of Tables

Table 2.1:	Summary of Site and Nearby Potable Water Supply Wells	4
Table 2.2:	Climate Normals from Environment Canada	5
Table 2.3:	Regional and Blackwater Precipitation Summary (from KP)	5
Table 3.1:	Construction Details for 2013 Blackwater Water Test Wells.....	7
Table 5.1:	Summary of Aquifer Properties Estimated from Test Pumping	10
Table 6.1:	Summary of Water Quality Exceedances	12
Table 6.2:	Summary of Water Quality Results	13

List of Appendices

Appendix A	Desktop Analysis for Groundwater Supply Development Options
Appendix B	Well Logs
Appendix C	Pumping Test Data and Graphs
Appendix D	Water Quality Summary Table and Laboratory Reports
Appendix E	GWUDI Checklists for TW13-01 and TW13-02
Appendix F	ODK – Cost Estimate to Pipe from TW13-01 and TW13-02 to Construction Camp

I. INTRODUCTION

At the request of New Gold Inc., Western Water Associates Ltd. (WWAL) designed and monitored a groundwater supply exploration program between July 26 and August 12, 2013 at the Blackwater Mine site, located 160 km southwest of Vanderhoof, B.C. This report documents the selection of the drilling locations, construction and the results of testing the new groundwater sources at four locations.

I.1 Project Background

New Gold Inc. has plans to proceed with development of the Blackwater Mine. To build the mine and processing plant a construction camp is required and commissioning of the construction camp is planned to begin in the first quarter of 2015. The proposed new construction camp location is over 4 km to the northeast, relatively distant, from the existing exploration camp water supply well (Kilometer 15 Well). Therefore, a water supply test program was undertaken, during the summer of 2013, to explore water supply options in the vicinity of the proposed construction camp. The construction camp is planned to be built for accommodate 1,500 persons; requiring a potable water supply of about 60 to 70 USgpm to service the full build out. The operations camp, planned to be located in the same area as the construction camp is planned to service 500 persons; requiring about a third of the water demand of the construction camp. The construction camp is planned to operate for two years, whereas the permanent operations camp will be active for 17 years, the planned life of the mine.

After the 2013 drilling and test pumping program was completed it was decided, based on high yield and good water quality results, that two of the four wells drilled in the program would be considered, at this time, for Northern Health source water approval. Therefore, the bulk of this report will focus on TW13-01 and TW13-02, as these two wells (or aquifers the wells are completed in) are of interest for supplying potable water for the proposed construction camp and potentially the long term operations camp. In this report summaries will be provided for TW13-03 and TW13-04; however, minimal discussion of these two wells will be made as New Gold will not be looking to source potable camp water from TW13-03 or TW13-04 at this time.

I.2 Scope of Services

WWAL provided the following services for the current project:

- 1) Performed a desk-top analysis to assess drilling locations with potentially higher yields based on the intersection of geologic fractures. WWAL provided a technical memorandum summarizing potential new well locations, which were based on the aforementioned analysis as well as drill rig access, mine operation and location within the mine's land tenure;
- 2) Selected four drilling locations at the site which best fit the applicable criteria, including meeting minimum setback distances from the proposed construction camp wastewater effluent disposal area;
- 3) Monitored the drilling, development, test pumping and performed the water quality sampling of the four test wells; and
- 4) Analyzed the test pumping and water quality data and prepared this hydrogeological report.

2. SITE DESCRIPTION AND HYDROGEOLOGIC SETTING

The following sections describe the well site locations and hydrogeological setting. Climate and hydrology of nearby water course is also discussed.

2.1 Site Description

The Blackwater Mine (site) is located about 112 km southwest of Vanderhoof, BC near Mt. Davidson on the Nechako plateau (Figure 1). Regionally, the site is located on a topographic high. There has been extensive exploration drilling performed in the vicinity of the main ore body. Further, there are several flowing artesian wells on the site; however, these flowing artesian wells are located within planned mine operation areas and are therefore not usable for future camp potable water supply. There are four existing water supply wells at the site and all four produce from low yielding bedrock aquifers. Two of these wells have run dry and the other two wells yield around 5 USgpm. Only one of these low yielding wells is currently in use to provide water to the existing Blackwater and Capoose camps. The well is located on the current site access road at Kilometer marker 15 and is therefore referred to as Kilometer 15 Well (also referred to as Well 3 with Well Plate No. 31679). Information about Kilometer 15 well along with the drilled but currently unused Kilometer 14.5 Well (Well 4) is provided in the 2012 draft completion report (VWAL 2012).

Eight areas were identified as potential new well sites based on the desktop analysis (See Figures 4 and 5 in the Desk Top Study provided in Appendix A). Three drilling sites (TW13-01, TW13-02 and TW13-04) (Figures 3) were selected based on the desktop study findings, proximity to the proposed construction camp and road access. TW13-03 was selected as it will be in close proximity to the proposed gravel quarry and the client was interested in sourcing water for aggregate washing for mine construction (Figure 4). TW13-03 and TW13-04 will not be considered for source water approval at this time. Figure 2 shows the planned mine site at year 1 of the mine life and Figure 3 show the location of the new wells (TW13-01, TW13-02 and TW13-04) with respect to the proposed construction camp, the existing camp wells, the ore body, watersheds, and surface water in the area. Figure 4 shows the location of TW13-03, situated 6 km north of the proposed mine processing plant. There is opportunity to develop mine plant production water from the aquifer discovered at TW13-03 and New Gold should consider further groundwater exploration at this location prior to developing the 16 km pipe line to source water from Tatelkuz Lake.

2.2 Hydrogeologic Setting

The site is situated on the north flank of Mt. Davidson, with the catchment above the site of approximately 700 ha. The catchment to the west of the proposed construction camp is that of Davidson Creek. The catchment TW13-01 and TW13-02 are completed in is termed Creek 661 (AMEC a and b 2013). Creek 661 follows surface topography, flowing towards the east, northeast and north. Groundwater recharge and flow in the area is expected to be similarly topographically driven, with recharge occurring upslope and groundwater discharge occurring down slope, to the north and northeast. From the current drilling program we have added to the hydrogeological conceptual model of the site. Previous efforts to source water from the surficial deposits had proved unfruitful. Water for the current camp is sources from low yielding bedrock. In contrast, during the current program

three of the four wells were completed in confined to semi-confined surficial deposits located north and east of the ore body and the existing camp (Figure 2).

The Nechako Plateau, on which the Blackwater Mine is situated, consists of volcanic bedrock overlain with Quaternary (also referred to as overburden or surficial) deposits. Perched groundwater seeps through windows or lenses of higher permeability deposits (sand and gravel) which exist within the low permeability unsaturated soil matrix (glacial till). These perched groundwater zones are not true aquifers which could be sources for groundwater supply.

However, from test pitting performed by others and by WWAL it was observed that at the northern part of the site surficial deposits appeared thicker and more appreciable groundwater was present. During the drilling at TW13-01 and TW13-02 sufficient groundwater supplies were found within what we believe are semi-confined (at TW13-01) and confined (TW13-02) surficial aquifers. Borehole logs from both the current program (see Appendix B) and from previous investigations (Knight Piesold Ltd 2011, WWAL 2011, 2012 and 2013) show that surficial deposits range from sands and gravel to clay and till.

2.3 Geologic Setting

The bedrock geology in the vicinity of the site is composed primarily of volcanic and volcanoclastic felsic to intermediate lapilli and ash tuff. Major faulting in the area has resulted in three distinct geologic zones. A review the site surficial geology shows there are deposits of glacial till of varying thicknesses and composition across the site, with the surficial deposits increases in thickness to the east and northeast.

2.4 Site Groundwater Use and Nearby Reported Water Wells

Due to the relatively remote location of the mine site, current off-site groundwater extraction in the near vicinity of the mine is negligible. During the exploration phase, groundwater was being sourced for exploration drilling and for the existing camp, currently the groundwater use at the site is minimal. The current camp well, located at KM 15 produces on the order of 5 USgpm, supplying water to the Blackwater camp and the Capoose camp. Capoose camp is located just off the Kuluskus FSR at about kilometer 124. This is the only potable water supply well currently in operation at the site. Water use for on-going exploration drilling is quite minimal and is sourced from a 250 USgpm flowing artesian condemnation borehole, located on the southwest side of the ore body.

As mentioned above, four wells were drilled for the current water supply test program. Three test wells (TW13-01, TW13-02 and TW13-04) were drilled in the vicinity of the proposed construction camp about 3 km northeast of the existing exploration camp (Figure 3). The purpose of drilling the three wells was to identify the feasibility of sourcing groundwater for the construction camp potable water supply. The fourth well (TW13-03) was drilled about 6 km north of the proposed mine plant (Figure 4) and is not being considered for source water approval. TW13-03 was drilled near a proposed gravel quarry, to be used to wash gravel during mine construction. From the results of test pumping at TW13-03 we have found a very productive aquifer which could be considered as a source for mine plant production water.

Table 2.1 summarizes well information for the test water supply wells, the existing camp supply well (KM 15 Well) along with KN 14.5 Well (currently not in service), the previous camp supply wells (Well 1 and 2, which are not in use due to low yield) and the most nearby off-site wells registered on the provincial WELLS database (BCMoE 2013). One of these off-site wells reportedly supplies the Kluskus First nation village at Kluskus Lake and the other appears to be owned by a forest company. Both of the off-site wells are more than 20 km from the proposed dispersal field. Well logs for new test wells are provide in Appendix B.

Table 2.1: Summary of Site and Nearby Potable Water Supply Wells

Well Name and Well Tag or Well Plate Number	Date Drilled	Reported Yield (US gpm)	Total Depth m (ft)	Static Water Level m (ft)	Aquifer Type
TW13-01	July 31, 2013	70	27.4 m (90 ft)	2.5 m (8.3ft)	Surficial Semi-confined to confined
TW13-02	Aug 2, 2013	30	54.8 m (180 ft)	Flowing Artesian	Surficial Confided
TW13-03	Aug 2, 2013	70	13.7 m (45 ft)	4.8 m (15.7 ft)	Surficial Unconfined
TW13-04	July 28, 2013	4	121.9 m (400 ft)	6.1 m (20 ft)	Bedrock
Km 15 Well (Well No 3, I2C) WPN 31679	March 2012	5	76.5 m (251 ft)	18.99 (61.2 ft)	Bedrock
Km 14 Well (Well No 4, I2D) WPN 31680	March 2012	6	43.9 m (144 ft)	21 m (69 ft)	Bedrock
WW11-01 WPN - 31656	June 24, 2011	1.5 (Knight Piésold 2011)	121.9 m (400 ft)	6.1 m (20 ft)	Bedrock
WW10-01 WPN 31634	September 4, 2010	8	109.7 m (360 ft)	18.3 m (60 ft)	Bedrock
Kluskus well WTN 98647	2009	100	20.7 m (68 ft)	3.6 m (12 ft)	Surficial
TTM Resources WTN 95966	2008	8	64.9 m (213 ft)	57.9 m (190 ft)	Surficial

2.5 Site Climate and Hydrology

2.5.1 Climate

Climate at the site is characterized by warm summers and cold winters, with precipitation fairly well distributed throughout the year. Given these conditions, we would expect recharge to the shallow aquifer system would occur in all but the coldest months of winter when the ground is likely frozen and frost penetration is at a maximum. Climate normals for the Environment Canada climate station in Vanderhoof are provided in Table 2.2, below. Note that the Vanderhoof climate station is 600-700 m

lower in elevation than the camp site. Thus we would expect the climate at the camp to be markedly cooler than Vanderhoof and with more precipitation, and with a higher proportion of the annual precipitation falling as snow. Table 2.3 provides a summary of site specific precipitation data from Knight Piésold (2013).

Table 2.2: Climate Normals from Environment Canada Station No. 1098D90 (Vanderhoof; Elevation 638 m)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Daily Average (°C)	-9.5	-5.7	0	5.5	10.7	14.2	16.3	15.8	11.1	5.1	-2.6	-8.6	4.4
Rainfall (mm)	5.8	6.4	7.3	21.4	35.2	58	47.3	44.5	40.9	41.6	17.2	5	330.6
Snowfall (mm)	41.5	23.1	15.3	4.2	0.3	0.3	0	0	0.3	7	30.4	43	165.3
Precipitation (mm)	47.3	29.5	22.7	25.6	35.5	58.3	47.3	44.5	41.1	48.6	47.6	48	495.9

Data Source: Environment Canada 2013

Table 2.3: Regional and Blackwater Precipitation Summary (from KP)

Station Name	Period of Record	Elevation (masl)	Distance from Mine Site (km)		Units
Vanderhoof	1970 - 2012	674	112	488	Mm
				100%	% annual
				64%	Mm
				36%	% annual
Tatelkuz	1970 - 1977	914	17	483	Mm
				100%	% annual
				55%	Mm
				45%	% annual
Blackwater Low Climate Station ^{1,2}	2011	1051	15	120.2	Mm
				-	% annual
	2012			405.8	Mm
					% annual

Data from Knight Piésold, 2013.

2.5.2 Hydrology

Both TW13-01 and TW13-02 are completed in the watershed of Creek 661 (BC Watershed Atlas Code 100-567134-610692-671007-505659-146920). Creek 661 flows east into Chedakuz Creek and then northeast into Tatelkuz Lake, which is located about 15 km from the site. The stream closest to

the wells and tributary to Creek 661 is ranked as stream class order S3 (AMEC 2013a), as outlined in the Forest Practices Code “Fish-stream Identification Guidebook.” The unnamed stream, tributary to Creek 661, was 2.1 m in width and 0.3 m in depth in July 2013, during the drilling program. The creek is likely ephemeral.

3. WELL DRILLING

The four new test water supply wells (TW13-01, TW13-02, TW13-03 and TW13-04) are 150 mm in diameter and drilled using the air rotary. Drilling was completed by Cariboo Water Wells Ltd. of Prince George, B.C. (B.C. Registered Well Driller # 05111704) and monitored by Ryan Rhodes (VWWAL). The drilling program commenced on July 26, 2013 and was completed on August 30, 2013. Samples were collected at 5 ft intervals for logging of the lithology. The lithology is described on the well logs provided in Appendix B and a summary is provided below.

3.1 Summary of Lithology

TW13-01

TW13-01 sits at an elevation of 1312 masl and is located on the west side of the stream tributary to Creek 661. The well was screened within a 4 m (13 ft) sand and coarse gravel (cobble) surficial aquifer, located between about 23 m (76 ft) and 27 m (88 ft) below ground surface (bgs). Above the water bearing zone is a confining layer of sandy clay with boulders about 11 m (36 ft) thick, between 7 m (23 ft) and 18 m (58 ft) bgs.

TW13-02

TW13-02 sits about 1,300 m northeast of TW13-01 and at an elevation of 1249 masl; is lower in elevation relative to TW13-01. Like TW13-01, TW13-02 is completed within the Creek 661 drainage basin. The well was flowing artesian, measured at about 10 lbs of pressure on August 2, 2013. Lithology from the borehole showed glacial till with a high percentage of silt from 0 m (0 ft) to 29 m (95 ft) bgs. Wet soil samples were observed at 21 m (70 ft); then the formation showed a dense, dry material, termed “cemented till” between 24 m (80 ft) to 27 m (88 ft). From 27 m (88 ft) to and 29 m (95 ft) was silt and sand. Between 29 m (95 ft) and 55 m (180 ft) the formation becomes more coarse with a higher sand and gravel composition but still termed cemented till. The driller stated that the major water producing zone was between 43 m (140 ft) and 49 m (160 ft); however, it was apparent that after 29 m (95 ft) a confined aquifer was present and water production was sizable.

Borehole logs and the driller’s reports which include the lithological details at TW13-03 and TW13-04 may be found in Appendix B.

3.2 Well Construction Details

Drilling was initiated at by installing a surface seal by auguring an oversized borehole, prior to advancing of the 150 mm diameter production casing inside the augured hole. The space between the oversized hole and the drilling casing was then filled with hydrated bentonite chips.

TW13-01

TW13-01, was completed in semi confined to confined surficial deposits at a depth of 27.4 m (90 ft) and has a 2.4 m (8ft) screen of 25 slot (4 ft) and 30 slot (4 ft) size.

TW13-02

TW13-02 is completed in a confined aquifer and is 54.8 m (180 ft) in depth. The well is flowing artisan and was completed with a 42.7 m (140 ft) PVC liner from 40 to 180 ft bgs. As drilling in the cemented till at TW13-02 became increasingly difficult to advance casing the borehole was drilled open hole from about 29 m (95 ft) to the end of the borehole. Due to the consolidated nature of the cemented till the borehole remained open for the placement of the PVC liner.

A summary of well construction details are provided in Table 3.1 and the well logs and well drillers reports are provided in Appendix B.

Table 3.1: Construction Details for 2013 Blackwater Water Test Wells.

Construction Detail	Well Plate Number	Casing Diameter	Screen Diameter	Total Well Depth (bgs)	Length of Open Screen	K-Packer Depth	Screen Design
TW13-01	28413	150 mm (6 inch)	6" Telescoping / Johnson	27.4 m (90 ft)	2.4 m (8ft)	Riser from 23.3 m (76.5 ft) to 24 m (78.5 ft) with K-Packer at 23.3 m (76.5 ft)	4 ft of stainless steel 25 slot from 24 m to 25.1 m (78.5 ft to 82.5 ft) 4 ft of stainless steel 30 slot screen from 25.1 m to 26.4 m (82.5 ft to 86.5 ft)
TW13-02	28414	150 mm (6 inch) to 29.6 m (97 ft)	4.5" PVC Perforated Liner	54.8 m (180 ft)	42.7 m (140 ft)	N/A	Perforated liner between 12 m (40 ft) and 54.9 m (180 ft)
TW13-03	28415	150 mm (6 inch)	6" Telescoping / Johnson	13.7 m (45 ft)	1.2 m (4 ft)	Riser between 9.44 m (31 ft) and 10 m (33 ft) with K-Packer at top of riser	4 ft of stainless steel 25 slot screen from 10 m 33 ft to 11.27 m (37 ft)
TW13-04	28412	150 mm (6 inch)	4.5" PVC Perforated Liner	122 m (400 ft)	107 m (350 ft)	N/A	Perforated liner between 15.2 m (50 ft) and 122 m (400 ft)

3.3 Well Development

Following screen installation, the wells were developed using the air lift technique with the air rotary drilling rig. Air lifting rates varied for each well; 4 USgpm (TW13-04), 20 USgpm (TW13-02 and TW13-03) and 40-50 USgpm (TW13-01). These rates were used throughout the development process to remove suspended fines in the water column. Sediment-laden water was discharged to ground and managed so as not to flow into nearby water courses. TW13-01 was developed for 6 hours, TW13-02 was developed for 4 hours, and TW13-03 and TW13-04 were developed for about 2 to 3 hours each. At the end of development, the water flowing from the wells was visibility clear.

4. WELL TEST PUMPING METHODS

WWAL designed and monitored pumping tests at each of the four test wells between August 5 and August 12, 2013 using electric submersible pumps. The durations of the constant rate tests ranged from 46 to 62 hours. Aquatech Services of Kelowna (B.C. qualified well pump installer # WPI 05110206) supplied, installed and operated the test pumps powered by diesel fuel generators. The flow rates were controlled with a gate valve on the discharge line. Flow rates were measured using a 25 mm (1 inch) magnetic flow meter.

Water depths in the wells were measured using an electric water level tape at regular intervals. Further, pressure transducers were installed for the duration of the test as a backup to monitor water level changes over time. Water levels and flow rates were measured and recorded throughout the tests, with the most frequent readings made early in the test and again at the beginning of recovery.

Prior to pump installation, the wells were chlorinated with chlorine tablets. Personnel from Aquatech were on site for the duration of the test and collected flow and water level measurements at intervals we specified. Water from the tests was discharged at a down-slope location approximately 30 m (100 feet) from the wells. Following pump shutoff, water level recovery measurements were collected.

The test pumping program for the four wells is summarized here. All tables and graphs are provided in Appendix C.

TW13-01

The testing program for TW13-01 consisted of the following:

- Variable rate step test with 90 minute steps at 3.13 and 3.79 L/sec (50 and 65 US gpm). (Table C1; Figures C1)¹.
- 48 hour constant rate test at 4.42 L/sec (70 US gpm). (Table C2; Figures C2 and C3).

TW13-02

The testing program for TW13-02 consisted of the following:

- Variable rate step test with 90 minute steps at 0.69, 0.95, 1.26 and 1.89 L/sec (11, 15, 20 and 30 US gpm). (Table C3 and Figure C4).

¹ Table and Figure references to pumping test data tables and graphs in Appendix C .

- 46 hour constant rate test at 1.89 L/sec (30 US gpm). (Table C4, Figures C5 and C6).

TW13-03

The testing program for TW13-03 consisted of the following:

- Variable rate step test with 90 minute steps at 1.58, 1.89, and 2.52 L/sec (25, 30 and 40 US gpm). (Table C5 and Figure C7).
- 62 hour constant rate test at 4.4 L/sec (70 US gpm). (Table C6, Figures C8 and C9).

TW13-04

The testing program for TW13-04 (completed in bedrock) consisted of the following:

- 60 hour constant rate test at 0.25 L/s (4 US gpm). (Table C6, Figures C5 and C6).

5. WELL TESTING RESULTS

To interpret the test pumping results, we processed raw pumping test data into a series of graphs and analyzed the data. The analysis included well and aquifer hydraulics in order to estimate aquifer properties and to assess whether the aquifer's productivity is sufficient for the intended use. Using provincial guidelines, we estimated each well's long-term sustainable capacity. Appendix C provides the graphs and interpretations.

5.1 Effect of Season on Aquifer Levels During Testing

The test pumping occurred in August, which is considered representative of average seasonal groundwater conditions. Thus test pumping was conducted at a time of year when recharge from infiltration was not significant. It is likely that once freshet has occurred during late spring and summer months aquifer recharge is higher, and accordingly, greater short-term well yields could be expected due to higher groundwater levels. Therefore, well yield ratings from test pumping in August are considered representative of an average for the year.

5.2 TW13-01 Test Pumping Results

The well was able to sustain a constant pumping rate of 4.42 L/s (70 US gpm) for a 48 hour duration. At the end the 48 hour test the water level was 14.16 m (46.45 ft) below the datum (top of casing) and 53% percent of available drawdown was used. Around 1,500 minutes (25 hours) a positive recharge boundary was observed during the test pumping (Appendix C – Figure C3). Following the constant rate test, water levels recovered to 58% of the pre-pumping water level after 2 hours and 92% of the pre-pumping test water level after 24 hours.

5.3 TW13-02 Test Pumping Results

TW13-02 was able to sustain a constant pumping rate of 1.89 L/s (30 US gpm) for 46 hours (Figures C5 and C6). At the end of the test, the water level was 16.66 m (54 ft) below the top of the casing, utilizing approximately 35% of the available drawdown in the well, with the pump set at 47.2 m (155 ft). No obvious boundary conditions were observed during the test pumping. Water level recovery following the test pump was quite strong and recovered to the top of casing or 100% after two hours.

5.4 TW13-03 and TW13-04 Test Pumping Results

Refer to Appendix C for the test pumping results at TW13-03 and TW13-04. Note, the aquifer at TW13-03 appears to be very productive; recovery to the static water level, after 62 hours of continuous pumping at 4.4 L/sec (70 USgpm) occurred within one minute. As mentioned above, the aquifer discovered at TW13-03 is extremely productive and there is opportunity to source mine plant production water from this aquifer. Further exploration of this area should be considered. See Figures C8 and C9 (Appendix C) for the time – drawdown plots at TW13-03.

5.5 Aquifer Properties

Aquifer properties of transmissivity and hydraulic conductivity were estimated using the Cooper-Jacob solution applied to the recovery responses and the results are summarized in Table 5.1 for the four test wells. Transmissivity values estimated from TW13-01 and TW13-02 differ by an order of magnitude; similarly, the hydraulic conductivity values derived from test pumping at the two wells differ. Although there was significant difference in hydraulic response at the two wells there is similarity in the groundwater geochemistry at both locations. Possibility, the wells are completed in aquifers that are hydraulically related but due to the heterogeneity of the surficial formations the two aquifers or aquifer zones showed different hydraulic responses during test pumping. Further, from assessment of the groundwater geochemistry, lithology and hydraulic response, it may be that TW13-01 is completed in an aquifer zone which sees a larger contribution of fresh water, from surface, compared to the aquifer zone TW13-02 is completed in (further discussion in Section 6). Lithology at both TW13-01 and TW13-02 consisted of sand, gravel and silt of varying proportions; with stratigraphy at TW13-02 showed a higher percent of fine material compared to TW13-01. Note, depth at the bottom of the well screens and static water levels at the time of testing were used to estimate aquifer thicknesses for calculation of hydraulic conductivity.

Table 5.1: Summary of Aquifer Properties Estimated from Test Pumping

Well ID	Transmissivity (m ² /sec)	Hydraulic Conductivity (m/sec)
TW13-01	1.28E-04	3.00E-05
TW13-02	2.16E-05	9.50E-07
TW13-03	3.68E-02	6.03E-03
TW13-04	1.20E-05	1.40E-07

5.6 Well Interference

Test pumping of TW13-01 and TW13-02 was performed in tandem, where TW13-01 was pumped on August 5, 2013 and TW13-02 was test pumped starting 10 hours later, the morning of August 6, 2013. For the remainder of the testing both wells were pumped at the same time to mimic possible future well operation.

Further, two New Gold monitoring wells (MW12-12-S and MW12-12-D), located 300 m to the northwest of TW13-02 were monitored for water level response during the tests. It happened that Avison Management Services Ltd (Avison), based in Vanderhoof, had staff sampling at the monitoring wells during the test pumping program. However, sampling was performed with low flow sampling apparatus (bladder pump). Therefore, no appreciable water was withdrawn and we do not believe the environmental monitoring performed by Avison affected our test pumping results.

Periodic monitoring over the duration of test pumping indicated no response in either monitoring well to the test pumping at TW13-02. Based on the pumping rates and the estimated aquifer hydraulic properties, it is unlikely that measurable well interference occurred during the tests. With the given projected demand for the proposed 1,500 person construction camp of about 60 to 70 USgpm, if both TW13-01 and TW13-02 were operated at the same time we do not anticipate significant well interference. However installation of pressure transducers, for the operations of the wells, is recommended; so that ongoing operation questions regarding well performance can be answered without significant reworking of the pumping configuration.

5.7 Long-Term Sustainable Yield Estimates

Estimates of the well yield for the wells were made using the standard B.C. long term well capacity rating termed the Certificate of Public Convenience and Necessity (CPCN) calculation (Allen et. al. 1999). Although there are uncertainties in the potential demand on these two proposed new water sources and likely there will be continuous long-term production as opposed to only 100 days of production we feel the 50% safety factor is adequate to protect this groundwater source. The CPCN calculations can be found in Appendix C -Figures C3, C6, C9 and C11 for the four wells. The long-term sustainable yield ratings of the wells, with a conservative 50% safety factor, are as follows:

- TW13-01 - 68 USgpm (4.29 L/sec);
- TW13-02 - 30 USgpm (1.89 L/sec);
- TW13-03 - 70 USgpm (4.4 L/sec); and
- TW13-04 - 4 USgpm (0.25 L/sec).

Total projected sustainable yield from the two wells proposed for the construction camp potable water supplt, TW13-01 and TW13-02 are estimated at 98 USp gm (6.2 L/sec) when applying the 50% safety factor which is based on the assumption of continuous pumping for no more than 100 days. This is well beyond the projected maximum demand of the construction camp of about 70 USgpm.

6. WATER QUALITY

TW13-01 and TW13-02 were both sampled for the full Northern Health Authority Source Approval List whereas TW13-03 and TW13-04 were sampled for a more limited standard potability analysis. See Table 6.1, below, for a summary of water quality exceedances, Table 6.2 for a summary of water quality parameters and refer to Appendix D for the fully tabled water quality results along with the laboratory reports.

The water quality from all four wells is good with low concentrations of all major ions (see Table 6.1). With total hardness values in the surficial aquifers between 45 mg/L to 65 mg/L, the groundwater at the new wells is not considered hard. Water quality results for both TW13-01 and TW13-02 are similar, with groundwater at TW13-01 being slightly fresher than that at TW13-02. We expect the groundwater at TW13-01 to have travelled along shorter subsurface flow paths and be less mineralized than groundwater at TW13-02. However, the geochemical signature of the groundwater at both wells is similar; suggesting the majority of the source water for both wells is the same.

Nitrite was below detection limits in both wells and nitrate was found at a very low concentration (below 0.1 mg/l) at all wells. These results indicate low to non-detectable nutrient levels, which is what we would expect in pristine, not anthropogenically affected, source water in this setting.

6.1 Exceedances of Drinking Water Guidelines

Table 6.1 summarizes the exceedances in drinking water quality guidelines. We compared the results to the Guidelines for Canadian Drinking Water Quality (CGDWQ (AO = aesthetic objective, MAC = health-based maximum acceptable concentration)) (Health Canada 2013) and the British Columbia Approved Water Quality Guidelines for Drinking Water (BCAWQG DW). Note, that the exceedance in drinking water quality guideline is for phosphorus; however, this guideline applies to surface water sources only and is not applicable to groundwater. Total iron exceeded the aesthetic objective of 0.3 mg/L at 1.57 mg/L; however, this is an aesthetic objective and does not require treatment. Therefore, there were no applicable GCDWQ MAC exceedances in water quality guidelines. Note, turbidity at TW13-02 was slightly elevated at 2.3 NTU, due to the atypical screen design. However, the turbidity is not believed to be a significant issue for this well. Further discussion regarding drilling a production well within the same aquifer as TW13-02, but with a more conservative screen design will be discussed in Section 9.

Table 6.1: Summary of Water Quality Exceedances

Sampling Location	Guideline	Exceedances
TW13-01	BCAWQG DW	Phosphorus (dissolved, by ICPMS/ICPOES), Phosphorus (total, by ICPMS/ICPOES)
TW13-02	GCDWQ AO	Iron (total)
	BCAWQG DW	Phosphorus (dissolved, by ICPMS/ICPOES), Phosphorus (total, by ICPMS/ICPOES)

Table 6.2: Summary of Water Quality Results

Analyte	Unit	Guideline				Sampling Location			
		GCDWQ MAC	GCDWQ AO	BCAWQG	BCWWQG	TW13-01	TW13-02	TW13-03	TW13-04
				DW	DW				
General									
Conductivity	µS/cm	NG	NG	NG	NG	109	143	123	169
Depth to Water	m	NG	NG	NG	NG			4.8	4.8
Oxidation reduction potential	mV	NG	NG	NG	NG	272	202	144	133
Temperature	°C	NG	15	15 ^{3.2}	NG	5.1	4.5	4.8	6.4
Turbidity	NTU	N ^{1.1}	NG	N ^{3.3}	NG	0.6	2.3		
Alkalinity (total, as CaCO3)	mg/L	NG	NG	NG	NG	49	66	62	88
Chloride	mg/L	NG	250	250 ^{3.13}	NG	0.12	0.15	0.2	0.12
Conductivity	µS/cm	NG	NG	NG	NG	104	136	123	169
Hardness, Total (total as CaCO3)	mg/L	NG	NG	NG	NG	44.9	65.9	59.7	78.8
pH		NG	6.5 - 8.5	6.5 - 8.5 ^{3.15}	NG	7.86	8.07	7.64	8.05
Sulphate	mg/L	NG	500 ^{2.2}	500	NG	2.5	2.8	2.9	<1.0
Total dissolved solids	mg/L	NG	500	NG	NG	65	75	67	88.3
Microbiological									
E. coli (counts)	CFU/100 mL	0 ^{1.6}	NG	0 ^{3.18}	NG	<1	<1	<1	<1
Fecal coliforms (counts)	CFU/100 mL	0 ^{1.8}	NG	0 ^{3.20}	NG	<1	<1		
Nutrients									
Nitrate (as N)	mg/L	10	NG	10 ^{3.22}	NG	0.051	0.045	0.03	0.032
Phosphorus (dissolved, by ICPMS/ICPOES)	mg/L	NG	NG	0.010 ^{3.25}	NG	<u>0.09</u>	<u>0.08</u>	<0.20	<0.20
Phosphorus (total, by ICPMS/ICPOES)	mg/L	NG	NG	0.010 ^{3.26}	NG	<u>0.111</u>	<u>0.177</u>	<0.2	<0.2
Total Metals									
Aluminum (total)	mg/L	NG	N ^{2.3}	NG	NG	0.006	1.14	<0.05	<0.05
Arsenic (total)	mg/L	0.010 ^{1.14}	NG	0.025 ^{3.28}	NG	0.0026	0.0036	<0.005	<0.005
Calcium (total)	mg/L	NG	NG	NG	NG	12.7	18.3	19	20
Copper (total)	mg/L	NG	1.0	0.500 ^{3.29}	NG	0.0004	0.0042	<0.002	<0.002
Iron (total)	mg/L	NG	0.3	NG	NG	0.01	1.57	<0.1	<0.1
Lead (total)	mg/L	0.010	NG	0.050 ^{3.30}	NG	<0.0001	0.0012	<0.001	<0.001
Magnesium (total)	mg/L	NG	NG	NG	NG	3.17	4.89	3.2	6.8
Manganese (total)	mg/L	NG	0.05	NG	NG	0.0002	0.0158	<0.002	<0.002
Molybdenum (total)	mg/L	NG	NG	0.25 ^{3.32}	NG	0.0018	0.0033	0.001	<0.001
Nickel (total)	mg/L	NG	NG	NG	NG	<0.0002	0.0018	<0.002	<0.002
Silicon (total, as Si)	mg/L	NG	NG	NG	NG	8.6	12.5	7	9
Sodium (total)	mg/L	NG	200	NG	NG	4.55	4.82	3.4	6.7
Strontium (total)	mg/L	NG	NG	NG	NG	0.091	0.133	0.1	0.24
Uranium (total)	mg/L	0.02	NG	NG	NG	0.00021	0.00068	<0.0002	0.0008
Related to HAA and THM Formation Potential									
Chlorine demand	mg/L	NG	NG	NG	NG	0.4	0.4		
Free chlorine, final	mg/L	NG	NG	NG	NG	3.9	4.5		
Free chlorine, initial dose	mg/L	NG	NG	NG	NG	4.3	4.9		
Incubation Temperature	°C	NG	NG	NG	NG	20	20		
Incubation Time	d	NG	NG	NG	NG	7	7		

7. PRELIMINARY SOURCE PROTECTION AND PRELIMINARY GWUDI ASSESSMENT

7.1 Preliminary Source Protection Considerations

The wells we are seeking source approval for are TW13-01 and TW13-02; both are completed in semi-confined to confined aquifers located on the north slope of Davidson Mountain. The area above the wells has seen little development; however, the existing exploration camp wastewater dispersal field is located about 1.1 km southwest and upgradient of TW13-01. The location of the current wastewater dispersal field is well outside the required provincial setback of 90 m (for a well completed in a confined aquifer). Further, operations of the proposed construction camp waste water disposal area is to occur approximately 750 m to the southeast of TW13-01, and 1,400 m south of TW13-02; meeting the provincial setback, as specified in the Municipal Wastewater Regulation, of 90 m for confined aquifers. The wastewater disposal area is cross gradient to both wells and with consideration of the semi-confined and confined nature of the aquifers the wells are completed in, we do not see the operation of the proposed construction camp wastewater disposal to be a significant risk to water quality. However, as noted above, ongoing water quality monitoring will be recommended in Section 9.

Further, the mine plan shows that waste rock may be stored in the catchment of Creek 661 (Figure 2) upgradient of TW13-01 and TW13-02. The construction camp will be operated for only two years; after the mine construction is complete a permanent operations camp will require a potable water source. The permanent operations camp will require a water supply of about 1/3 the demand compared to the construction camp. During the two year operation of the construction camp there will not be potential leaching of the waste rock into the groundwater. However, after operation of the mine begins and waste rock is being stored upgradient of TW13-01 and TW13-02 there may be risk of potentially altering the composition of the groundwater due to leaching of the waste rock. The lower demand during operation will reduce the risk, yet there remains potential risk to the groundwater source from leaching of waste rock. Therefore, we recommend an ongoing groundwater monitoring program during the entire operational life of the wells; see Section 9 for further details.

7.2 Preliminary GWUDI Assessment

The GWUDI screening followed the protocols of the B.C. Ministry of Environment *Version 2 – Guidance Document for Determining Groundwater at Risk of Containing Pathogens including Groundwater Under the Direct Influence of Surface Water* (MOE July 2013). The B.C. MoE Screening Tool Checklist for Ground Water at Risk of Containing Pathogens (B.C. MoE 2013) was used to perform a preliminary assessment of whether the newly drilled test wells TW13-01 and TW13-02 are considered “at risk” of containing pathogens. The completed checklists for TW13-01 and TW13-02 are provided in Appendix E. The wells are not considered to be at risk.

8. CONCLUSIONS

From the study we provide the following conclusions:

- C1 Four new 150 mm diameter wells have been completed at the Blackwater Mine (TW13-01, TW13-02, TW13-03 and TW13-04). Based on geographical location, well yield and water quality two of the new wells (TW13-01 and TW13-02) are adequate for development of groundwater for the proposed mine construction camp. All four wells were drilled and developed using the air rotary method, and construction details are provided in this report.
- C2 TW13-01 and TW13-02 are both completed within water bearing surficial deposits. Either the wells are completed in two different, hydraulically independent aquifers or more likely, the wells are completed within the same heterogeneous surficial aquifer but in different aquifer zones which display different hydraulic responses. The aquifers or aquifer zones are semi-confined (at TW13-01) to confined (TW13-02) in nature. The aerial extent of the aquifer(s) are unknown at this time. Due to the remote location, these aquifers have not been mapped by the Province of B.C.
- C3 The test pumping occurred during the time of year when aquifer levels are typically at an average annual level (late summer) and will provide average sustainable yield estimates.
- C4 Based on the results of the testing program and application of a conservative 50% safety factor, we conclude that the two wells (TW13-01 and TW13-02) should be capable of a combined 6.2 L/s (98 US gpm). A higher combined yield should be possible if a new production well is drilled in the vicinity of TW13-02. TW13-02 is located in close proximity to the proposed construction camp and due to the apparent confined nature of the aquifer TW13-02 is completed in, this aquifer may have a lower potential to be affected by surface born contamination than TW13-01.
- C5 Water quality is acceptable for potability, meeting all health-based Guidelines for Canadian Drinking Water Quality Maximum Acceptable Concentrations. Total iron did exceed the aesthetic objective (AO) at TW13-02. However, we anticipate that if a filter pack screen design is implemented when drilling a production well at the same location as TW13-02 total iron will not exceed the AO.
- C6 An assessment of whether the wells, TW13-01 and TW13-02 should be considered under the direct influence of surface water (GWUDI) was completed. Based on the results, we recommend the wells not be considered GWUDI and that they be considered secure groundwater sources.
- C7 The surficial aquifer at TW13-03 appears to be highly productive and there is opportunity for this location to potentially produce the water demand for the mine metallurgical plant operation. The TW13-03 aquifer is only 6 km northeast of the proposed mine site; compared to the 16 km distance to Tatalkuz Lake, currently proposed for the plant operations water source.

9. RECOMMENDATIONS

- R1 Based on the testing data, we recommend maximum pumping rates of 4.3 L/s (68 US gpm) from TW13-01 and 1.89 L/s (30 US gpm) from TW13-02.
- R2 Each well should be equipped with a submersible pressure transducer so that pumping and static water levels can be monitored. We recommend that a hydrogeologist be retained during the first year of operation to review the operational data and provide updated recommendations for operating parameters. This will enable on-going monitoring of the well operations; which is vital in understanding the actual well yields over time.
- R3 TW13-02 was completed using the well screen materials available on-site during test drilling. Although the well could be used for source water, as it meets all specific criteria, consideration should be made to drill a new production well. The new well would be located in the vicinity of TW13-02 and be completed at about the same depth as TW13-02. However, the production well should be a larger diameter and be screened with a filter pack to help reduce turbidity and maximize the yield potential for the confined aquifer. We recommend drilling a 200 mm (8") well with a 217 mm (5") screen filter pack; the estimated cost to drill a new well would be approximately \$45,000.
- R4 With the potential for these wells (TW13-01 and potentially TW13-02) to be affected by the mine operation, we recommend an annual monitoring program be implemented. We recommend that a full compressive potability water quality assessment be performed on both wells and on any other future production wells drilled into these source aquifers. Further, the sampling should occur three times per year to coincide with the high, average and low water levels at the wells. These data should be provided to a database manager to enable easy tracking of changes to water quality over time. We recommend Wireless Water Inc. as a database manager. Further, we recommend that a qualified person assess the data on a yearly basis to compare the water quality results over time; in this way any potential water quality degradation which may occur thought the life of the mine can be evaluated. This water quality monitoring would occur separate to that specified by Northern Health for routine microbiological assessment.
- R5 The wells drilled at TW13-01 and TW13-02 have demonstrated adequate groundwater yield and quality; therefore, piping of potable water from these locations to the proposed construction/operations camp should be considered by New Gold. Opus DaytonKnight provided cost estimates to pipe and store potable drinking water to the proposed construction and operations camps. These cost estimates are \$413,100 to pipe from TW13-01 and \$283,100 from TW13-02 and are detailed in Appendix F.
- R6 There is an opportunity to source mine plant production water from the groundwater source discovered at TW13-03. A drilling program to explore the surficial aquifer 6 km northeast of the proposed mine plant, in the vicinity of TW13-03 (Figure 4), should be considers. If this option is

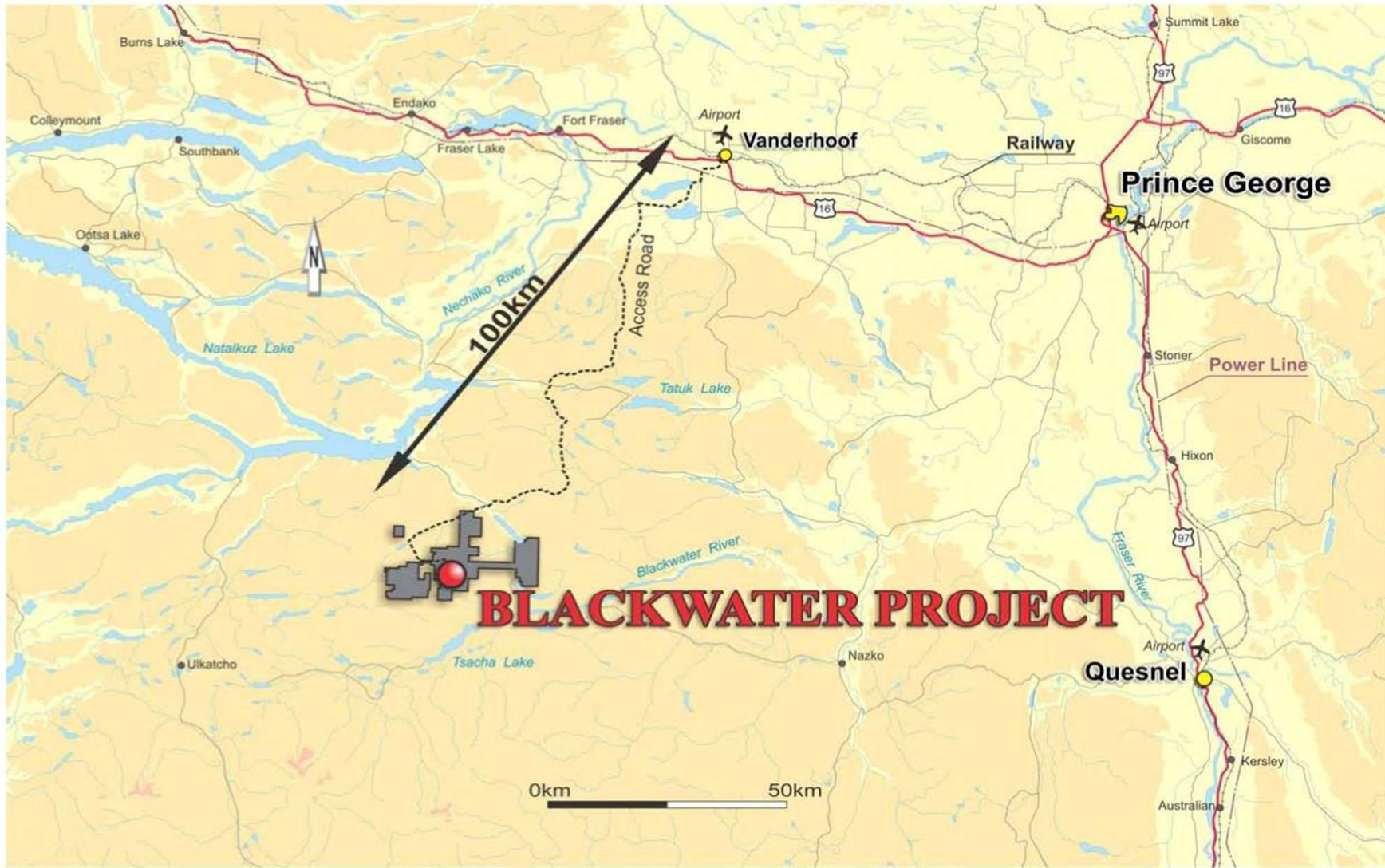
of interest, this groundwater exploration program should occur before major engineering efforts are made to source water from Tatelkuz Lake.

10. CLOSURE

We trust that the professional opinions and advice presented in this document are sufficient for your current requirements. Please note that there are restrictions and limitations that apply to the scope of our services and conclusions provided herein, as outlined on the attached Standard Report Limitations page. Should you have any questions, or if we can be of further assistance in this matter, please contact the undersigned.

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New Gold – Blackwater
Construction Camp Water Supply

TITLE
Figure 1: Site Location Map



DRAWN BRM

DATE September 2013

PROJECT NO. 13-019-01

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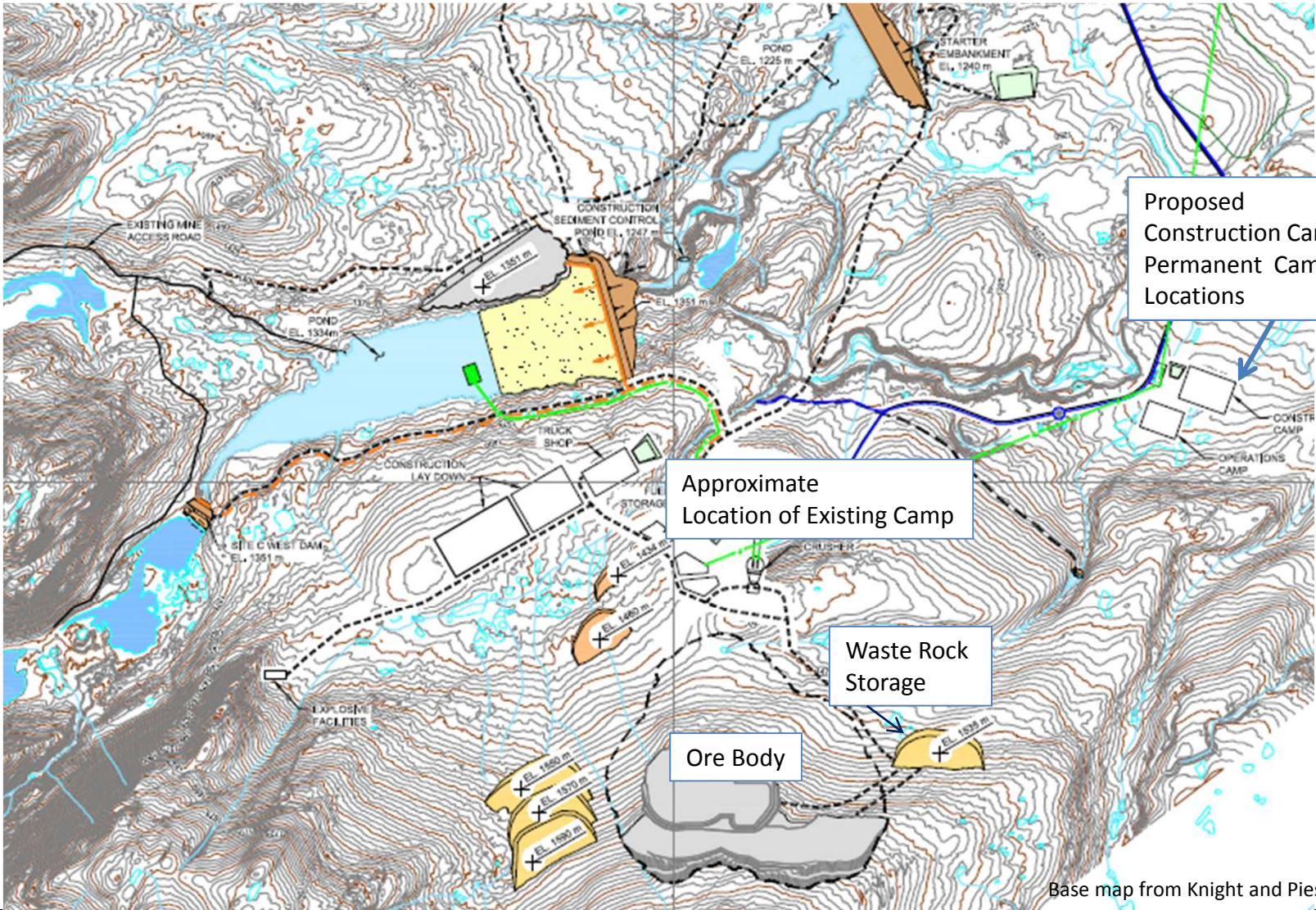
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FIGURE VERSION NO. 1



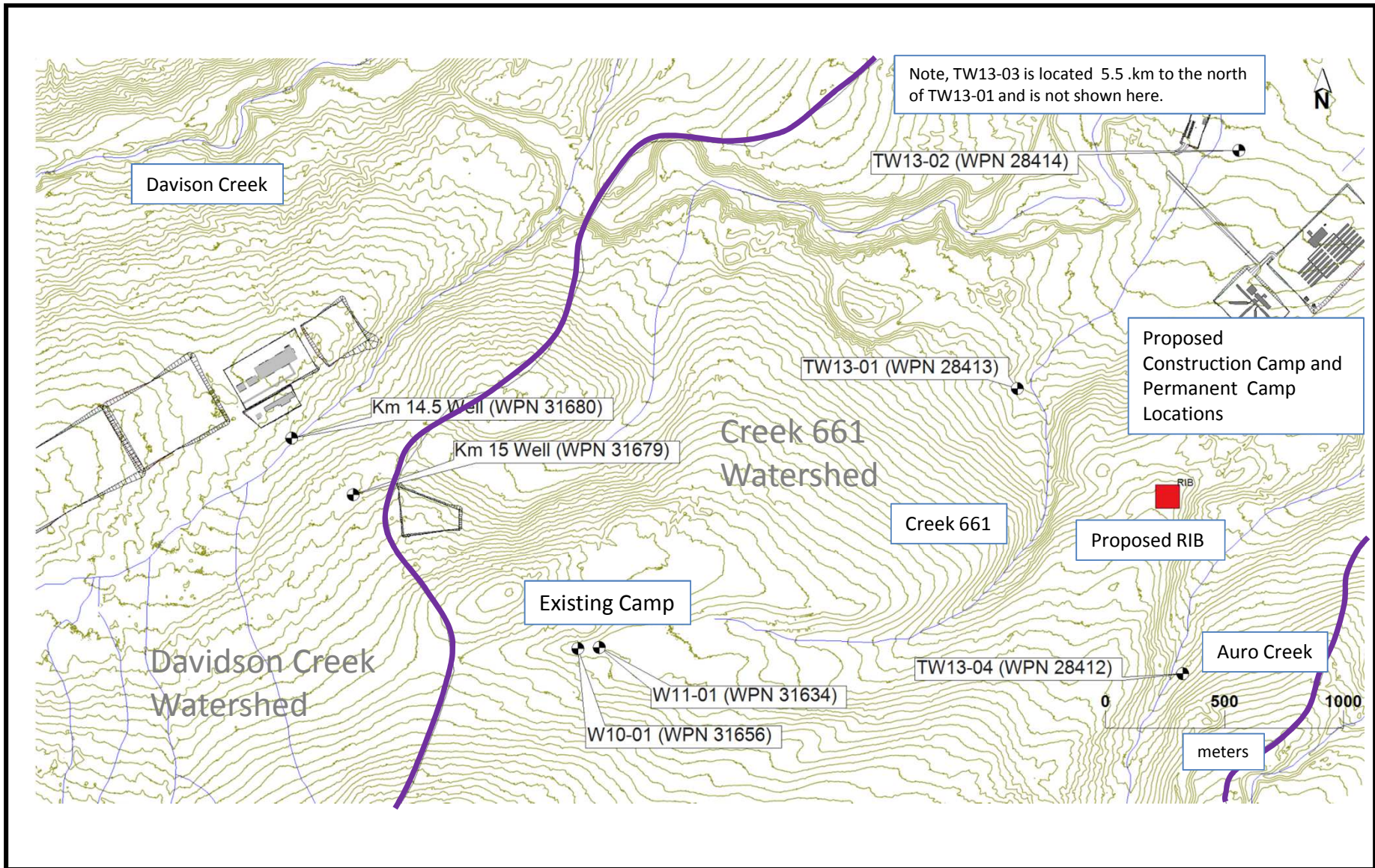
Base map from Knight and Piesold, 2013.

New Gold – Blackwater
Construction Camp Water Supply

TITLE **Figure 2: Blackwater -Year 1 of Mine** – with planned mine infrastructure , with the existing camp location, the ore body and the proposed construction camp location identified



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New Gold – Blackwater
Construction Camp Water Supply

TITLE **Figure 3: Site Map** With Test Wells, 5 m contours , watershed boundaries (purple), creek names and the location of the RIB (proposed waste water dispersal area) provided.



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DATE September 2013

PROJECT NO. 13-019-01

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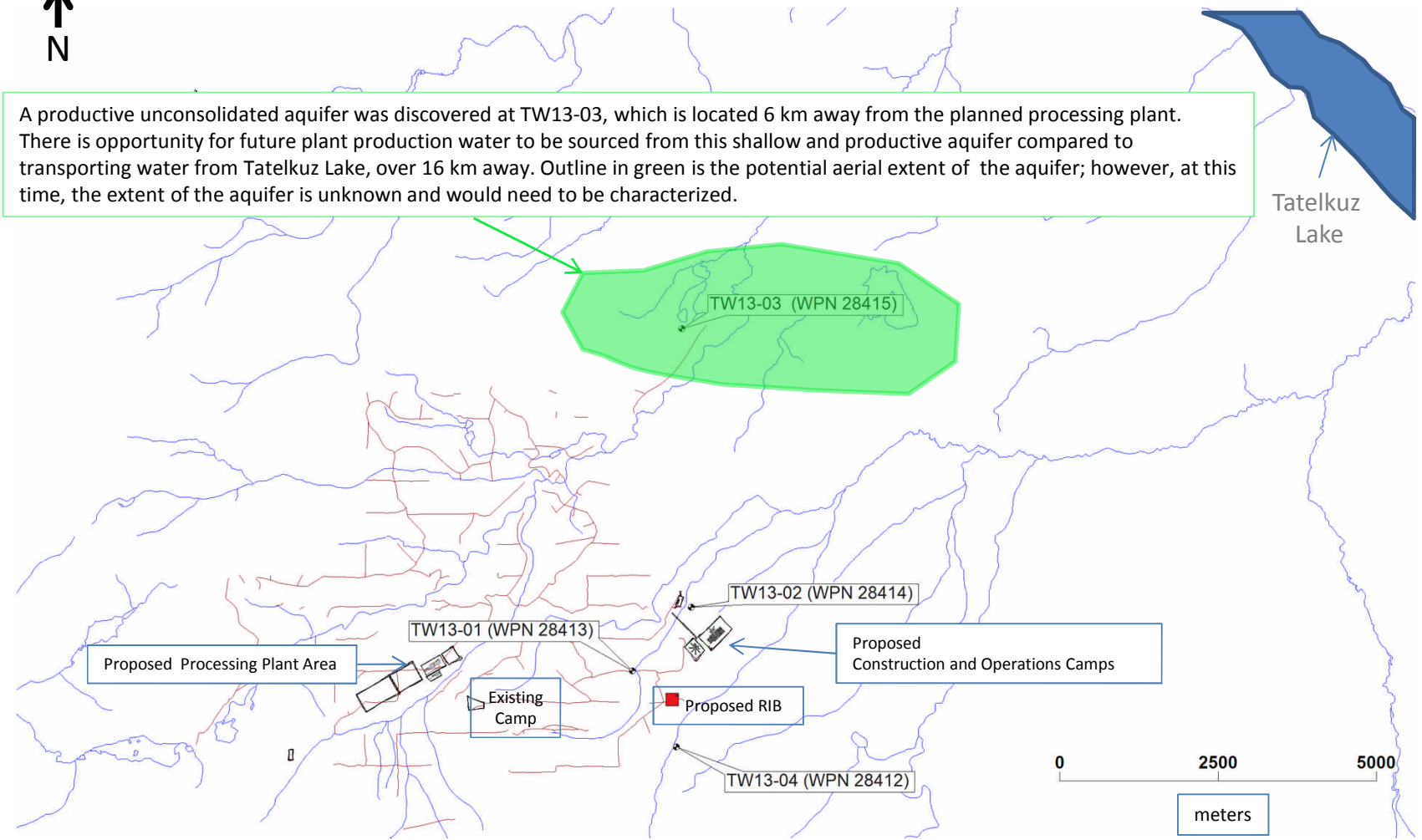
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FIGURE VERSION NO. 3



A productive unconsolidated aquifer was discovered at TW13-03, which is located 6 km away from the planned processing plant. There is opportunity for future plant production water to be sourced from this shallow and productive aquifer compared to transporting water from Tatalkuz Lake, over 16 km away. Outline in green is the potential aerial extent of the aquifer; however, at this time, the extent of the aquifer is unknown and would need to be characterized.



New Gold – Blackwater
Construction Camp Water Supply

TITLE **Figure 4: Site Map showing TW13-03, located 6 km from the proposed processing plant**



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FILE NO.

PROJECT NO. 13-019-01
DWG. NO. na
FIGURE VERSION NO. 1

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Appendix A

Desktop Analysis for Groundwater Supply Development Options



TABLE OF CONTENTS

1. INTRODUCTION	1
2. PROJECT BACKGROUND	1
3. SCOPE OF WORK AND METHODOLOGY	1
4. HYDROGEOLOGICAL ANALYSIS	3
4.1 Potentiometric Elevations and Estimated Contours	4
4.2 Conceptual Groundwater Flow Model	4
4.3 Precipitation Distribution.....	4
4.4 Lineaments	5
4.5 Hydraulic Conductivity Measurements	5
4.6 Well Yield Data.....	5
5. WATER QUALITY REVIEW.....	6
6. DEVELOPMENT OF SITING CRITERIA.....	6
7. POTENTIAL DRILLING LOCATIONS.....	7
8. DISCUSSION AND RECOMMENDATIONS	11
9. CONCLUSIONS	12
10. CLOSURE.....	13

List of Figures

Figure 1: Blackwater Well Locations

Figure 2: Blackwater Estimated Potentiometric Contours

Figure 3: Blackwater Conceptual Groundwater Flow Model

Figure 4: Blackwater Wide Area Plan with Gridded Total Annual Precipitation Normals (1961-1990)

Figure 5: Potential Drilling Locations for Blackwater Project Potable Groundwater Supply

List of Tables

Table 1: Previously Measured Well Yield

Table 2: Summary of Siting Criteria Analysis for Potential Water Supply Well Drilling, Blackwater Mine Site

I. INTRODUCTION

Western Water Associates Ltd. (WWAL) has prepared this report to outline the results of a Desktop Study conducted to assess potential drilling areas for a new potable groundwater supply for the future 1,500 man mine construction camp at the New Gold Inc. (New Gold) Blackwater Site (the Site). It is our understanding that water demand for the new camp will be approximately 56 USgpm, and that a temporary groundwater supply is required for a two year period until a surface water source is secured. This study represents Task I of WWAL's work plan outlined in our proposal dated May 1, 2013 for Hydrogeological Services to Supply Water for the New Gold Blackwater Construction Camp, Blackwater, BC. The Desktop Study (Task I) involved gathering and evaluating available geological and hydrogeological data to identify and evaluate potential drilling locations for a new potable water supply.

2. PROJECT BACKGROUND

Previous groundwater supply evaluation has been conducted at the site. Water supply Wells 1 and 2 (Figure 1) were initially drilled at the camp area (Knight Piesold Consulting) in 2010 and 2011, respectively. In February 2012, due to the need for additional groundwater supply at the camp, WWAL conducted a desktop review of available well information, and subsequently sited and supervised the drilling of two additional wells (Well 3 at kilometer 15 and Well 4 at kilometer 14) at areas to the west of the camp (Figure 1). Results of the well testing for Wells 3 and 4 were presented in our report dated May 2012. Since the May 2012 report, additional drilling and sampling has been conducted at the site by Knight Piesold Consulting (KPC) associated with hydrogeological and geotechnical baseline work.

It is the purpose of this study to build upon previous analysis using the newly available site hydrogeological and water quality data to provide an updated desktop evaluation of potential groundwater supply locations for the proposed 1,500 man mine construction camp.

3. SCOPE OF WORK AND METHODOLOGY

The desktop study involved the assembly and analysis of relevant available hydrogeological, hydrological, topographic, and geological data to evaluate potential groundwater supply well drilling locations. The target area for establishing a groundwater supply was determined by NewGold and is indicated as "Groundwater Supply Investigation Area" on Figures 4 and 5. Our analysis considered this area as well as outside areas where site data suggested greater potential well yields (e.g., documented artesian well conditions).

We note that it is not the purpose of this desktop analysis to complete a site hydrogeological review as it is our understanding that such a detailed review is being conducted separately as part of the site baseline study. In addition, there has been significant field work conducted at the site to date, and compilation of all borehole logs, geological interpretation, bedrock fracture observations, hydrogeological, and available geospatial data is beyond the scope of this study. This study, therefore, is

limited to review of the specific reports and data as identified below, and a “desktop” level analysis related to water supply well siting.

The following project tasks were conducted for this project:

1. **Data Review and Assembly:** Review available previous reports and data to identify useful information relevant to the water supply well siting and obtain required data. Assemble data for the hydrogeological analysis.
2. **Hydrogeological Analysis:** Develop a preliminary potentiometric contour diagram based on site data, develop a conceptual groundwater flow model to assess groundwater flow directions, review gridded climate normal to assess the spatial distribution of precipitation/recharge, review previous lineament analysis, conduct a preliminary review of bedrock K values measured at the site, compile existing yield data for site wells.
3. **Groundwater Quality Review:** Review available groundwater quality data for the site wells and surface water data for creeks with respect to heavy metals or other parameters exceeding Guidelines for Canadian Drinking Water Quality (GCDWQ). Consider the spatial variability of groundwater quality in the context of the hydrogeological analysis.
4. **Develop Well Siting Criteria:** Develop criteria to evaluate potential groundwater supply locations.
5. **Evaluate Potential Well Locations:** Evaluate potential groundwater development locations with respect to developed criteria.
6. **Recommendations and Reporting:** Provide recommendations regarding potential areas for water supply well development, and prepare a report of summarizing the results of the study.

In completing Task 1, data review and assembly, the following reports and data were reviewed.

- **Blackwater Gold Project – Safe Yield Estimates for Camp Water Supply (letter report)**, August 8, 2011, Knight Piesold Consulting (KPC). Report provides well log for Well WW11-01 (also identified as “Well 2”) with lithology, well location/elevation and outlines hydrogeological testing and well yield analysis.
- **Potable Water Supply for Blackwater Camp (letter report)**, September 16, 2011, KPC. Report provides information regarding well yield in Wells 1 and 2 (also identified as wells WW10-01 and WW11-01, respectively).
- **Well #1 Drill Log (2010), Well #1 Water Analysis (2010), Well #2 Drill Log (2011), Well #2 Water Analysis (2011)**.
- **2012 Groundwater Quality Data Collection and Summary (letter report)**, February 8, 2012, KPC. This report includes 2012 hydrogeological, water quality, lithology, and location/elevation data for monitoring wells MW12-01 through MW12-13.
- **Newgold Blackwater Camp – Preliminary Groundwater Development Feasibility Study**, February 28, 2012, WWAL. A preliminary well siting study was conducted to evaluate potential well drilling locations within 3 km of the existing camp based on inferred groundwater recharge and flow systems and a fault/lineament analysis. Preferred locations were evaluated based on defined siting criteria.

- **Draft- Well Drilling and Completion Report: Blackwater Mine Camp Production Wells, Blackwater Mine, BC, May 2012, WWAL.** This report provides hydrogeological, water quality, and location/elevation data, and well yield analysis for test production wells drilled in 2012 (Wells 3 and 4).
- **Geotechnical Borehole Logs and Table C.1, Geotechnical Drillhole Hydrogeological Summary Information Sheet, KPC.** Logs and table provide hydrogeological, lithology, and borehole location/elevation data for boreholes GT12-1 to 12 and GT-28.
- **Geomechanical Borehole Logs (appendix a1) and Table B.1, Summary of Hydraulic Conductivity Testing, KPC.** Logs and table provide hydrogeological, lithology, and borehole location/elevation data for boreholes GM12-01 to GM12-13.
- **Blackwater Gold Project, Draft Water and Sediment Quality Baseline Report, March 2013, AMEC Environment and Infrastructure.** This report provides surface water quality data for specific surface water sampling points.
- **Maps and drawings previously generated by KPC** (well and borehole locations, overburden thickness map, terrain map, cross sections based on condemnation drilling).
- **Borehole RCH071 (artesian flow) water quality data and well flow measurements/observations.**

Additional geospatial data that were also utilized in this desktop analysis included:

- Gridded climate normal for total annual precipitation 1961-1990, ClimateBC, <http://www.genetics.forestry.ubc.ca/cfcg/ClimateBC40/Default.aspx>
- Digital Elevation Model Data (1:50000), GeoBase, <http://www.geobase.ca/geobase/en/>
- National Hydro Network Hydrologic Data, GeoBase, <http://www.geobase.ca/geobase/en/>
- 3rd Order and Higher Watershed Boundaries, BC Watershed Atlas, <https://apps.gov.bc.ca/pub/geometadata/metadataDetail.do?recordUID=4434&recordSet=ISO19115>
- Google Earth Images

4. HYDROGEOLOGICAL ANALYSIS

The hydrogeological analysis involved:

- review of well and vibrating wire piezometer (VWP) groundwater level data for monitoring wells (MWs), geotechnical boreholes (GT), and Geomatic boreholes (GM), to estimate potentiometric contours;
- the development of a conceptual groundwater flow model based on the potentiometric contours and topography;
- a review of climate data to indicate areas of higher potential groundwater recharge;
- a review of previously conducted lineament analysis;
- a review of hydraulic conductivity (K) measurements and for bedrock at the site; and

- a review of previously determined well yields.

The hydrogeological analysis is discussed in the following sections.

4.1 Potentiometric Elevations and Estimated Contours

Figure 2 indicates estimated potentiometric contours based on measured water levels in wells and VVPs as well as approximate groundwater elevations indicated by stream locations (which in mountainous topography are likely in direct connection with the water table). The potentiometric contours were developed based on water level monitoring data that were collected over different dates extracted from previous reports cited above. Where multi-level monitoring wells or multi-level VVPs are present in wells, the water level in the shallow well was used unless the shallow well was reported as “dry”, and in that case, the next deepest water level was used. The maximum difference between shallow and deep potentiometric measurements was approximately 35 m which is below the potentiometric contour interval of 50 m. Therefore, while the contours are approximate, they nonetheless provide a preliminary indication of general groundwater flow directions (see Section 4.2).

4.2 Conceptual Groundwater Flow Model

Figure 3 includes arrows to indicate conceptual groundwater flow directions based on the potentiometric contours. Groundwater flow directions are topographically-driven and follow the general topographic slope. Groundwater recharge is inferred to occur at topographic highs and groundwater discharge is inferred at topographic lows, which are inferred near stream valleys or near the base of steep slopes. Artesian flow conditions or upward gradients in wells would be expected at groundwater discharge zones. Wells drilled at groundwater discharge zones are inferred to have higher potential yields than those drilled at groundwater recharge zones. Wells drilled in areas of converging groundwater flow are also inferred to have greater potential yields due to a greater potential recharge area for the well.

4.3 Precipitation Distribution

Figure 4 illustrates the spatial distribution of precipitation across the watershed areas using ClimateBC gridded total annual precipitation normals (1961-1990), and demonstrates that higher total annual precipitation is generated at higher elevations. The spatial distribution of precipitation relates to the spatial distribution of potential groundwater recharge, and greater rates of groundwater recharge are inferred at areas of higher precipitation. Wells drilled in areas in proximity to zones of higher precipitation are inferred to have greater sources of recharge and thus greater potential yield.

4.4 Lineaments

In 2012, WWAL conducted a lineament analysis in the vicinity of the ore body (shown on Figure 4) which assisted in evaluating water supply well drilling location options at that time. Lineaments were reviewed again here in the context of the developed conceptual groundwater flow model, as one indicator of higher potential well yield due to the potential for higher fracturing around structural lineaments such as faults. As noted in our previous report, lineament analysis alone is not a strong indicator of high well productivity, but the presence of lineaments in conjunction with other indicators of high well productivity may increase the potential for higher well yield.

4.5 Hydraulic Conductivity Measurements

Hydraulic conductivity (K) data for the wells were also reviewed for this analysis. Geomean values were generated for all lugon and response tests for each bedrock borehole. K testing indicates wells in bedrock having a range of K from approximately 3×10^{-9} m/s to 7×10^{-5} m/s with a geometric mean of 9×10^{-8} m/s. K measured at wells in bedrock reflects the specific fracture characteristics at the well and at the depth of testing. A preliminary review of the spatial variability of K using the geomean of all measurements completed at each well did not indicate any obvious clustering of higher or lower bedrock K zones. Additional geospatial analysis would be required to determine whether there are any statistically significant areas (or depths) of higher bedrock K.

4.6 Well Yield Data

The following table summarizes well yield measurements and observations at the site for Wells 1, 2, 3, 4, and RCH-071. Declining yields since drilling are indicated at Wells 1 and 2. The highest yield estimate is at flowing artesian borehole RCH-071. Well yield measurements reflect subsurface conditions in the vicinity of the well and the well construction. Yield values are used in this desktop analysis as they may indicate likely productivity in nearby wells, however, unknown variability in bedrock fracture characteristics can cause significantly different well yields for adjacent wells.

Table 1: Previously Measured Well Yield

Well	Aquifer	Date	Yield (USgpm)
Well 1	Bedrock	July 28, 2010	8 USgpm, drillers estimate
		September 16, 2011	1.3 USgpm, KPC letter report
Well 2	Bedrock	June 20, 2011	3-4 USgpm, drillers estimate
		July 8-10, 2011	1.5 USgpm, pumping test
Well 3	Bedrock	May 2012	4.6 USgpm, pumping test
Well 4	Unconsolidated	May 2012	5.6 USgpm, pumping test
RCH071	Bedrock	June 2013	200 USgpm, flowing artesian

5. WATER QUALITY REVIEW

Groundwater analytical results presented in the KPC report, Feb 8, 2013, and recent analytical results of groundwater from RCH-071 were reviewed. Indicators of groundwater quality with respect to exceedences of Guidelines for Canadian Drinking Water Quality (GCDWQ) Maximum Acceptable Concentrations (MACs) for heavy metals (antimony, arsenic, barium, boron, cadmium, chromium, lead, mercury, selenium, and uranium) are considered here as potential indicators of groundwater impacts due to contact with the ore body. Samples containing heavy metals or other parameters at total concentrations exceeding the GCDWQ MAC were identified in the following groundwater samples (highlighted on Figures 3 and 4).

- Lead (Pb) (MAC = 0.01 mg/L): Well 4 (screened in unconsolidated materials)
- Arsenic (As) (MAC = 0.01 mg/L): MW12-01D, MW12-02S, MW12-04D
- Antimony (Sb) (MAC = 0.006 mg/L) = Well 1 (WW10-01)
- Fluoride (F) (MAC = 1.5 mg/L): RCH-071

Other exceedences of GCDWQ Aesthetic Objectives (AO) have been measured in groundwater at the site and are indicated below.

- Dissolved Aluminum (AO = 0.1 mg/L): MW12-04D
- Total Iron (AO = 0.3 mg/L): MW12-01D, MW12-02S, MW12-04S/D, MW12-05S/D, MW12-06S, MW12-07D
- Total Manganese (AO = 0.05 mg/L): MW12-01D, MW12-02S/D, MW12-04S/D, MW12-05S/D, MW12-06S, MW12-07D
- pH (AO = 6.5 to 8.5): RCH-071

This report does not include tables of analytical results or laboratory analytical reports as these will or have been presented in other baseline report(s).

Surface water samples as reported on Table 4.3.1 in the Draft Water and Sediment Quality Baseline Report, AMEC, 2013, did not exceed GCDWQ for heavy metals. Some surface water samples contained Al, Fe, and Mn in excess of GCDWQ AOs. Surface water quality results can be referenced in the AMEC Blackwater Gold Project, Draft Water and Sediment Quality Baseline Report, 2013.

6. DEVELOPMENT OF SITING CRITERIA

Potential well development in unconsolidated (overburden) materials is not considered here. It was suggested in previous reports by KPC that the potential for water supply well development in overburden would be uncertain due to elevated turbidity and uncertainty in the presence of water bearing aquifer materials (e.g., clean sand and gravel units).

The following describes the siting criteria selected to maximize the potential for the development of a successful bedrock groundwater supply. We considered well productivity indicators, groundwater

quality indicators, and some practical considerations. Data for the evaluation of these criteria was variable depending on the target location. Most of the site investigation has been conducted in the upper elevation areas near the ore body or higher in the watersheds, and less data were available for lower elevations across much of the delineated groundwater supply investigation area. We also emphasize that the prediction of well productivity based on a desktop analysis is uncertain in a bedrock environment, where bedrock fracture characteristics are an important control on well productivity and ground water chemistry (quality) and are highly variable and unpredictable.

Well Productivity Indicators

- **Inferred groundwater discharge zone:** Based on conceptual groundwater flow model, geospatial data, and Google Earth images.
- **Coincident or proximal to fault, lineament, or stream valley:** Based on previous lineament mapping/analysis and mapped streams. Note that lineament mapping has only been completed in the vicinity of the ore body.
- **Zone of relatively high total annual precipitation:** Based on gridded precipitation normal from ClimateBC.
- **Nearby higher yield wells:** Based on site measurements and previous analysis where available.

Groundwater Quality Indicators

- **Inferred not downgradient of ore body (or other potential sources of contamination):** Based on conceptual groundwater flow model and ore body and site facility locations.
- **Groundwater samples within area less than GCDWQ for heavy metals:** Based on reported groundwater analytical results.

Practical Considerations

- **Terrain relative relief** (low, mod, high): Based on topographic contours
- **Overburden thickness:** Based on overburden thickness map (KPC, Figure 1: Camp Alternatives Assessment Overburden Thickness, 2013). Note that the overburden thickness map extends mainly in the vicinity of the ore body and much of the area within the delineated Groundwater Supply Investigation Area has not been mapped for overburden thickness.

We note that proximity to an existing road or trail, or proposed site facility, may also be a practical consideration, however, we have not been provided with current maps showing the existing road/trail network, and therefore this was not expressly considered as a criterion.

7. POTENTIAL DRILLING LOCATIONS

Based on the above-described criteria, we have identified eight (8) potential drilling locations (Figures 4 and 5) which were selected to best meet the siting criteria described above. The proposed locations are indicated on Figure 5. Three of the locations (Locations A, B, and C) are located upslope and outside of the defined Groundwater Supply Investigation Area due to anticipated higher well yields, and the remaining five locations (D, E, F, G, and H) are within the Groundwater Supply Investigation Area. A summary of the locations and comments related to the siting criteria are provided in Table 2. Further discussion regarding the pros and cons of each potential drilling location is provided in Section 8.

Table 2: Summary of Siting Criteria Analysis for Potential Water Supply Well Drilling, Blackwater Mine Site

Location (Figure 5) Approximate UTM Coordinates of Centroid	Well Productivity Indicators				Water Quality Indicators		Practical Considerations	
	Inferred groundwater discharge zone	Coincident or proximal to fault, lineament, or stream valley	Total Annual Precip- itation	Nearby higher yield wells	Inferred not downgradient of ore body (or other potential sources of contamination)	Groundwater samples within area less than GCDWQ	Terrain relative relief (low, mod, high)	Overburden thickness estimate
Location A E 373815 N 5893593	Inferred groundwater discharge zone based on steep slope and existing artesian BH RCH-071. Inferred area of converging groundwater flow (see conceptual model).	Transected by a N-S trending lineament noted as a "primary fault". High stream density in area approximately parallel to fault trace.	High ~ 600 to 700 mm/y	Condemnation BH RCH071 artesian flow ~200 USgpm	Location A is northwest of ore body and on the west side of the streams that are mapped to intersect the ore body. It is inferred that groundwater in this area is not downgradient of the ore body.	Artesian flowing BH RCH071 has fluoride in excess of MAC and pH exceeding AO. No MAC exceedences for heavy metals.	Relatively high relief with steep slopes to the N.	Relatively thin (10-60 m)
Location B: E 372472 N 5893469	Inferred groundwater discharge zone near base of slope.	Location B is in the area of a mapped headwater stream.	High ~ 600 to 700 mm/y	None identified	Location B is higher in the Davidson Cr. Watershed than location A and inferred not to be downgradient of ore body.	No wells in area.	Relatively high relief with steep slopes to the N, NE.	Relatively thin (10-60 m)
Location C E 374432 N 5896398	Possible groundwater discharge zone near base of stream valley slope.	Davidson Creek is adjacent to southeast. Mapped lineaments trending with Davidson Cr.	Moderate to high ~ 550 to 650 mm/y	None identified	Groundwater flow is inferred to be toward the creek and thus not inferred to be flowing through a contaminant source.	No bedrock wells in area. (MW12-06S/D are in overburden.)	Steep slopes near creek.	Relatively thin to moderate thickness (10-80 m)
Location D E 378621 N 5894257	Groundwater discharge zones may exist in close proximity to stream valley, but the shallower topographic slope in this area suggests relatively small groundwater flow gradients (and thus lower groundwater fluxes).	Lineaments are mapped in area extending along stream valley trend. Location D intersects mapped lineament that is identified as a "primary fault". Area coincides with mapped stream valley.	Moderate ~ 550 to 600 mm/y	None identified	Inferred not directly downgradient of ore body, however, limited groundwater level data in this area. Location D may be downgradient of proposed waste rock storage area and/or potential sources of contamination at camp.	No wells in area.	Gently sloping to the northeast. Steeper local slopes in proximity to stream valley.	Thick overburden (60-140 m)
Location E E 380865 N 5897627	Groundwater discharge zone may exist in proximity to stream.	At stream valley. Lineaments not mapped in area.	Low to moderate ~ 500 to 550 mm/y	None identified	Groundwater flow direction unconfirmed in area – inferred to be potentially downgradient of ore body and proposed waste rock storage area.	No wells in area.	Gentle regional slope, inferred steeper near stream valley.	Moderate (10-60m)
Location F E 382787 N 5897642	Groundwater discharge zone may exist in proximity to stream.	At stream valley. Lineaments not mapped in area.	Low to moderate ~ 500 to 550 mm/y	None identified	Groundwater flow direction unconfirmed in area – inferred unlikely downgradient of ore body and proposed waste rock storage area.	No wells in area.	Gentle regional slope, inferred steeper near stream valley.	Unknown Estimated moderate to very thick >100m
Location G	Groundwater discharge zone	At stream valley.	Low to	None	Groundwater flow direction	No wells in area.	Gentle	Unknown

E 383962 N 5898300	may exist in proximity to stream.	Lineaments not mapped in area.	moderate ~ 500 to 550 mm/y	identified	unconfirmed in area – inferred unlikely downgradient of ore body and proposed waste rock storage area.		regional slope, inferred steeper near stream valley.	Estimated moderate to very thick >100m
Location H E 379575 N 5901770	Groundwater discharge zone may exist in proximity to stream.	At stream valley. Lineaments not mapped in area.	Low to moderate ~ 500 to 550 mm/y	None identified	Groundwater flow direction unconfirmed in area – inferred unlikely to be downgradient of potential contaminant sources.	No wells in area.	Gentle regional slope, inferred steeper near stream valley.	Unknown Estimated moderate to very thick >100m

8. DISCUSSION AND RECOMMENDATIONS

Based on the analysis of criteria summarized in Table 2, the following discussion and recommendations are provided regarding the potential groundwater supply well drilling locations.

Location A would provide the most certain groundwater source based on existing high flowing artesian well (RCH-071 demonstrated high yield), inferred groundwater discharge zone, association with mapped fault/lineament, and inferred high groundwater recharge rates (high total annual precipitation). In addition, groundwater analyzed from RCH-071 did not exceed GCDWQ for heavy metals. Exceedences of GCDWQ AO (pH) and MAC (fluoride) at well RCH-071 may be addressed by treatment and/or mixing RCH-071 well water with water from additional wells drilled at Location A. Additional groundwater quality analysis from RCH-071 and nearby small streams (which are inferred to act as discharge locations for groundwater under low flow conditions) would assist in evaluating additional drilling locations in this area based on water quality indicators. Although Location A would provide the most certain high yielding groundwater area, this location is known to be the future site of mine waste rock storage and therefore is likely not be suited to further potable groundwater development.

Location B provides an alternative to Location A which is inferred to be even further upgradient from the ore body (and thus lower potential for impacts by heavy metals). Location B is inferred to be a groundwater discharge zone based on the conceptual groundwater flow model, and is within an area of higher total annual precipitation. Condemnation borehole RCH-073 is inferred to be located within this area based on the maps provided to WWAL. Water quality and yield observations, if available from RCH-073, may provide additional data to evaluate this potential location.

Location C is at large distances from potential sources of contaminants, and is inferred to be isolated from the proposed mine activities and facilities as it is on the opposite side of Davidson Creek (an inferred groundwater flow divide). Location C is inferred to be a groundwater discharge zone and is within an area of relatively high total annual precipitation. Overburden may be moderately thick in this area and steep slopes adjacent to the creek may provide difficult drilling conditions. Bedrock groundwater quality is unconfirmed.

Location D is located within the East watershed at a stream valley. Topography across the area appears to be moderately steep based on the topographic contours and Google Earth image. The contributing area for bedrock groundwater flow is inferred to extend upslope within the East watershed based on the conceptual groundwater flow model. Location D is not inferred to be directly downgradient of the ore body. Precipitation in the area is relatively moderate. This location is in an area indicated to have thick overburden deposits (KPC overburden thickness map), and large drilling depths would, thus, be required to develop a bedrock groundwater well.

Location E is located within the East watershed at the confluence of a series of small creeks. Local creek valleys may be gently to moderately steep. The contributing area for bedrock groundwater flow is inferred to extend up slope within the watershed, potentially including the ore body area. Overburden

thickness is inferred to be relatively thin to moderate based the overburden thickness map, however, overburden thickness may be high closer to the stream. Groundwater quality is unconfirmed.

Location F is located on at the confluence of a series of creeks forming a small watershed on the eastern side of the groundwater investigation area. Local creek valleys may be gently to moderately steep. Bedrock groundwater contributing area is inferred to extend upslope within the mapped watershed boundaries, but is not inferred to include the ore body area. Overburden thickness is uncertain but may be thin to moderate based on extrapolation of the KPC overburden thickness map. Groundwater quality is unconfirmed.

Location G is located on the eastern portion of the east watershed on the upslope side of the main creek. Topography is indicated to be gently to moderately sloping to the north (toward creek). The contributing area for bedrock groundwater is inferred to extend upslope but is not inferred to include the ore body area. Overburden thickness is uncertain in this area but field observations may provide an indication. Groundwater quality is unconfirmed.

Location H is located within the Davidson creek Watershed adjacent to Davidson Cr. Topography may slope gently to moderately toward creek. The contributing area for bedrock groundwater is inferred to extend upslope within the Davidson Creek watershed. Overburden thickness is uncertain in this area but field observations may provide an indication. Groundwater quality is unconfirmed.

As noted previously there is, in general, high uncertainty in developing water supply wells within a fractured bedrock aquifer. The bedrock fracture network and connectivity, which are unknown, may create conditions for preferential flow of groundwater, influencing both water quality and potential well yield. Therefore, while the above locations have been selected based on a desktop level review of site data to target locations of potentially high well yield and acceptable groundwater quality, individual well characteristics remain unpredictable until wells are drilled. It is possible that wells drilled at a particular location may underperform in terms of yield and groundwater quality.

Given the inherent uncertainty in siting groundwater supply wells in bedrock systems, it is recommended that a site reconnaissance be conducted at each potential drilling location to further assess: indication/evidence of groundwater seepage/springs; slope; lineaments; vegetation as indicators of groundwater seepage; and indicators of thickness of overburden (e.g., proximity to bedrock outcrops). It is also recommended that a contingency be incorporated into a drilling program to allow for additional wells if needed. Preliminary test drilling at preferred locations is recommended as the next stage in groundwater supply development to assess well yield, groundwater quality, determine the number of wells required, and assess well interference.

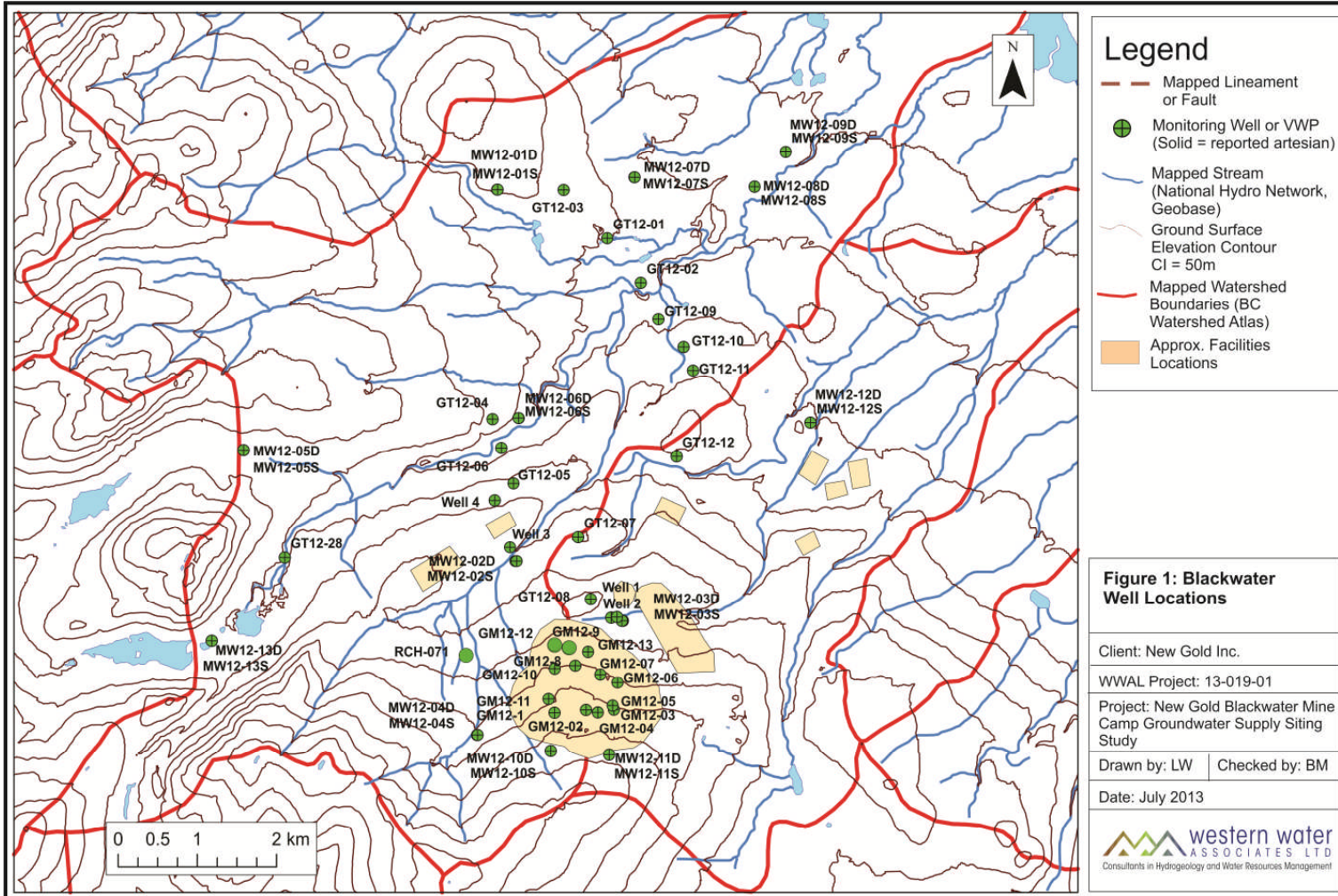
9. CONCLUSIONS

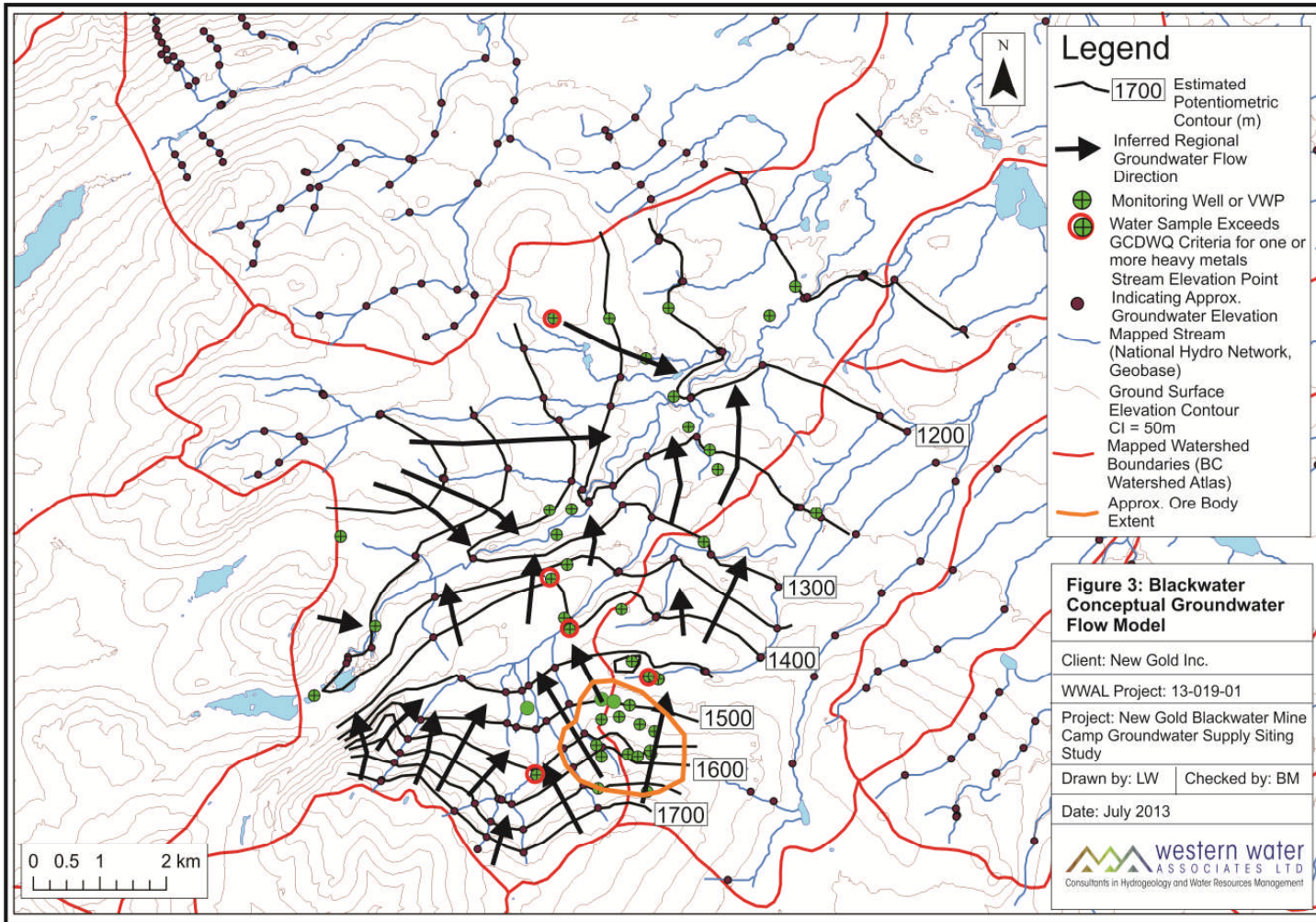
The analysis conducted for this desktop study provides a reasonable framework for proceeding with the next stages of groundwater supply development at the site focusing on the potential drilling areas identified here. It is recommended that New Gold review this report and the comments provided in Table 2 to consider the pros and cons of each location based on their priorities and budget or based on

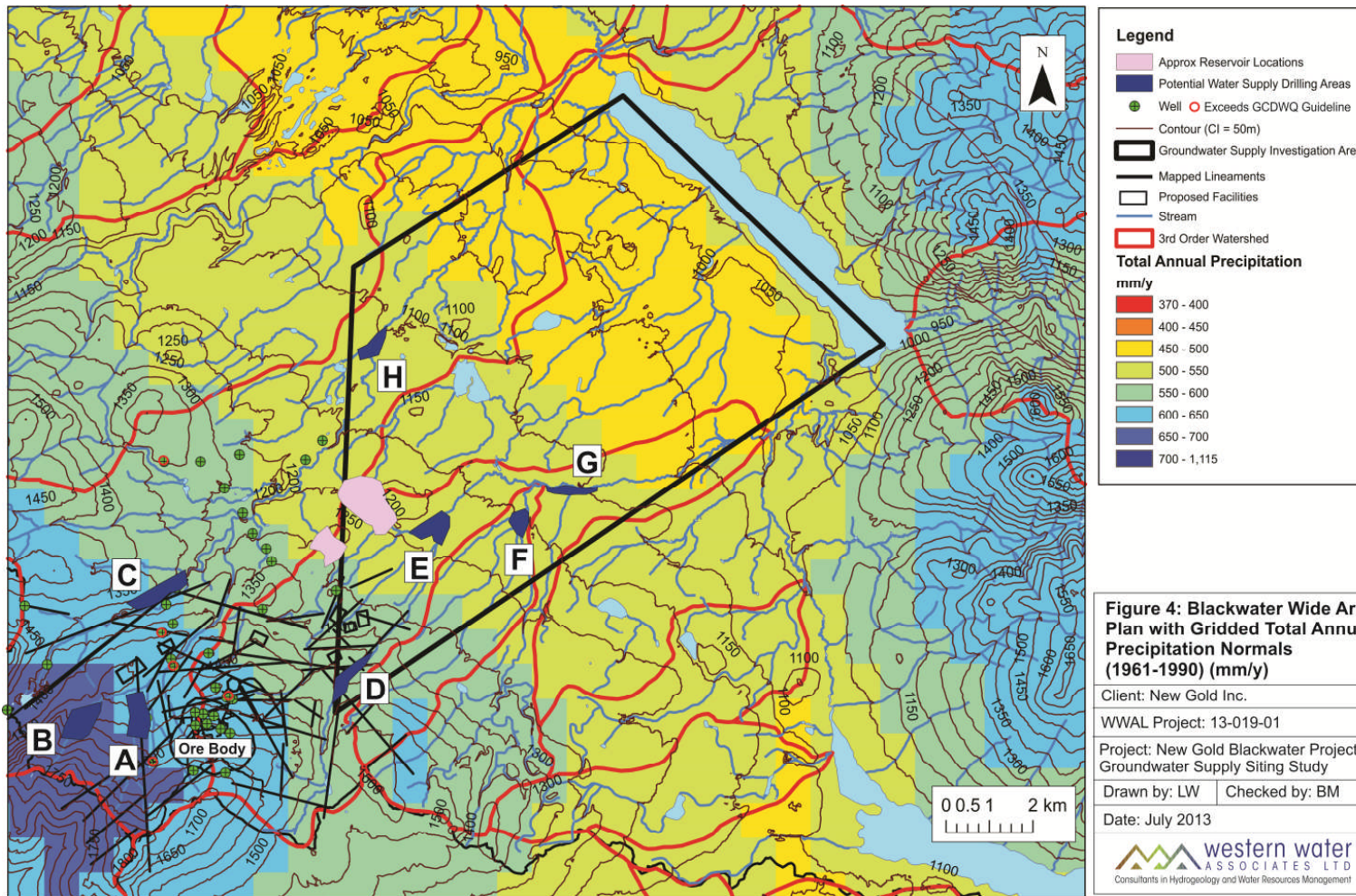
other considerations which may be unknown to WWAL and thus not incorporated into the criteria presented here. It is recommended that the next stage of the groundwater supply development involve selection of one or more target areas for site reconnaissance and test well drilling.

10. CLOSURE

We trust that the professional opinions and advice presented in this document are sufficient for your current requirements. Please note that there are restrictions and limitations that apply to the scope of our services and conclusions provided herein, as outlined on the attached Standard Report Limitations page. Should you have any questions, or if we can be of further assistance in this matter, please contact Bryer Manwell at WWAL.







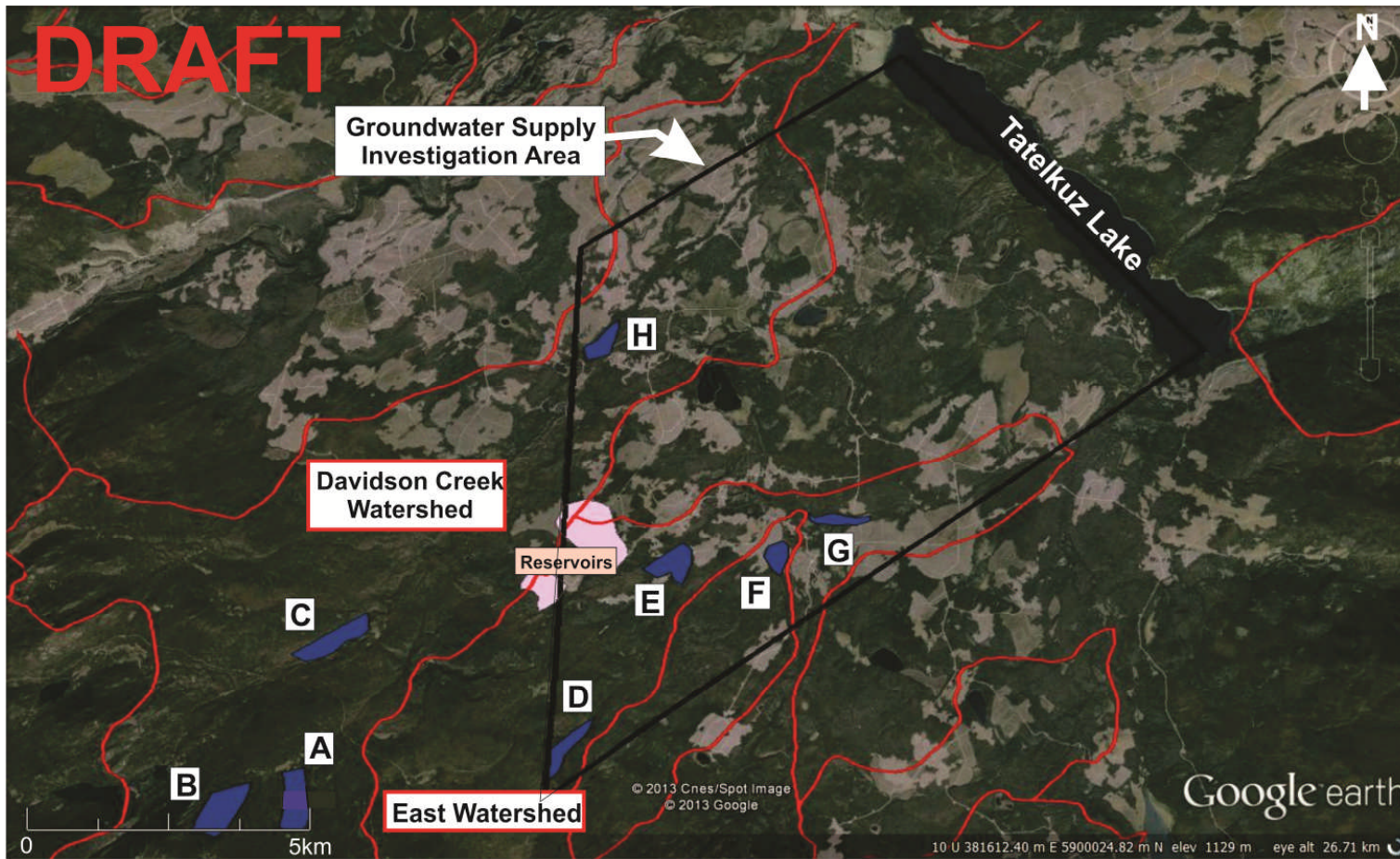


Figure 1: Potential Drilling Locations for Blackwater Project Potable Groundwater Supply

Project: 13-019-01 | Project Name: NewGold Blackwater Project, Water Supply | Date: July 2013 | Drawn by: LW | Checked by: BM

Indicates Proposed Potential Drilling Area for Water Supply Wells

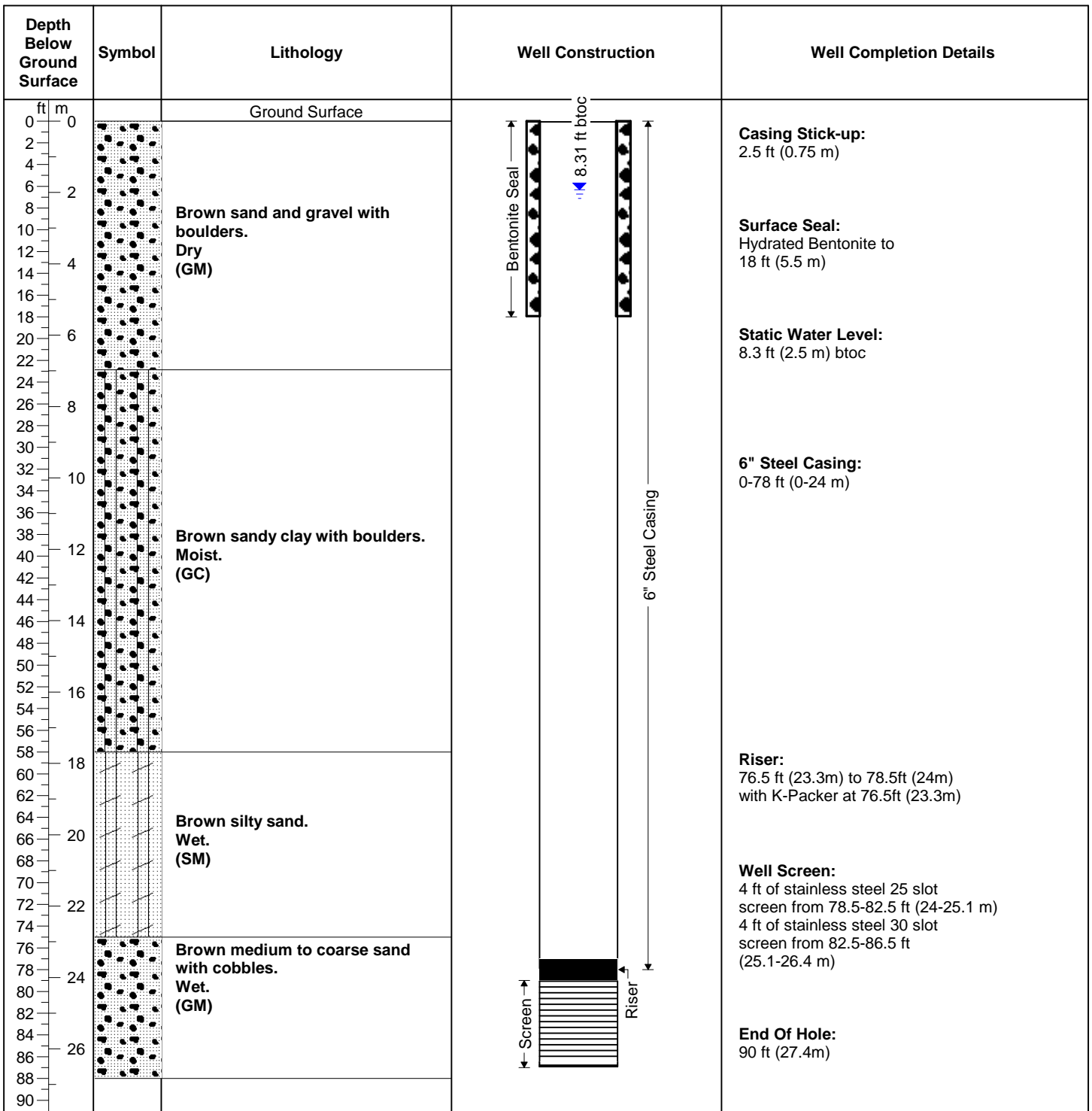


Appendix B

Water Well Logs



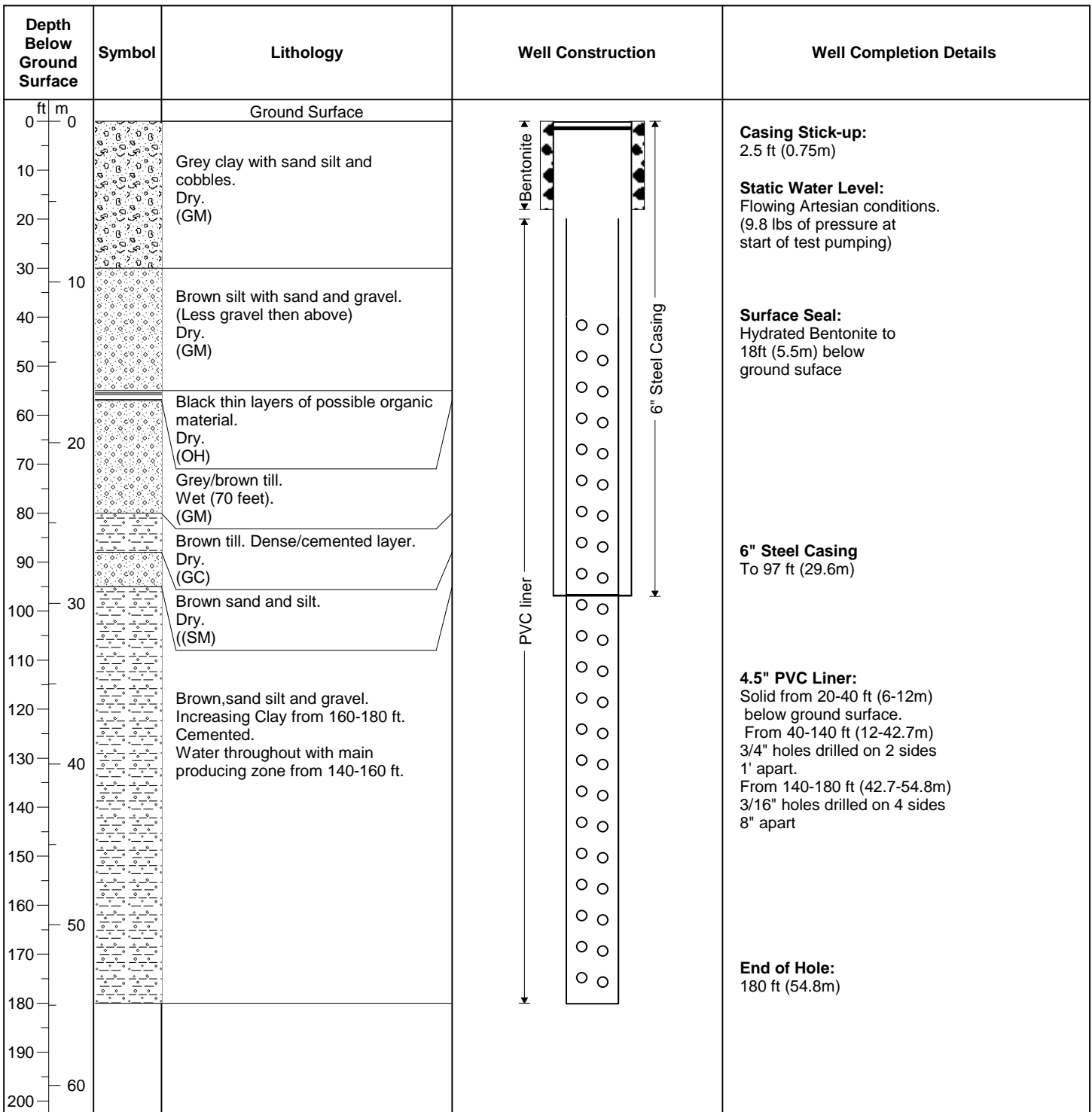
Well Number: TW13-01 (WPN 28413) Client: NewGold - Blackwater
 Project: Feasibility-Water Supply Project Number: 13-019-01
 Location: On the L Trail, near removed bridge.



Coordinates: E 377709 N 5894991
 Yield: 67.6 USgpm
 Elevation: 1312 masl
 Logged By: Ryan Rhodes
 Drawn By: Anthony Friesen Checked By: Bryer Manwell

Drilling Contractor: Cariboo Drilling
 Drilling Method: Air Rotary
 Date of Completion: July 31, 2013

Well Number: TW13-02 (WPN 28414) Client: NewGold-Blackwater
 Project: Backwater Supply Wells Project Number: 13-019-01
 Location: Northwest of TW13-01 (near future camp)



Coordinates: E 378640 N 5895993

Yield: 30 USgpm

Elevation: 1249 masl

Logged By: Ryan Rhodes

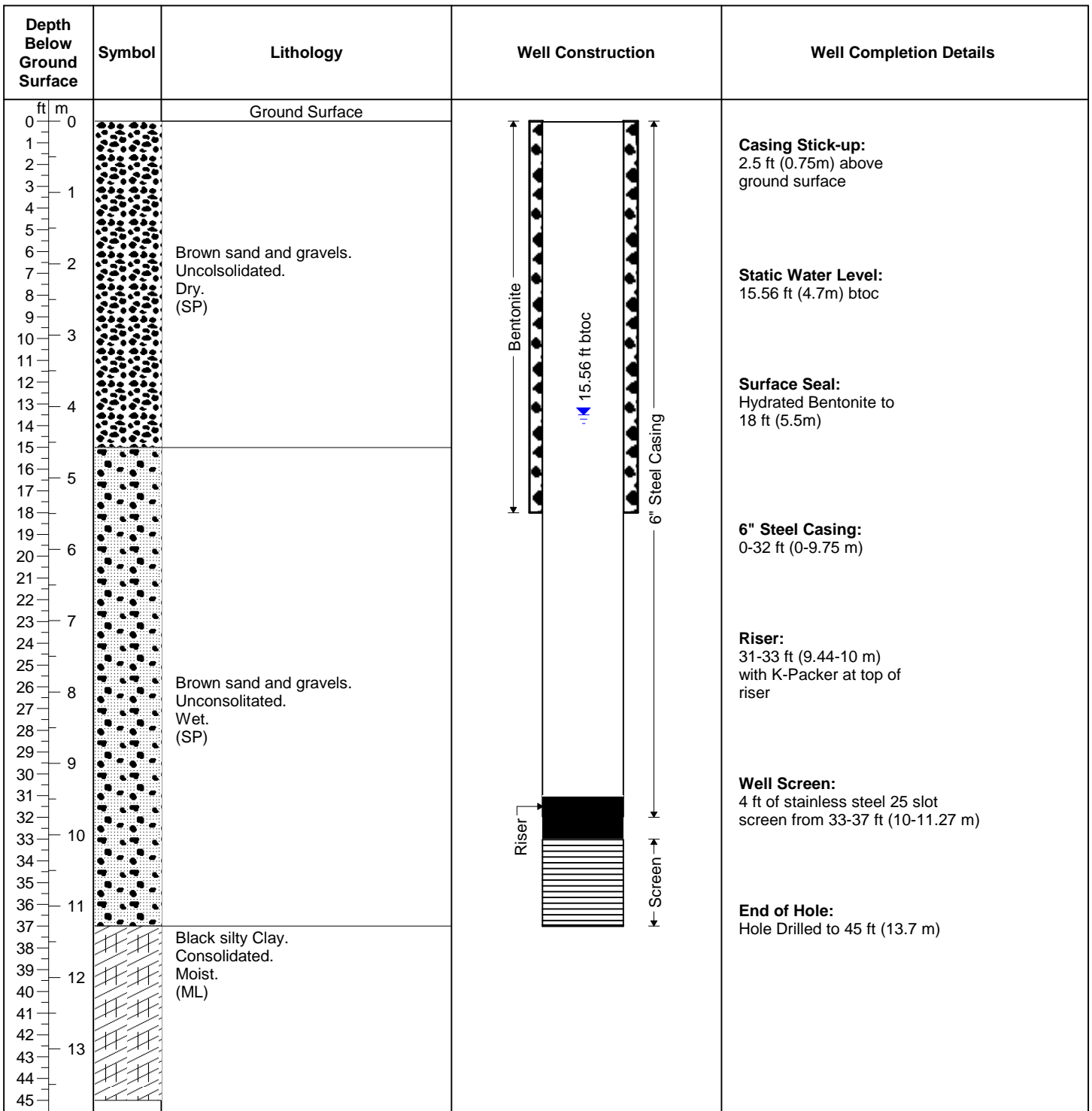
Drawn By: Anthony Friesen Checked By: Bryer Manwell

Drilling Contractor: Cariboo Drilling

Drilling Method: Air Rotary

Date of Completion: August 02, 2013

Well Number: TW13-03 (WPN 28415) Client: NewGold - Blackwater
 Project: Feasibility-Water Supply Project Number: 13-019-01
 Location: 5km east off the C Trail at the 6.5 km mark.



Coordinates: E 378492 N 5900405

Yield: 70 USgpm

Elevation: 1134 masl

Logged By: Ryan Rhodes

Drawn By: Anthony Friesen Checked By: Bryer Manwell

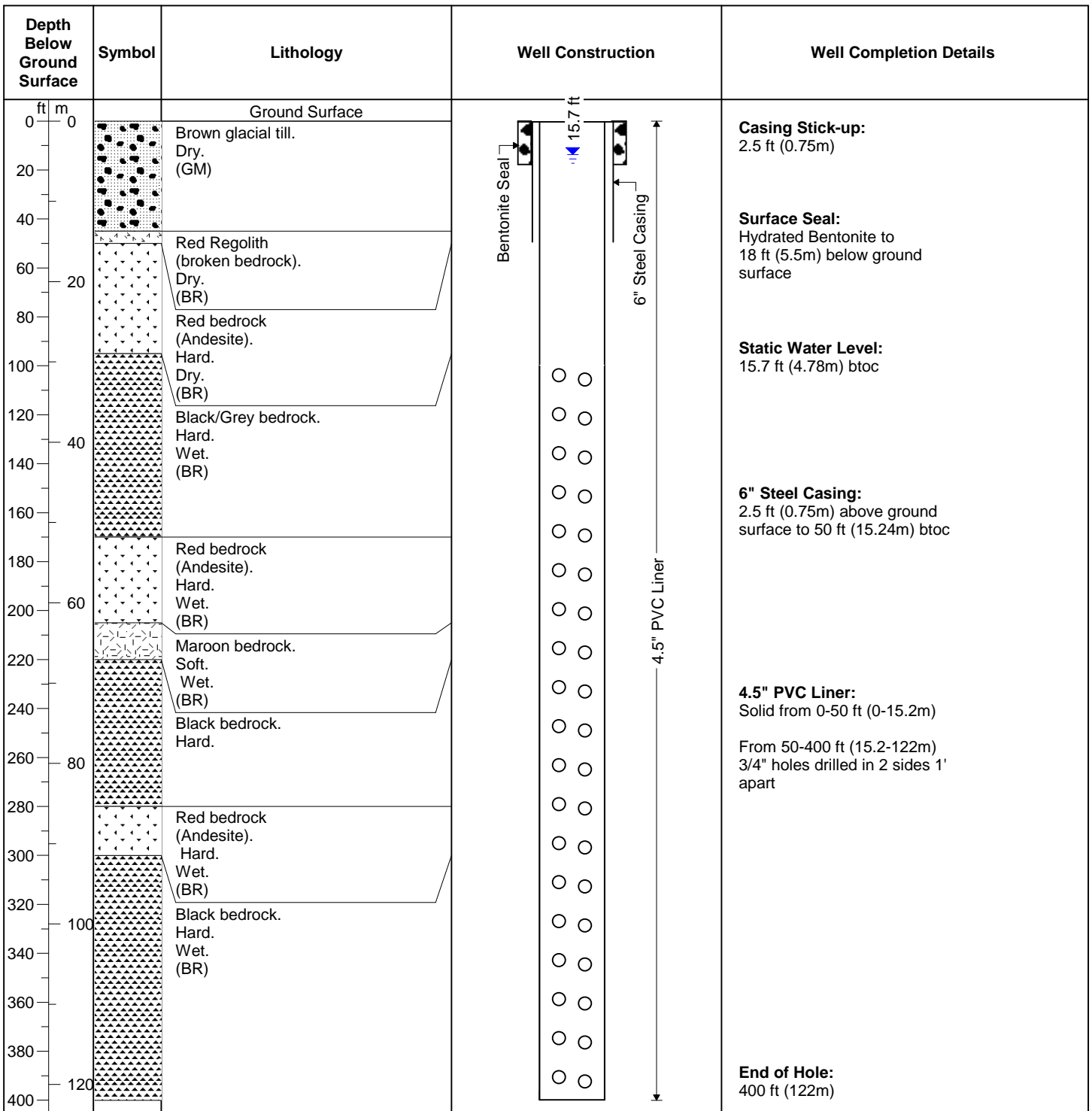
Drilling Contractor: Cariboo Drilling

Drilling Method: Air Rotary

Date of Completion: August 2, 2013

Well Number: TW13-04 (WPN 28412)
Project: Feasibility-Water Supply
Location: East of Auro Creek bridge.

Client: NewGold - Blackwater
Project Number: 13-019-01



Coordinates: E 378404 N 5893792

Yield: 4 USgpm

Elevation: 1398 masl

Logged By: Ryan Rhodes

Drawn By: Anthony Friesen Checked By: Bryer Manwell

Drilling Contractor: Cariboo Drilling

Drilling Method: Air Rotary

Date of Completion: July 28, 2013

Appendix C

Pumping Test Data and Graphs



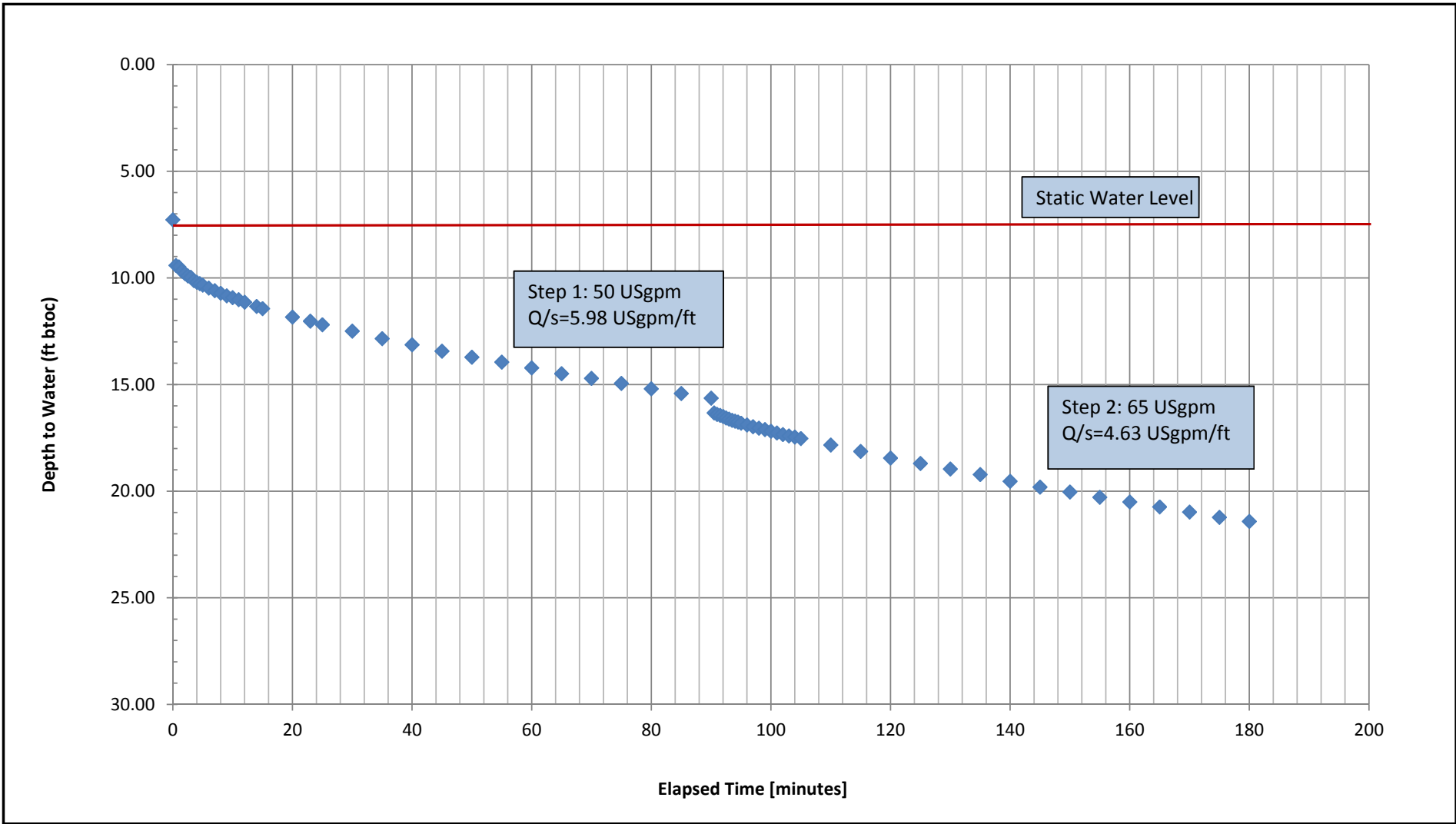
Project No: 13-019-01, Table C1 - Blackwater TW13-01, WPN 28413, Step Test, August 5, 2013.


Well depth = 86.5 ft											
Well diameter = 6 in		Measurement method =		Flow Meter		Pump Depth = 80 ft				Specific Capacity	
Comments	Real Time	Time since pump started (minutes)	Water level measurement (btoc) (ft)	Water level measurement (btoc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	L/s/m	Usrpm/ft
STATIC	4:33 PM	0	7.28	2.22	--	0.00	0.00	3.15	50.00	--	--
Step 1		0.5	9.42	2.87	0.65	2.14	0.65	3.15	50.00	76.78	23.40
		1	9.49	2.89	0.02	2.21	0.67	3.15	50.00	74.23	22.62
		1.5	9.68	2.95	0.06	2.40	0.73	3.15	50.00	68.35	20.83
		2	9.80	2.99	0.04	2.52	0.77	3.15	50.00	65.10	19.84
		2.5	9.91	3.02	0.03	2.63	0.80	3.15	50.00	62.37	19.01
		3	9.97	3.04	0.02	2.69	0.82	3.15	50.00	60.98	18.59
		3.5	10.13	3.09	0.05	2.85	0.87	3.15	50.00	57.56	17.54
		4	10.21	3.11	0.02	2.93	0.89	3.15	50.00	55.99	17.06
		4.5	10.27	3.13	0.02	2.99	0.91	3.15	50.00	54.86	16.72
		5	10.34	3.15	0.02	3.06	0.93	3.15	50.00	53.61	16.34
		6	10.48	3.19	0.04	3.20	0.98	3.15	50.00	51.26	15.63
		7	10.60	3.23	0.04	3.32	1.01	3.15	50.00	49.41	15.06
		8	10.72	3.27	0.04	3.44	1.05	3.15	50.00	47.69	14.53
		9	10.84	3.30	0.04	3.56	1.09	3.15	50.00	46.08	14.04
		10	10.93	3.33	0.03	3.65	1.11	3.15	50.00	44.94	13.70
		11	11.02	3.36	0.03	3.74	1.14	3.15	50.00	43.86	13.37
		12	11.14	3.40	0.04	3.86	1.18	3.15	50.00	42.50	12.95
		14	11.34	3.46	0.06	4.06	1.24	3.15	50.00	40.40	12.32
		15	11.44	3.49	0.03	4.16	1.27	3.15	50.00	39.43	12.02
		20	11.84	3.61	0.12	4.56	1.39	3.15	50.00	35.97	10.96
		23	12.03	3.67	0.06	4.75	1.45	3.15	50.00	34.54	10.53
		25	12.20	3.72	0.05	4.92	1.50	3.15	50.00	33.34	10.16
		30	12.50	3.81	0.09	5.22	1.59	3.15	50.00	31.43	9.58
		35	12.85	3.92	0.11	5.57	1.70	3.15	50.00	29.45	8.98
		40	13.14	4.01	0.09	5.86	1.79	3.15	50.00	27.99	8.53
		45	13.44	4.10	0.09	6.16	1.88	3.15	50.00	26.63	8.12
		50	13.72	4.18	0.09	6.44	1.96	3.15	50.00	25.47	7.76
		55	13.95	4.25	0.07	6.67	2.03	3.15	50.00	24.59	7.50
		60	14.22	4.33	0.08	6.94	2.12	3.15	50.00	23.64	7.20
		65	14.49	4.42	0.08	7.21	2.20	3.15	50.00	22.75	6.93
		70	14.71	4.48	0.07	7.43	2.26	3.15	50.00	22.08	6.73
		75	14.95	4.56	0.07	7.67	2.34	3.15	50.00	21.39	6.52
		80	15.20	4.63	0.08	7.92	2.41	3.15	50.00	20.71	6.31
		85	15.42	4.70	0.07	8.14	2.48	3.15	50.00	20.15	6.14
		90	15.64	4.77	0.07	8.36	2.55	3.15	50.00	19.62	5.98
Step 2	6:03 PM	90.5	16.33	4.98	0.21	9.05	2.76	4.13	65.50	23.75	7.24
		91	16.40	5.00	0.02	9.12	2.78	4.13	65.50	23.56	7.18
		91.5	16.45	5.01	0.02	9.17	2.80	4.13	65.50	23.43	7.14
		92	16.50	5.03	0.02	9.22	2.81	4.13	65.50	23.31	7.10
		92.5	16.57	5.05	0.02	9.29	2.83	4.13	65.50	23.13	7.05
		93	16.62	5.07	0.02	9.34	2.85	4.13	65.50	23.01	7.01
		93.5	16.68	5.08	0.02	9.40	2.87	4.13	65.50	22.86	6.97
		94	16.72	5.10	0.01	9.44	2.88	4.13	65.50	22.76	6.94
		94.5	16.76	5.11	0.01	9.48	2.89	4.13	65.50	22.67	6.91
		95	16.81	5.12	0.02	9.53	2.90	4.13	65.50	22.55	6.87
		96	16.90	5.15	0.03	9.62	2.93	4.13	65.50	22.34	6.81
		97	16.98	5.18	0.02	9.70	2.96	4.13	65.50	22.15	6.75
		98	17.05	5.20	0.02	9.77	2.98	4.13	65.50	22.00	6.70
		99	17.11	5.22	0.02	9.83	3.00	4.13	65.50	21.86	6.66
		100	17.19	5.24	0.02	9.91	3.02	4.13	65.50	21.68	6.61
		101	17.27	5.26	0.02	9.99	3.04	4.13	65.50	21.51	6.56
		102	17.35	5.29	0.02	10.07	3.07	4.13	65.50	21.34	6.50
		103	17.41	5.31	0.02	10.13	3.09	4.13	65.50	21.21	6.47
		104	17.46	5.32	0.02	10.18	3.10	4.13	65.50	21.11	6.43
		105	17.53	5.34	0.02	10.25	3.12	4.13	65.50	20.97	6.39
		110	17.84	5.44	0.09	10.56	3.22	4.13	65.50	20.35	6.20
		115	18.14	5.53	0.09	10.86	3.31	4.13	65.50	19.79	6.03
		120	18.45	5.62	0.09	11.17	3.40	4.13	65.50	19.24	5.86
		125	18.70	5.70	0.08	11.42	3.48	4.13	65.50	18.82	5.74
		130	18.96	5.78	0.08	11.68	3.56	4.13	65.50	18.40	5.61
		135	19.22	5.86	0.08	11.94	3.64	4.13	65.50	18.00	5.49
		140	19.54	5.96	0.10	12.26	3.74	4.13	65.50	17.53	5.34
		145	19.81	6.04	0.08	12.53	3.82	4.13	65.50	17.15	5.23
		150	20.04	6.11	0.07	12.76	3.89	4.13	65.50	16.84	5.13
		155	20.29	6.18	0.08	13.01	3.97	4.13	65.50	16.52	5.03
		160	20.51	6.25	0.07	13.23	4.03	4.13	65.50	16.24	4.95
		165	20.74	6.32	0.07	13.46	4.10	4.13	65.50	15.97	4.87
		170	20.98	6.39	0.07	13.70	4.18	4.13	65.50	15.69	4.78
		175	21.23	6.47	0.08	13.95	4.25	4.13	65.50	15.40	4.70
	7:33 PM	180	21.42	6.53	0.06	14.14	4.31	4.13	65.50	15.20	4.63
Recovery	7:34 PM	181	18.59	5.67	-0.86	11.31	3.45	0.00	0.00	0.00	0.00
		182	18.23	5.56	-0.11	10.95	3.34	0.00	0.00	0.00	0.00
		183	17.97	5.48	-0.08	10.69	3.26	0.00	0.00	0.00	0.00
		184	17.79	5.42	-0.05	10.51	3.20	0.00	0.00	0.00	0.00
		185	17.63	5.37	-0.05	10.35	3.15	0.00	0.00	0.00	0.00
		186	17.48	5.33	-0.05	10.20	3.11	0.00	0.00	0.00	0.00
		187	17.35	5.29	-0.04	10.07	3.07	0.00	0.00	0.00	0.00
		188	17.24	5.25	-0.03	9.96	3.04	0.00	0.00	0.00	0.00
		189	17.13	5.22	-0.03	9.85	3.00	0.00	0.00	0.00	0.00
		190	17.03	5.19	-0.03	9.75	2.97	0.00	0.00	0.00	0.00
		191	16.93	5.16	-0.03	9.65	2.94	0.00	0.00	0.00	0.00
		192	16.86	5.14	-0.02	9.58	2.92	0.00	0.00	0.00	0.00
		193	16.78	5.11	-0.02	9.50	2.90	0.00	0.00	0.00	0.00
		194	16.71	5.09	-0.02	9.43	2.87	0.00	0.00	0.00	0.00
		195	16.64	5.07	-0.02	9.36	2.85	0.00	0.00	0.00	0.00
		196	16.57	5.05	-0.02	9.29	2.83	0.00	0.00	0.00	0.00
		197	16.51	5.03	-0.02	9.23	2.81	0.00	0.00	0.00	0.00
		198	16.44	5.01	-0.02	9.16	2.79	0.00	0.00	0.00	0.00
		199	16.39	5.00	-0.02	9.11	2.78	0.00	0.00	0.00	0.00
		200	16.33	4.98	-0.02	9.05	2.76	0.00	0.00	0.00	0.00
		201	16.27	4.96	-0.02	8.99	2.74	0.00	0.00	0.00	0.00
		202	16.22	4.94	-0.02	8.94	2.72	0.00	0.00	0.00	0.00
		203	16.17	4.93	-0.02	8.89	2.71	0.00	0.00	0.00	0.00
		204	16.11	4.91	-0.02	8.83	2.69	0.00	0.00	0.00	0.00
		205	16.07	4.90	-0.01	8.79	2.68	0.00	0.00	0.00	0.00
		206	16.01	4.88	-0.02	8.73	2.66	0.00	0.00	0.00	0.00
		207	15.97	4.87	-0.01	8.69	2.65	0.00	0.00	0.00	0.00
		208	15.92	4.85	-0.02	8.64	2.63	0.00	0.00	0.00	0.00
		209	15.87	4.84	-0.02	8.59	2.62	0.00	0.00	0.00	0.00
		210	15.83	4.82	-0.01	8.55	2.61	0.00	0.00	0.00	

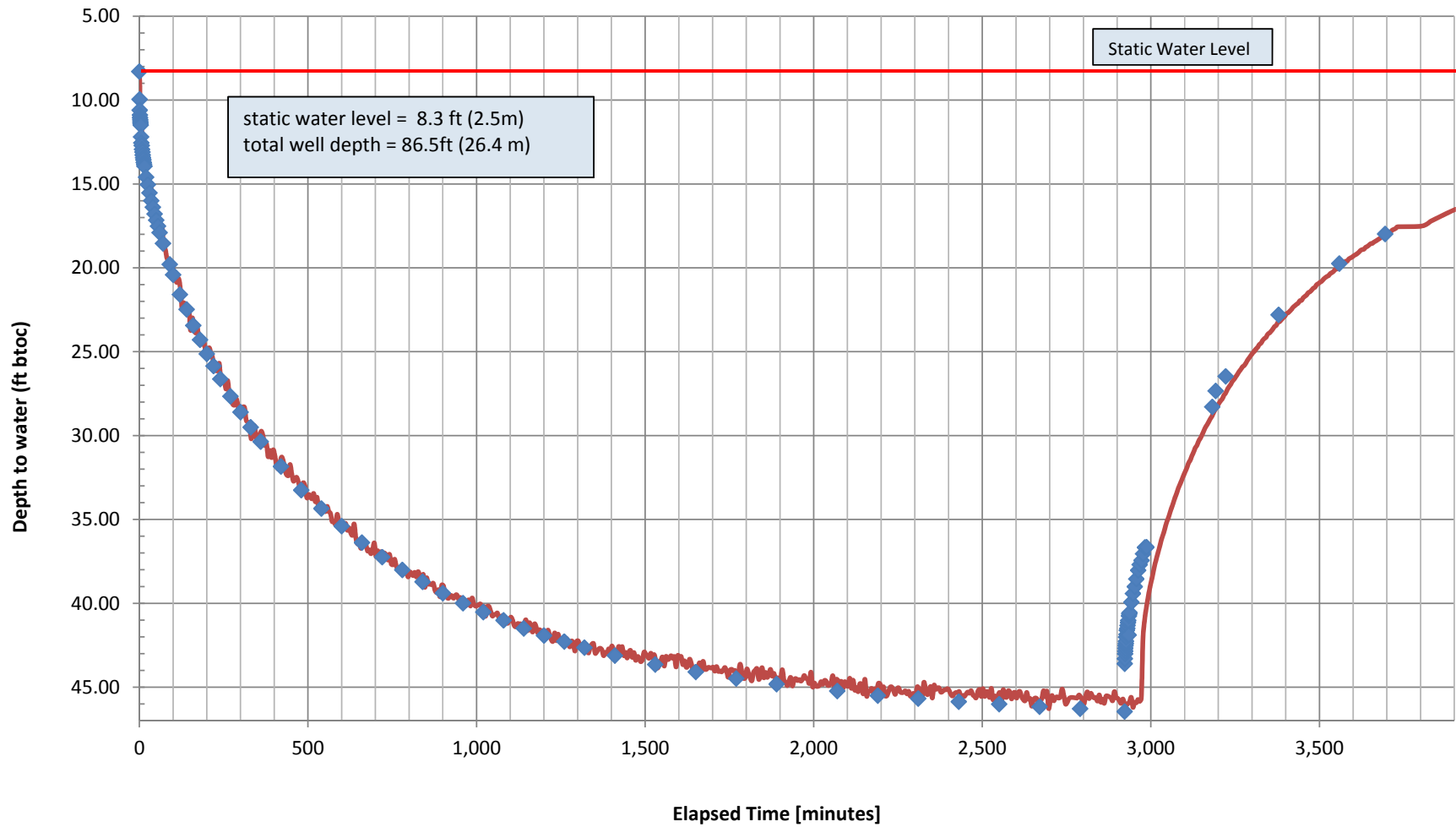
Project No: 13-019-01, Table C2 - Blackwater TW13-01, WPN 28413, 46 Hour Constant Rate Test, August 6-8, 2013.

Project No: 13-019-01, Table C2 - Blackwater TW13-01, WPN 28413, 46 Hour Constant Rate Test, August 6-8, 2013.											
Well depth = 86.5 ft		Well diameter = 6 in		Measurement method =		Flow Meter		Pump Depth = 80 ft		Specific Capacity	
Comments	Real Time	Time since pump started (minutes)	Water level measurement (btoc) (ft)	Water level measurement (btoc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	L/s/m	Usqpm/ft
STATIC	4:50 PM	0.00	8.30	2.53	0.00	0.00	0.00	--	--	--	--
		0.50	9.96	3.04	0.51	1.66	0.51	3.53	56.00	6.98	33.73
CR Test		1	10.60	3.23	0.20	2.30	0.70	3.53	56.0	5.04	24.35
		1.5	10.89	3.32	0.09	2.59	0.79	3.53	56.0	4.47	21.62
		2	11.05	3.37	0.05	2.75	0.84	3.53	56.0	4.21	20.36
		2.5	11.18	3.41	0.04	2.88	0.88	3.53	56.0	4.02	19.44
		3	11.30	3.44	0.04	3.00	0.91	3.53	56.0	3.86	18.57
		3.5	11.40	3.47	0.03	3.10	0.94	3.53	56.0	3.74	18.06
		4	11.50	3.51	0.03	3.20	0.98	3.53	56.0	3.62	17.50
		5	12.20	3.72	0.21	3.90	1.19	4.42	70.0	3.71	17.95
		6	12.55	3.83	0.11	4.25	1.30	4.42	70.0	3.41	16.47
		7	12.71	3.87	0.05	4.41	1.34	4.42	70.0	3.29	15.87
		8	12.94	3.94	0.07	4.64	1.41	4.42	70.0	3.12	15.09
		9	13.10	3.99	0.05	4.80	1.46	4.42	70.0	3.02	14.58
		10	13.28	4.05	0.05	4.98	1.52	4.42	70.0	2.91	14.06
		11	13.44	4.10	0.05	5.14	1.57	4.42	70.0	2.82	13.62
		12	13.57	4.14	0.04	5.27	1.61	4.42	70.0	2.75	13.28
		13	13.72	4.18	0.05	5.42	1.65	4.42	70.0	2.67	12.92
		14	13.83	4.22	0.03	5.53	1.69	4.42	70.0	2.62	12.66
		15	13.95	4.25	0.04	5.65	1.72	4.42	70.0	2.56	12.39
		20	14.60	4.45	0.20	6.30	1.92	4.42	70.0	2.30	11.11
		25	15.04	4.58	0.13	6.74	2.05	4.42	70.0	2.15	10.39
		30	15.53	4.73	0.15	7.23	2.20	4.42	70.0	2.00	9.68
		35	16.00	4.88	0.14	7.70	2.35	4.42	70.0	1.88	9.09
		40	16.39	5.00	0.12	8.09	2.47	4.42	70.0	1.79	8.65
		45	16.79	5.12	0.12	8.49	2.59	4.42	70.0	1.71	8.24
		50	17.16	5.23	0.11	8.86	2.70	4.42	70.0	1.64	7.90
		55	17.52	5.34	0.11	9.22	2.81	4.42	70.0	1.57	7.59
	5:50 PM	60	17.90	5.46	0.12	9.60	2.93	4.42	70.0	1.51	7.29
		65		0.00	-5.46	-8.30	-2.53	4.42	70.0	-1.75	-8.43
		70	18.55	5.65	5.65	10.25	3.12	4.42	70.0	1.41	6.83
		80		0.00	-5.65	-8.30	-2.53	4.42	70.0	-1.75	-8.43
		90	19.80	6.04	6.04	11.50	3.51	4.42	70.0	1.26	6.09
		100	20.42	6.22	0.19	12.12	3.69	4.42	70.0	1.20	5.78
	6:50 PM	120	21.59	6.58	0.36	13.29	4.05	4.42	70.0	1.09	5.27
		140	22.48	6.85	0.27	14.18	4.32	4.42	70.0	1.02	4.94
		160	23.44	7.14	0.29	15.14	4.61	4.42	70.0	0.96	4.62
	7:50 PM	180	24.29	7.40	0.26	15.99	4.87	4.42	70.0	0.91	4.38
		200	25.13	7.66	0.26	16.83	5.13	4.42	70.0	0.86	4.16
		220	25.86	7.88	0.22	17.56	5.35	4.42	70.0	0.82	3.99
	8:50 PM	240	26.63	8.12	0.23	18.33	5.59	4.42	70.0	0.79	3.82
		270	27.66	8.43	0.31	19.36	5.90	4.42	70.0	0.75	3.62
	9:50 PM	300	28.60	8.72	0.29	20.30	6.19	4.42	70.0	0.71	3.45
		330	29.51	8.99	0.28	21.21	6.46	4.42	70.0	0.68	3.30
		360	30.36	9.25	0.26	22.06	6.72	4.42	70.0	0.66	3.17
August 7th 2013		420	31.84	9.70	0.45	23.54	7.17	4.42	70.0	0.62	2.97
		480	33.25	10.13	0.43	24.95	7.60	4.42	70.0	0.58	2.81
	1:50 AM	540	34.35	10.47	0.34	26.05	7.94	4.42	70.0	0.56	2.69
		600	35.40	10.79	0.32	27.10	8.26	4.42	70.0	0.53	2.58
		660	36.38	11.09	0.30	28.08	8.56	4.42	70.0	0.52	2.49
		720	37.24	11.35	0.26	28.94	8.82	4.42	70.0	0.50	2.42
		780	38.01	11.59	0.23	29.71	9.06	4.42	70.0	0.49	2.36
		840	38.72	11.80	0.22	30.42	9.27	4.42	70.0	0.48	2.30
		900	39.39	12.01	0.20	31.09	9.48	4.42	70.0	0.47	2.25
		960	39.99	12.19	0.18	31.69	9.66	4.42	70.0	0.46	2.21
		1020	40.52	12.35	0.16	32.22	9.82	4.42	70.0	0.45	2.17
		1080	41.01	12.50	0.15	32.71	9.97	4.42	70.0	0.44	2.14
		1140	41.50	12.65	0.15	33.20	10.12	4.42	70.0	0.44	2.11
		1200	41.92	12.78	0.13	33.62	10.25	4.42	70.0	0.43	2.08
	1:50 PM	1260	42.28	12.89	0.11	33.98	10.36	4.42	70.0	0.43	2.06
		1320	42.64	13.00	0.11	34.34	10.47	4.42	70.0	0.42	2.04
		1410	43.12	13.14	0.15	34.82	10.61	4.42	70.0	0.42	2.01
		1530	43.65	13.30	0.16	35.35	10.77	4.42	70.0	0.41	1.98
		1650	44.09	13.44	0.13	35.79	10.91	4.42	70.0	0.40	1.96
August 8th 2013		1770	44.49	13.56	0.12	36.19	11.03	4.42	70.0	0.40	1.93
		1890	44.82	13.66	0.10	36.52	11.13	4.42	70.0	0.40	1.92
		2070	45.23	13.79	0.12	36.93	11.26	4.42	70.0	0.39	1.90
		2190	45.50	13.87	0.08	37.20	11.34	4.42	70.0	0.39	1.88
		2310	45.68	13.92	0.05	37.38	11.39	4.42	70.0	0.39	1.87
		2430	45.86	13.98	0.06	37.56	11.45	4.42	70.0	0.39	1.86
		2550	46.01	14.02	0.04	37.71	11.49	4.42	70.0	0.38	1.86
		2670	46.16	14.07	0.05	37.86	11.54	4.42	70.0	0.38	1.85
		2790	46.28	14.11	0.04	37.98	11.58	4.42	70.0	0.38	1.84
Stopped pumping	6:17 PM	2922	46.45	14.16	0.05	38.15	11.63	4.42	70.0	0.38	1.83

Comments	Real Time	Time since pump started (minutes)	Water level measurement (bloc) (ft)	Water level measurement (bloc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	Specific Capacity	
										L/s/m	Usqpm/ft
Recovery		2922.5	43.60	13.29	-0.87	35.30	10.76	0.00	0.00	0.00	0.00
		2923	43.30	13.20	-0.09	35.00	10.67	0.00	0.00	0.00	0.00
		2923.5	43.01	13.11	-0.09	34.71	10.58	0.00	0.00	0.00	0.00
		2924	42.85	13.06	-0.05	34.55	10.53	0.00	0.00	0.00	0.00
		2924.5	42.68	13.01	-0.05	34.38	10.48	0.00	0.00	0.00	0.00
		2925	42.52	12.96	-0.05	34.22	10.43	0.00	0.00	0.00	0.00
		2925.5	42.40	12.92	-0.04	34.10	10.39	0.00	0.00	0.00	0.00
		2926	42.26	12.88	-0.04	33.96	10.35	0.00	0.00	0.00	0.00
		2926.5	42.01	12.80	-0.08	33.71	10.27	0.00	0.00	0.00	0.00
		2928	41.85	12.76	-0.05	33.55	10.23	0.00	0.00	0.00	0.00
		2929	41.61	12.68	-0.07	33.31	10.15	0.00	0.00	0.00	0.00
		2930	41.50	12.65	-0.03	33.20	10.12	0.00	0.00	0.00	0.00
		2931	41.32	12.59	-0.05	33.02	10.06	0.00	0.00	0.00	0.00
		2932	41.15	12.54	-0.05	32.85	10.01	0.00	0.00	0.00	0.00
		2933	41.02	12.50	-0.04	32.72	9.97	0.00	0.00	0.00	0.00
		2934	41.89	12.77	0.27	33.59	10.24	0.00	0.00	0.00	0.00
		2935	40.75	12.42	-0.35	32.45	9.89	0.00	0.00	0.00	0.00
		2936	40.63	12.38	-0.04	32.33	9.85	0.00	0.00	0.00	0.00
		2937	40.56	12.36	-0.02	32.26	9.83	0.00	0.00	0.00	0.00
		2942	39.93	12.17	-0.19	31.63	9.64	0.00	0.00	0.00	0.00
		2947	39.42	12.02	-0.16	31.12	9.49	0.00	0.00	0.00	0.00
		2952	39.01	11.89	-0.12	30.71	9.36	0.00	0.00	0.00	0.00
		2957	38.55	11.75	-0.14	30.25	9.22	0.00	0.00	0.00	0.00
		2962	38.03	11.59	-0.16	29.73	9.06	0.00	0.00	0.00	0.00
		2967	37.69	11.49	-0.10	29.39	8.96	0.00	0.00	0.00	0.00
		2972	37.44	11.41	-0.08	29.14	8.88	0.00	0.00	0.00	0.00
		2977	37.05	11.29	-0.12	28.75	8.76	0.00	0.00	0.00	0.00
		2982	36.67	11.18	-0.12	28.37	8.65	0.00	0.00	0.00	0.00
		2987	36.65	11.17	-0.01	28.35	8.64	0.00	0.00	0.00	0.00
		3182	28.29	8.62	8.62	19.99	6.09	0.00	0.00	0.00	0.00
		3192	27.34	8.33	-0.29	19.04	5.80	0.00	0.00	0.00	0.00
		3222	26.47	8.07	-0.27	18.17	5.54	0.00	0.00	0.00	0.00
August 9/2103	2:00 AM	3379	22.8	6.95	-1.12	14.50	4.42	0.00	0.00	0.00	0.00
	5:00 AM	3559	19.75	6.02	-0.93	11.45	3.49	0.00	0.00	0.00	0.00
		3695	17.98	5.48	-0.54	9.68	2.95	0.00	0.00	0.00	0.00
	9:49 PM	3854	11.81	3.60	-1.88	3.51	1.07	0.00	0.00	0.00	0.00



<p>New Gold TW13-01</p>	<p>TITLE Figure C1 - Step Test Hydrograph (50 and 65 USgpm)</p>		
 <p>western water ASSOCIATES LTD Consultants in Hydrogeology and Water Resources Management</p>	<p>DRAWN AMF</p>	<p>DATE August 5, 2013</p>	<p>JOB NO. 13-019-01</p>
	<p>CHECKED BM</p>	<p>SCALE na</p>	<p>DWG. NO. na</p>
	<p>REVIEWED DG</p>	<p>FILE NO.</p>	<p>FIGURE NO. C1</p>



New Gold TW13-01

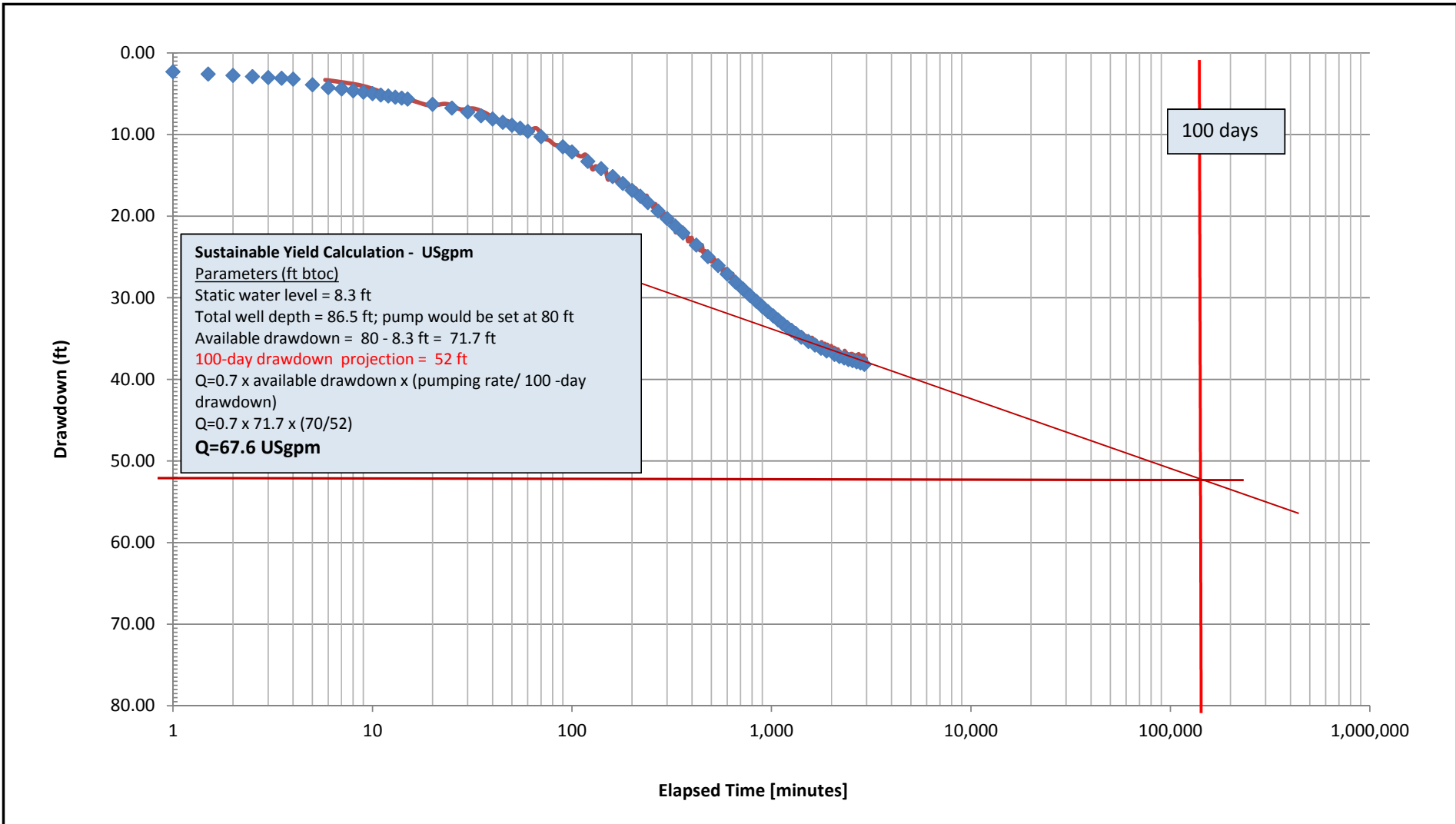
TITLE **Figure C2 - 46 hour constant rate test (70 US gpm).**
Blue diamonds are hand-measured water levels and red are pressure transducer measurements.




DRAWN AMF
CHECKED BM
REVIEWED DG

DATE August 6-8, 2013
SCALE na
FILE NO.

JOB NO. 13-019-01
DWG. NO. na
FIGURE NO. C2



<p>New Gold TW13-01</p>  <p>western water ASSOCIATES LTD Consultants in Hydrogeology and Water Resources Management</p>	<p>TITLE FigureC3- 46 hour constant rate test (70 US gpm)</p>		
	<p>DRAWN AMF</p> <p>CHECKED BM</p> <p>REVIEWED DG</p>	<p>DATE August 6-8,2013</p> <p>SCALE na</p> <p>FILE NO.</p>	<p>JOB NO. 13-019-01</p> <p>DWG. NO. na</p> <p>FIGURE NO. C3</p>

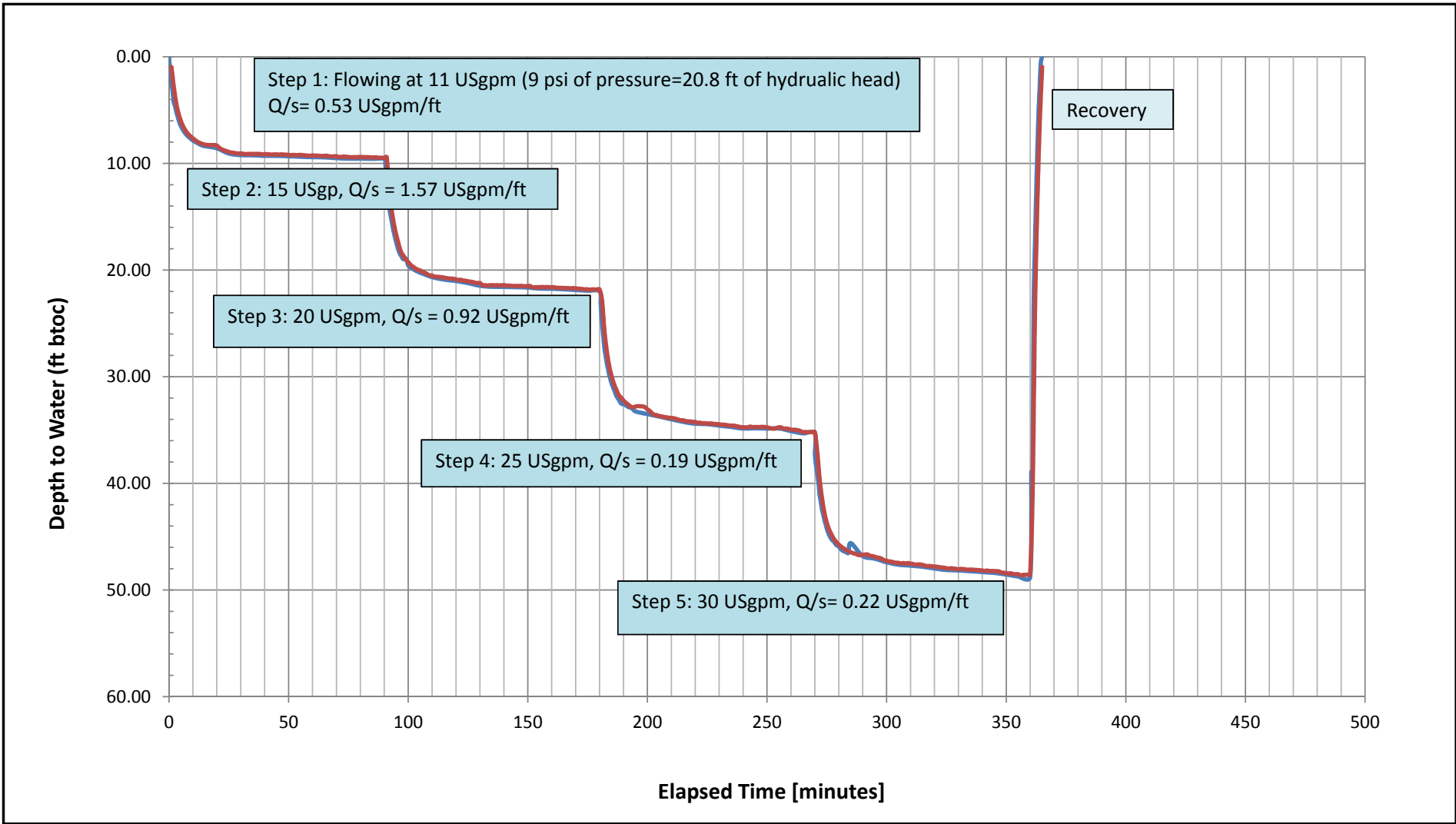
Project No: 13-019-01, Table C3 - Blackwater TW13-02, WPN 28414, Step Test, August 6, 2013.


Well depth = 180 ft (30.4 m)											
Well diameter = 6 /5 in		Measurement method =			Flow Meter		Pump Depth = 155 ft			Specific Capacity	
Comments	Real Time	Time since pump started, t (minutes)	Water level measurement (btoc) (ft)	Water level measurement (btoc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	L/s/m	Usgpm/ft
STATIC	7:52 AM	0	Artesian	Artesian							
Step 1	7:52 AM	0	0.00	0.00	0.00	0.00	0.00	0.69	11.00	--	--
	8:37 AM	0	0.00	0.00	0.00	0.00	0.00	0.69	11.00		
	8:52 AM	0	0.00	0.00	0.00	0.00	0.00	0.69	11.00		
Step 2		0.5	1.50	0.46	0.46	1.50	0.46	0.95	15.0	2.07	10.00
		1	2.40	0.73	0.27	2.40	0.73	0.95	15.0	1.29	6.25
		1.5	3.20	0.98	0.24	3.20	0.98	0.95	15.0	0.97	4.69
		2	4.29	1.31	0.33	4.29	1.31	0.95	15.0	0.72	3.50
		2.5	4.60	1.40	0.09	4.60	1.40	0.95	15.0	0.67	3.26
		3	5.09	1.55	0.15	5.09	1.55	0.95	15.0	0.61	2.95
		3.5	5.50	1.68	0.12	5.50	1.68	0.95	15.0	0.56	2.73
		4	5.90	1.80	0.12	5.90	1.80	0.95	15.0	0.53	2.54
		4.5	6.23	1.90	0.10	6.23	1.90	0.95	15.0	0.50	2.41
		5	6.49	1.98	0.08	6.49	1.98	0.95	15.0	0.48	2.31
		6	6.92	2.11	0.13	6.92	2.11	0.95	15.0	0.45	2.17
		7	7.23	2.20	0.09	7.23	2.20	0.95	15.0	0.43	2.07
		8	7.48	2.28	0.08	7.48	2.28	0.95	15.0	0.42	2.01
		9	7.67	2.34	0.06	7.67	2.34	0.95	15.0	0.40	1.96
		10	7.85	2.39	0.05	7.85	2.39	0.95	15.0	0.40	1.91
		12	8.11	2.47	0.08	8.11	2.47	0.95	15.0	0.38	1.85
		14	8.33	2.54	0.07	8.33	2.54	0.95	15.0	0.37	1.80
	15	8.38	2.55	0.02	8.38	2.55	0.95	15.0	0.37	1.79	
	20	8.58	2.62	0.06	8.58	2.62	0.95	15.0	0.36	1.75	
	25	9.07	2.76	0.15	9.07	2.76	0.95	15.0	0.34	1.65	
	30	9.22	2.81	0.05	9.22	2.81	0.95	15.0	0.34	1.63	
	35	9.23	2.81	0.00	9.23	2.81	0.95	15.0	0.34	1.63	
	40	9.29	2.83	0.02	9.29	2.83	0.95	15.0	0.33	1.61	
	45	9.29	2.83	0.00	9.29	2.83	0.95	15.0	0.33	1.61	
	50	9.33	2.84	0.01	9.33	2.84	0.95	15.0	0.33	1.61	
	55	9.37	2.86	0.01	9.37	2.86	0.95	15.0	0.33	1.60	
	60	9.41	2.87	0.01	9.41	2.87	0.95	15.0	0.33	1.59	
	65	9.43	2.87	0.01	9.43	2.87	0.95	15.0	0.33	1.59	
	70	9.50	2.90	0.02	9.50	2.90	0.95	15.0	0.33	1.58	
	75	9.56	2.91	0.02	9.56	2.91	0.95	15.0	0.32	1.57	
	80	9.55	2.91	0.00	9.55	2.91	0.95	15.0	0.33	1.57	
	85	9.57	2.92	0.01	9.57	2.92	0.95	15.0	0.32	1.57	
Step 3	9:22 AM	90	9.58	2.92	0.00	9.58	2.92	0.95	15.0	0.32	1.57
		90.5	10.15	3.09	0.17	10.15	3.09	1.26	20.0	0.41	1.97
		91	11.51	3.51	0.41	11.51	3.51	1.26	20.0	0.36	1.74
		91.5	12.82	3.91	0.40	12.82	3.91	1.26	20.0	0.32	1.56
		92	13.96	4.26	0.35	13.96	4.26	1.26	20.0	0.30	1.43
		92.5	14.70	4.48	0.23	14.70	4.48	1.26	20.0	0.28	1.36
		93	15.29	4.66	0.18	15.29	4.66	1.26	20.0	0.27	1.31
		93.5	15.93	4.86	0.20	15.93	4.86	1.26	20.0	0.26	1.26
		94	16.48	5.02	0.17	16.48	5.02	1.26	20.0	0.25	1.21
		95	17.40	5.30	0.28	17.40	5.30	1.26	20.0	0.24	1.15
	96	18.17	5.54	0.23	18.17	5.54	1.26	20.0	0.23	1.10	
	97	18.65	5.68	0.15	18.65	5.68	1.26	20.0	0.22	1.07	
	98	18.98	5.79	0.10	18.98	5.79	1.26	20.0	0.22	1.05	
adjustment		99	18.92	5.77	-0.02	18.92	5.77	1.26	20.0	0.22	1.06
		100	19.55	5.96	0.19	19.55	5.96	1.26	20.0	0.21	1.02
		101	19.75	6.02	0.06	19.75	6.02	1.26	20.0	0.21	1.01
		102	19.90	6.07	0.05	19.90	6.07	1.26	20.0	0.21	1.01
		103	20.04	6.11	0.04	20.04	6.11	1.26	20.0	0.21	1.00
		104	20.14	6.14	0.03	20.14	6.14	1.26	20.0	0.21	0.99
		105	20.25	6.17	0.03	20.25	6.17	1.26	20.0	0.20	0.99
		110	20.66	6.30	0.12	20.66	6.30	1.26	20.0	0.20	0.97
		115	20.89	6.37	0.07	20.89	6.37	1.26	20.0	0.20	0.96
		120	21.03	6.41	0.04	21.03	6.41	1.26	20.0	0.20	0.95
	125	21.22	6.47	0.06	21.22	6.47	1.26	20.0	0.20	0.94	
	130	21.47	6.54	0.08	21.47	6.54	1.26	20.0	0.19	0.93	
	135	21.57	6.57	0.03	21.57	6.57	1.26	20.0	0.19	0.93	
	140	21.58	6.58	0.00	21.58	6.58	1.26	20.0	0.19	0.93	
	145	21.60	6.58	0.01	21.60	6.58	1.26	20.0	0.19	0.93	
	150	21.64	6.60	0.01	21.64	6.60	1.26	20.0	0.19	0.92	
	155	21.74	6.63	0.03	21.74	6.63	1.26	20.0	0.19	0.92	
	160	21.75	6.63	0.00	21.75	6.63	1.26	20.0	0.19	0.92	
	165	21.8	6.64	0.02	21.80	6.64	1.26	20.0	0.19	0.92	
	170	21.86	6.66	0.02	21.86	6.66	1.26	20.0	0.19	0.91	
	175	21.93	6.68	0.02	21.93	6.68	1.26	20.0	0.19	0.91	

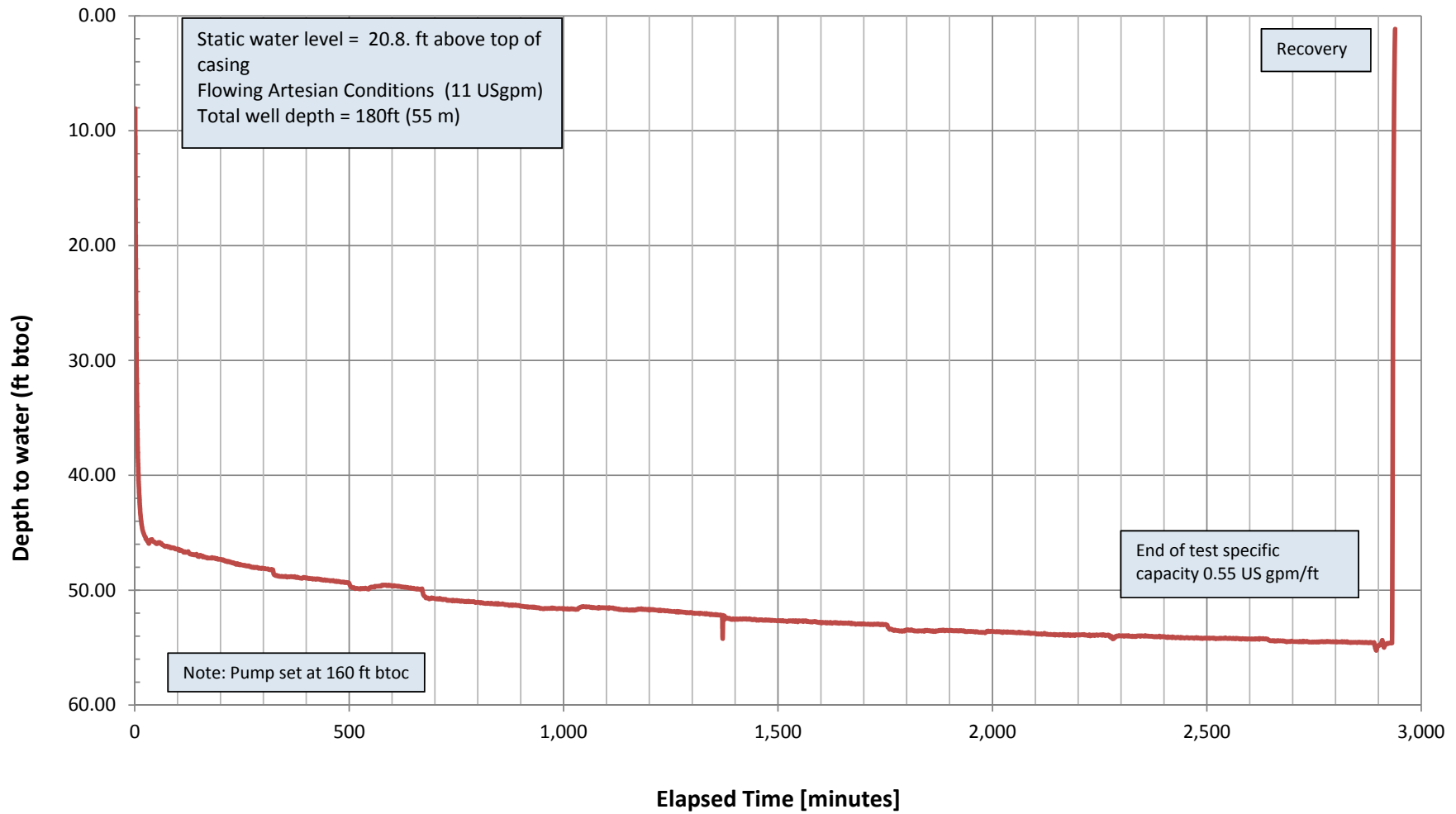
Comments	Real Time	Time since pump started, t (minutes)	Water level measurement (btoc) (ft)	Water level measurement (btoc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	Specific Capacity	
										L/s/m	Usqpm/ft
Step 4	11:52 AM	180	22.00	6.71	0.02	22.00	6.71	1.58	25.0	0.24	1.14
		180.5	23.31	7.10	0.40	23.31	7.10	1.58	25.0	0.22	1.07
		181	24.92	7.60	0.49	24.92	7.60	1.58	25.0	0.21	1.00
		181.5	26.11	7.96	0.36	26.11	7.96	1.58	25.0	0.20	0.96
		182	27.30	8.32	0.36	27.30	8.32	1.58	25.0	0.19	0.92
		182.5	27.99	8.53	0.21	27.99	8.53	1.58	25.0	0.18	0.89
		183	28.71	8.75	0.22	28.71	8.75	1.58	25.0	0.18	0.87
		183.5	29.23	8.91	0.16	29.23	8.91	1.58	25.0	0.18	0.86
		184	29.79	9.08	0.17	29.79	9.08	1.58	25.0	0.17	0.84
		184.5	30.20	9.20	0.12	30.20	9.20	1.58	25.0	0.17	0.83
		185	30.61	9.33	0.12	30.61	9.33	1.58	25.0	0.17	0.82
		186	31.19	9.51	0.18	31.19	9.51	1.58	25.0	0.17	0.80
		187	31.78	9.69	0.18	31.78	9.69	1.58	25.0	0.16	0.79
		188	32.15	9.80	0.11	32.15	9.80	1.58	25.0	0.16	0.78
		189	32.50	9.91	0.11	32.50	9.91	1.58	25.0	0.16	0.77
		190	32.59	9.93	0.03	32.59	9.93	1.58	25.0	0.16	0.77
		191	32.69	9.96	0.03	32.69	9.96	1.58	25.0	0.16	0.76
		192	32.84	10.01	0.05	32.84	10.01	1.58	25.0	0.16	0.76
		193	32.91	10.03	0.02	32.91	10.03	1.58	25.0	0.16	0.76
		194	33.06	10.08	0.05	33.06	10.08	1.58	25.0	0.16	0.76
		195	33.25	10.13	0.06	33.25	10.13	1.58	25.0	0.16	0.75
		200	33.51	10.21	0.08	33.51	10.21	1.58	25.0	0.15	0.75
		205	33.74	10.28	0.07	33.74	10.28	1.58	25.0	0.15	0.74
		210	33.99	10.36	0.08	33.99	10.36	1.58	25.0	0.15	0.74
		215	34.24	10.44	0.08	34.24	10.44	1.58	25.0	0.15	0.73
		220	34.41	10.49	0.05	34.41	10.49	1.58	25.0	0.15	0.73
		225	34.45	10.50	0.01	34.45	10.50	1.58	25.0	0.15	0.73
		230	34.58	10.54	0.04	34.58	10.54	1.58	25.0	0.15	0.72
		235	34.71	10.58	0.04	34.71	10.58	1.58	25.0	0.15	0.72
		240	34.86	10.63	0.05	34.86	10.63	1.58	25.0	0.15	0.72
		245	34.83	10.62	-0.01	34.83	10.62	1.58	25.0	0.15	0.72
		250	34.86	10.63	0.01	34.86	10.63	1.58	25.0	0.15	0.72
		255	34.85	10.62	0.00	34.85	10.62	1.58	25.0	0.15	0.72
		260	35.10	10.70	0.08	35.10	10.70	1.58	25.0	0.15	0.71
		265	35.31	10.76	0.06	35.31	10.76	1.58	25.0	0.15	0.71
Step 5	1:22 PM	270	35.31	10.76	0.00	35.31	10.76	1.58	25.0	0.15	0.71
		270.05	37.41	11.40	0.64	37.41	11.40	1.89	30	0.17	0.80
		271	39.10	11.92	0.52	39.10	11.92	1.89	30	0.16	0.77
		271.5	39.95	12.18	0.26	39.95	12.18	1.89	30	0.16	0.75
		272	41.11	12.53	0.35	41.11	12.53	1.89	30	0.15	0.73
		272.5	41.75	12.73	0.20	41.75	12.73	1.89	30	0.15	0.72
		273	42.47	12.94	0.22	42.47	12.94	1.89	30	0.15	0.71
		273.5	42.94	13.09	0.14	42.94	13.09	1.89	30	0.14	0.70
		274	43.44	13.24	0.15	43.44	13.24	1.89	30	0.14	0.69
		274.5	43.82	13.36	0.12	43.82	13.36	1.89	30	0.14	0.68
		275	44.25	13.49	0.13	44.25	13.49	1.89	30	0.14	0.68
		276	44.85	13.67	0.18	44.85	13.67	1.89	30	0.14	0.67
		277	45.25	13.79	0.12	45.25	13.79	1.89	30	0.14	0.66
		278	45.48	13.86	0.07	45.48	13.86	1.89	30	0.14	0.66
		279	45.78	13.95	0.09	45.78	13.95	1.89	30	0.14	0.66
		280	45.92	14.00	0.04	45.92	14.00	1.89	30	0.14	0.65
		281	46.20	14.08	0.09	46.20	14.08	1.89	30	0.13	0.65
		282	46.36	14.13	0.05	46.36	14.13	1.89	30	0.13	0.65
		283	46.43	14.15	0.02	46.43	14.15	1.89	30	0.13	0.65
		284	46.52	14.18	0.03	46.52	14.18	1.89	30	0.13	0.64
		285	46.60	13.90	-0.28	46.60	13.90	1.89	30	0.14	0.66
		290	46.82	14.27	0.37	46.82	14.27	1.89	30	0.13	0.64
		295	47.06	14.34	0.07	47.06	14.34	1.89	30	0.13	0.64
		300	47.40	14.45	0.10	47.40	14.45	1.89	30	0.13	0.63
		305	47.63	14.52	0.07	47.63	14.52	1.89	30	0.13	0.63
		310	47.71	14.54	0.02	47.71	14.54	1.89	30	0.13	0.63
		315	47.82	14.58	0.03	47.82	14.58	1.89	30	0.13	0.63
		320	47.98	14.62	0.05	47.98	14.62	1.89	30	0.13	0.63
		325	48.12	14.67	0.04	48.12	14.67	1.89	30	0.13	0.62
		330	48.16	14.68	0.01	48.16	14.68	1.89	30	0.13	0.62
		335	48.24	14.70	0.02	48.24	14.70	1.89	30	0.13	0.62
		340	48.32	14.73	0.02	48.32	14.73	1.89	30	0.13	0.62
		345	48.40	14.75	0.02	48.40	14.75	1.89	30	0.13	0.62
		350	48.55	14.80	0.05	48.55	14.80	1.89	30	0.13	0.62
		355	48.73	14.85	0.05	48.73	14.85	1.89	30	0.13	0.62
		360	48.79	14.87	0.02	48.79	14.87	1.89	30	0.13	0.61
Recovery	2:52 PM	360.5	38.91	11.86	-3.01	38.91	11.86	0	0	0	0
		361	39.91	12.16	0.30	39.91	12.16	0	0	0	0
		361.5	23.09	7.04	-5.13	23.09	7.04	0	0	0	0
		362	17.75	5.41	-1.63	17.75	5.41	0	0	0	0
		362.5	13.08	3.99	-1.42	13.08	3.99	0	0	0	0
		363	8.97	2.73	-1.25	8.97	2.73	0	0	0	0
		363.5	5.38	1.64	-1.09	5.38	1.64	0	0	0	0
		364	2.77	0.84	-0.80	2.77	0.84	0	0	0	0
		364.5	0.50	0.15	-0.69	0.50	0.15	0	0	0	0
		365	0.00	0.00	-0.15	0.00	0.00	0	0	0	0

Project No: 13-019-01, Table C4 - Blackwater, TW13-02, WPN 28414, 48 Hour Constant Rate Test (30 Usqpm), August 6-9, 2013.

Well depth = 180 ft (30.4 m)		Well diameter = 6 /5 in		Measurement method =		Flow Meter		Pump Depth = 155 ft		Specific Capacity	
Comments	Real Time	Time since pump started, t (minutes)	Water level measurement (btoc) (ft)	Water level measurement (btoc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	Specific Capacity	
										L/s/m	Usqpm/ft
STATIC	3:10 PM	0.00	0.00	0.00	0.00	0.00	0.00	1.89	30.00	--	--
CR Test		0.50	6.41	1.95	1.95	6.41	1.95	1.89	30.00	0.97	4.68
		1	11.64	3.55	1.59	11.64	3.55	1.89	30.00	0.53	2.58
		1.5	16.19	4.93	1.39	16.19	4.93	1.89	30.00	0.38	1.85
		2	19.71	6.01	1.07	19.71	6.01	1.89	30.00	0.32	1.52
		2.5	22.90	6.98	0.97	22.90	6.98	1.89	30.00	0.27	1.31
		3	25.99	7.92	0.94	25.99	7.92	1.89	30.00	0.24	1.15
		3.5	28.45	8.67	0.75	28.45	8.67	1.89	30.00	0.22	1.05
		4	30.51	9.30	0.63	30.51	9.30	1.89	30.00	0.20	0.98
		4.5	32.45	9.89	0.59	32.45	9.89	1.89	30.00	0.19	0.92
		5	33.95	10.35	0.46	33.95	10.35	1.89	30.00	0.18	0.88
		6	36.60	11.16	0.81	36.60	11.16	1.89	30.00	0.17	0.82
		7	38.42	11.71	0.55	38.42	11.71	1.89	30.00	0.16	0.78
		8	39.85	12.15	0.44	39.85	12.15	1.89	30.00	0.16	0.75
		9	40.91	12.47	0.32	40.91	12.47	1.89	30.00	0.15	0.73
	3:20 PM	10	41.74	12.72	0.25	41.74	12.72	1.89	30.00	0.15	0.72
		11	42.55	12.97	0.25	42.55	12.97	1.89	30.00	0.15	0.71
		12	43.08	13.13	0.16	43.08	13.13	1.89	30.00	0.14	0.70
		13	43.55	13.27	0.14	43.55	13.27	1.89	30.00	0.14	0.69
		14	43.91	13.38	0.11	43.91	13.38	1.89	30.00	0.14	0.68
		15	44.25	13.49	0.10	44.25	13.49	1.89	30.00	0.14	0.68
		20	45.10	13.75	0.26	45.10	13.75	1.89	30.00	0.14	0.67
		25	45.56	13.89	0.14	45.56	13.89	1.89	30.00	0.14	0.66
		30	45.90	13.99	0.10	45.90	13.99	1.89	30.00	0.14	0.65
		35	45.78	13.95	-0.04	45.78	13.95	1.89	30.00	0.14	0.66
		40	45.74	13.94	-0.01	45.74	13.94	1.89	30.00	0.14	0.66
		45	45.93	14.00	0.06	45.93	14.00	1.89	30.00	0.14	0.65
		50	46.03	14.03	0.03	46.03	14.03	1.89	30.00	0.13	0.65
		55	45.96	14.01	-0.02	45.96	14.01	1.89	30.00	0.14	0.65
	4:10 PM	60	46.03	14.03	0.02	46.03	14.03	1.89	30.00	0.13	0.65
		65	46.20	14.08	0.05	46.20	14.08	1.89	30.00	0.13	0.65
		70	46.30	14.11	0.03	46.30	14.11	1.89	30.00	0.13	0.65
		75	46.31	14.12	0.00	46.31	14.12	1.89	30.00	0.13	0.65
		90	46.40	14.14	0.03	46.40	14.14	1.89	30.00	0.13	0.65
		105	46.62	14.21	0.07	46.62	14.21	1.89	30.00	0.13	0.64
		120	46.83	14.27	0.06	46.83	14.27	1.89	30.00	0.13	0.64
		135	46.94	14.31	0.03	46.94	14.31	1.89	30.00	0.13	0.64
		150	47.15	14.37	0.06	47.15	14.37	1.89	30.00	0.13	0.64
	5:55 PM	165	47.28	14.41	0.04	47.28	14.41	1.89	30.00	0.13	0.63
	8:40 PM	328	48.85	14.89	0.48	48.85	14.89	1.89	30.00	0.13	0.61
	11:34 PM	502	49.71	15.15	0.26	49.71	15.15	1.89	30.00	0.12	0.60
August 7/2013		665	50.11	15.27	0.12	50.11	15.27	1.89	30.00	0.12	0.60
	6:12 AM	902	51.62	15.73	0.46	51.62	15.73	1.89	30.00	0.12	0.58
	9:12 AM	1082	51.74	15.77	0.04	51.74	15.77	1.89	30.00	0.12	0.58
	12:12 PM	1262	52.09	15.88	0.11	52.09	15.88	1.89	30.00	0.12	0.58
		1415	52.60	16.03	0.16	52.60	16.03	1.89	30.00	0.12	0.57
	5:12 PM	1562	53.77	16.39	0.36	53.77	16.39	1.89	30.00	0.12	0.56
	8:40 PM	1772	53.19	16.21	-0.18	53.19	16.21	1.89	30.00	0.12	0.56
		1892	53.76	16.39	0.17	53.76	16.39	1.89	30.00	0.12	0.56
		2012	53.86	16.42	0.03	53.86	16.42	1.89	30.00	0.12	0.56
		2192	54.11	16.49	0.08	54.11	16.49	1.89	30.00	0.11	0.55
		2312	54.30	16.55	0.06	54.30	16.55	1.89	30.00	0.11	0.55
		2432	54.35	16.57	0.02	54.35	16.57	1.89	30.00	0.11	0.55
		2672	54.49	16.61	0.04	54.49	16.61	1.89	30.00	0.11	0.55
		2792	54.65	16.66	0.05	54.65	16.66	1.89	30.00	0.11	0.55
August 8/2013		2912	54.75	16.69	0.03	54.75	16.69	1.89	30.00	0.11	0.55
Recovery	3:42 PM	2912.5	44.55	13.58	-3.11	44.55	13.58	0.00	0.00	0.00	0.00
		2913	35.30	10.76	-2.82	35.30	10.76	0.00	0.00	0.00	0.00
		2913.5	28.75	8.76	-2.00	28.75	8.76	0.00	0.00	0.00	0.00
		2914	22.95	7.00	-1.77	22.95	7.00	0.00	0.00	0.00	0.00
		2914.5	18.60	5.67	-1.33	18.60	5.67	0.00	0.00	0.00	0.00
		2915	14.79	4.51	-1.16	14.79	4.51	0.00	0.00	0.00	0.00
		2915.5	11.75	3.58	-0.93	11.75	3.58	0.00	0.00	0.00	0.00
		2916	9.10	2.77	-0.81	9.10	2.77	0.00	0.00	0.00	0.00
		2916.5	6.95	2.12	-0.66	6.95	2.12	0.00	0.00	0.00	0.00
		2917	5.00	1.52	-0.59	5.00	1.52	0.00	0.00	0.00	0.00
		2918	3.55	1.08	-0.44	3.55	1.08	0.00	0.00	0.00	0.00
		2919	2.20	0.67	-0.41	2.20	0.67	0.00	0.00	0.00	0.00
		2920	1.40	0.43	-0.24	1.40	0.43	0.00	0.00	0.00	0.00
		2921	0.60	0.18	-0.24	0.60	0.18	0.00	0.00	0.00	0.00
		2922	0.00	0.00	-0.18	0.00	0.00	0.00	0.00	0.00	0.00



<p>Blackwater TW13-02</p>	<p>TITLE Figure C4 - Step Test Hydrograph August 6, 2013</p>		
 <p>western water ASSOCIATES LTD Consultants in Hydrogeology and Water Resources Management</p>	<p>DRAWN AMF</p>	<p>DATE 6-August-2013</p>	<p>JOB NO. 13-019-01</p>
	<p>CHECKED BRM</p>	<p>SCALE na</p>	<p>DWG. NO. na</p>
	<p>REVIEWED DG</p>	<p>FILE NO.</p>	<p>FIGURE NO. C4</p>



Blackwater TW13-02

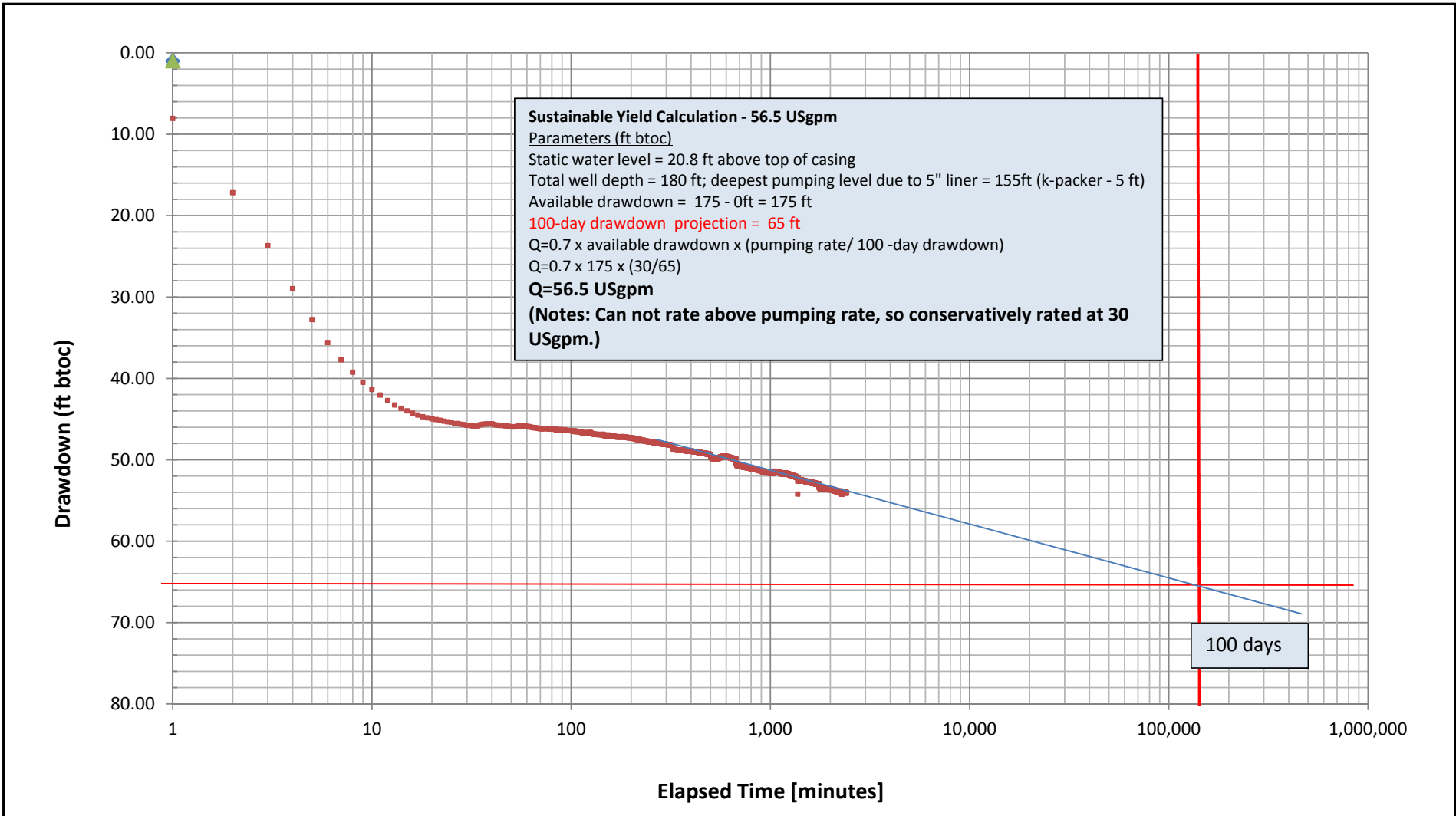
TITLE
Figure C5 - 48 Hour Constant Rate Test (30 USgpm)




DRAWN AMF
 CHECKED BM
 REVIEWED DG

DATE August 6-9, 2013
 SCALE na
 FILE NO.

JOB NO. 13-019-01
 DWG. NO. na
 FIGURE NO. **C5**



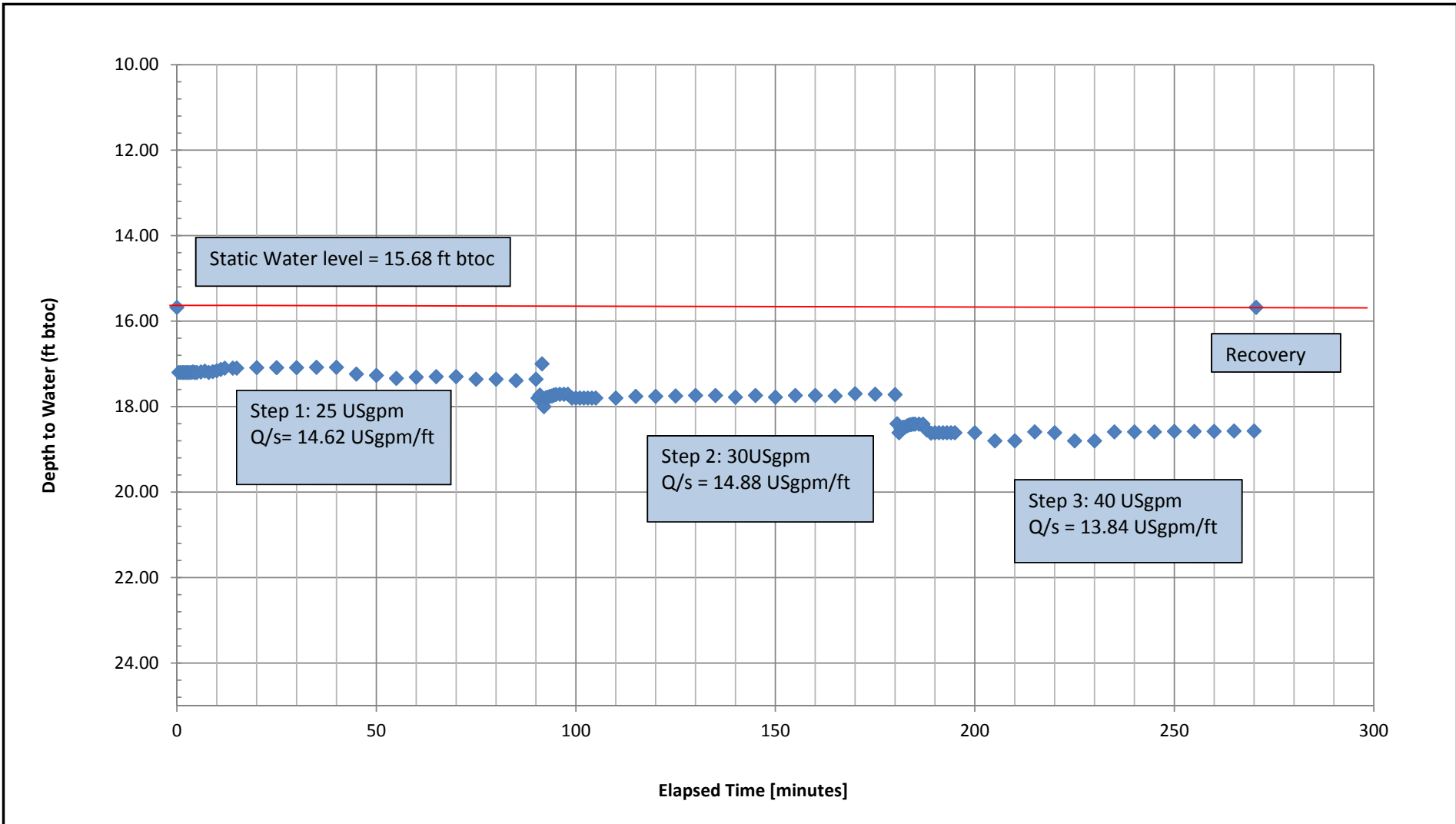
<p>Blackwater TW13-02</p>	<p>TITLE Figure C6- 48 Hour Constant Rate Test (30 USgpm)</p>		
	<p>DRAWN AMF</p>	<p>DATE August 6-9, 2013</p>	<p>JOB NO. 13-019-01</p>
	<p>CHECKED BM</p>	<p>SCALE na</p>	<p>DWG. NO. na</p>
	<p>REVIEWED DG</p>	<p>FILE NO.</p>	<p>FIGURE NO. C6</p>


Project No: 13-019-01, Table C5 - Blackwater TW13-03, WPN 28415, Step Test, August 9, 2013.

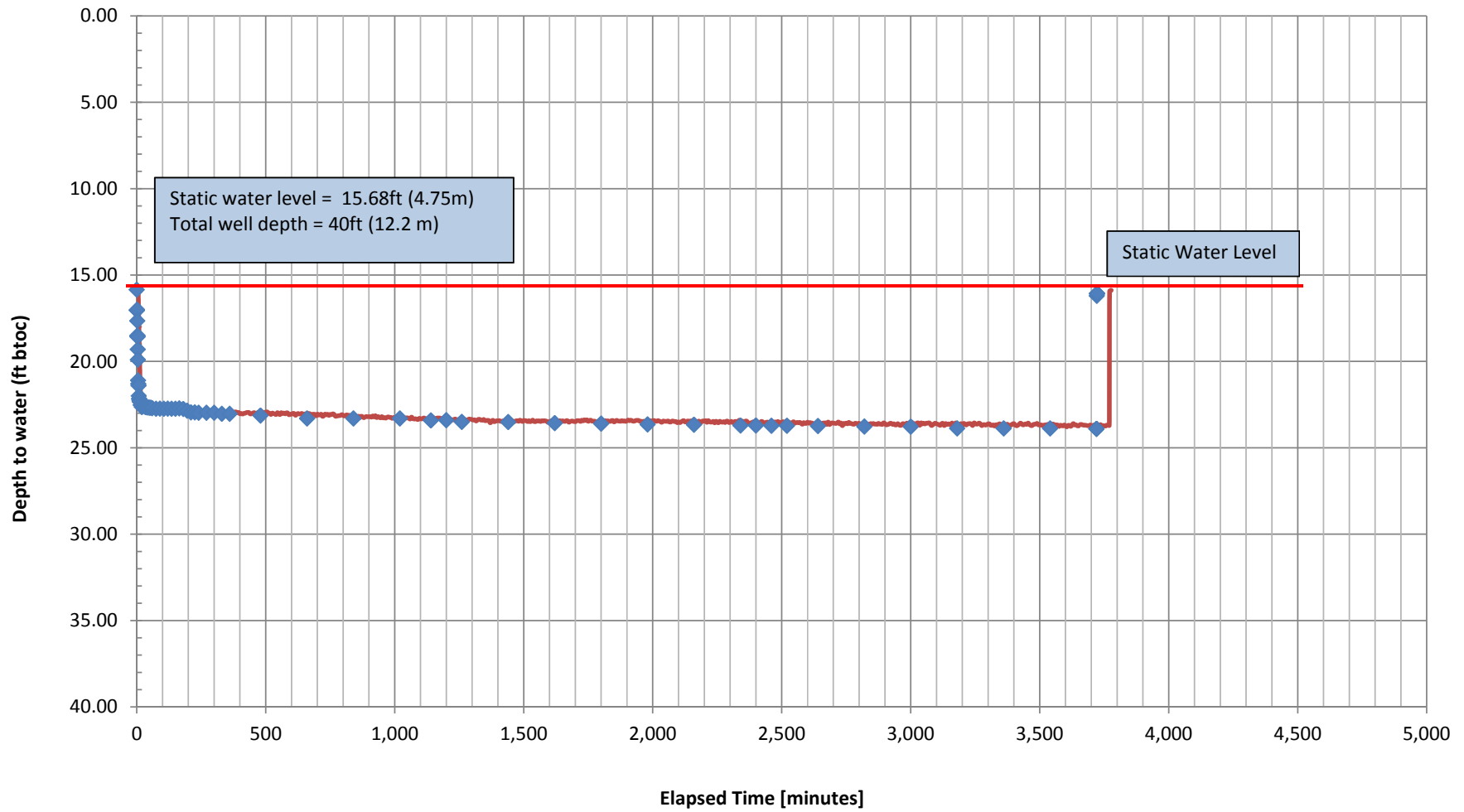
Well depth = 40 ft												
Well diameter = 6 in		Measurement method =			Flow Meter	Pump Depth = 29 ft					Specific Capacity	
Comments	Real Time	Time since pump started (minutes)	Water level measurement (btoc) (ft)	Water level measurement (btoc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	Specific Capacity		
										L/s/m	Usqpm/ft	
Static	11:47 AM	0	15.68	4.78	0	0	0	0.00	0	0	0	
Step 1		0.5	17.20	5.24	0.46	1.52	0.46	1.58	25.00	3.41	16.45	
		1	17.20	5.24	0.00	1.52	0.46	1.58	25.00	3.41	16.45	
		1.5	17.20	5.24	0.00	1.52	0.46	1.58	25.00	3.41	16.45	
Step 2		2	17.20	5.24	0.00	1.52	0.46	1.58	25.00	3.41	16.45	
		2.5	17.20	5.24	0.00	1.52	0.46	1.58	25.00	3.41	16.45	
		3	17.20	5.24	0.00	1.52	0.46	1.58	25.00	3.41	16.45	
		3.5	17.20	5.24	0.00	1.52	0.46	1.58	25.00	3.41	16.45	
		4	17.19	5.24	0.00	1.51	0.46	1.58	25.00	3.43	16.56	
		4.5	17.20	5.24	0.00	1.52	0.46	1.58	25.00	3.41	16.45	
		5	17.20	5.24	0.00	1.52	0.46	1.58	25.00	3.41	16.45	
		6	17.19	5.24	0.00	1.51	0.46	1.58	25.00	3.43	16.56	
		7	17.17	5.23	-0.01	1.49	0.45	1.58	25.00	3.48	16.78	
		8	17.20	5.24	0.01	1.52	0.46	1.58	25.00	3.41	16.45	
	9	17.18	5.24	-0.01	1.50	0.46	1.58	25.00	3.46	16.67		
	10	17.16	5.23	-0.01	1.48	0.45	1.58	25.00	3.50	16.89		
	11	17.13	5.22	-0.01	1.45	0.44	1.58	25.00	3.57	17.24		
	12	17.10	5.21	-0.01	1.42	0.43	1.58	25.00	3.65	17.61		
	14	17.10	5.21	0.00	1.42	0.43	1.58	25.00	3.65	17.61		
	15	17.10	5.21	0.00	1.42	0.43	1.58	25.00	3.65	17.61		
	20	17.09	5.21	0.00	1.41	0.43	1.58	25.00	3.68	17.73		
	25	17.09	5.21	0.00	1.41	0.43	1.58	25.00	3.68	17.73		
	30	17.09	5.21	0.00	1.41	0.43	1.58	25.00	3.68	17.73		
	35	17.08	5.21	0.00	1.40	0.43	1.58	25.00	3.70	17.86		
	40	17.08	5.21	0.00	1.40	0.43	1.58	25.00	3.70	17.86		
	45	17.24	5.25	0.05	1.56	0.47	1.58	25.00	3.32	16.03		
	50	17.27	5.25	0.01	1.59	0.48	1.58	25.00	3.26	15.72		
	55	17.34	5.29	0.02	1.66	0.51	1.58	25.00	3.12	15.06		
	60	17.31	5.28	-0.01	1.63	0.50	1.58	25.00	3.18	15.34		
	65	17.30	5.27	0.00	1.62	0.49	1.58	25.00	3.20	15.43		
	70	17.30	5.27	0.00	1.62	0.49	1.58	25.00	3.20	15.43		
	75	17.36	5.29	0.02	1.68	0.51	1.58	25.00	3.08	14.88		
	80	17.36	5.29	0.00	1.68	0.51	1.58	25.00	3.08	14.88		
	85	17.39	5.30	0.01	1.71	0.52	1.58	25.00	3.03	14.62		
Step 2	1:17 PM	90	17.36	5.29	-0.01	1.68	0.51	1.58	25.00	3.08	14.88	
		90.5	17.80	5.43	0.13	2.12	0.65	1.89	30.0	2.93	14.15	
		91	17.73	5.40	-0.02	2.05	0.62	1.89	30.0	3.03	14.63	
		91.5	17.00	5.18	-0.22	1.32	0.40	1.89	30.0	4.71	22.73	
		92	18.00	5.49	0.30	2.32	0.71	1.89	30.0	2.68	12.93	
		92.5	17.79	5.42	-0.06	2.11	0.64	1.89	30.0	2.95	14.22	
		93	17.78	5.42	0.00	2.10	0.64	1.89	30.0	2.96	14.29	
		93.5	17.76	5.41	-0.01	2.08	0.63	1.89	30.0	2.99	14.42	
		94	17.75	5.41	0.00	2.07	0.63	1.89	30.0	3.00	14.49	
		94.5	17.73	5.40	-0.01	2.05	0.62	1.89	30.0	3.03	14.63	
		95	17.72	5.40	0.00	2.04	0.62	1.89	30.0	3.05	14.71	
		96	17.71	5.40	0.00	2.03	0.62	1.89	30.0	3.06	14.78	
		97	17.71	5.40	0.00	2.03	0.62	1.89	30.0	3.06	14.78	
		98	17.71	5.40	0.00	2.03	0.62	1.89	30.0	3.06	14.78	
		99	17.80	5.43	0.03	2.12	0.65	1.89	30.0	2.93	14.15	
adjustment		100	17.80	5.43	0.00	2.12	0.65	1.89	30.0	2.93	14.15	
		101	17.80	5.43	0.00	2.12	0.65	1.89	30.0	2.93	14.15	
		102	17.80	5.43	0.00	2.12	0.65	1.89	30.0	2.93	14.15	
		103	17.80	5.43	0.00	2.12	0.65	1.89	30.0	2.93	14.15	
		104	17.80	5.43	0.00	2.12	0.65	1.89	30.0	2.93	14.15	
		105	17.80	5.43	0.00	2.12	0.65	1.89	30.0	2.93	14.15	
		110	17.80	5.43	0.00	2.12	0.65	1.89	30.0	2.93	14.15	
		115	17.76	5.41	-0.01	2.08	0.63	1.89	30.0	2.99	14.42	
	2:17 PM		120	17.76	5.41	0.00	2.08	0.63	1.89	30.0	2.99	14.42
			125	17.75	5.41	0.00	2.07	0.63	1.89	30.0	3.00	14.49
			130	17.74	5.41	0.00	2.06	0.63	1.89	30.0	3.02	14.56
			135	17.74	5.41	0.00	2.06	0.63	1.89	30.0	3.02	14.56
			140	17.78	5.42	0.01	2.10	0.64	1.89	30.0	2.96	14.29
			145	17.74	5.41	-0.01	2.06	0.63	1.89	30.0	3.02	14.56
			150	17.78	5.42	0.01	2.10	0.64	1.89	30.0	2.96	14.29
		155	17.74	5.41	-0.01	2.06	0.63	1.89	30.0	3.02	14.56	
		160	17.74	5.41	0.00	2.06	0.63	1.89	30.0	3.02	14.56	
		165	17.75	5.41	0.00	2.07	0.63	1.89	30.0	3.00	14.49	
		170	17.70	5.39	-0.02	2.02	0.61	1.89	30.0	3.08	14.85	
		175	17.71	5.40	0.00	2.03	0.62	1.89	30.0	3.06	14.78	
Step 3		3:17 PM	180	17.72	5.40	0.00	2.04	0.62	1.89	30.0	3.05	14.71
			180.5	18.40	5.61	0.21	2.72	0.83	2.52	40.0	3.05	14.71
			181	18.61	5.67	0.06	2.93	0.89	2.52	40.0	2.83	13.65
		181.5	18.62	5.64	-0.03	2.84	0.86	2.52	40.0	2.92	14.08	
		182	18.48	5.63	-0.01	2.80	0.85	2.52	40.0	2.96	14.29	
		182.5	18.48	5.63	0.00	2.80	0.85	2.52	40.0	2.96	14.29	
		183	18.45	5.62	-0.01	2.77	0.84	2.52	40.0	2.99	14.44	
		183.5	18.43	5.62	-0.01	2.75	0.84	2.52	40.0	3.01	14.55	
		184	18.42	5.61	0.00	2.74	0.83	2.52	40.0	3.02	14.60	
		184.5	18.41	5.61	0.00	2.73	0.83	2.52	40.0	3.04	14.65	
		185	18.41	5.61	0.00	2.73	0.83	2.52	40.0	3.04	14.65	
		186	18.41	5.61	0.00	2.73	0.83	2.52	40.0	3.04	14.65	
		187	18.41	5.61	0.00	2.73	0.83	2.52	40.0	3.04	14.65	
		188	18.55	5.65	0.04	2.87	0.87	2.52	40.0	2.89	13.94	
		189	18.62	5.68	0.02	2.94	0.90	2.52	40.0	2.82	13.61	
		190	18.61	5.67	0.00	2.93	0.89	2.52	40.0	2.83	13.65	
		191	18.61	5.67	0.00	2.93	0.89	2.52	40.0	2.83	13.65	
		192	18.61	5.67	0.00	2.93	0.89	2.52	40.0	2.83	13.65	
		193	18.61	5.67	0.00	2.93	0.89	2.52	40.0	2.83	13.65	
		194	18.61	5.67	0.00	2.93	0.89	2.52	40.0	2.83	13.65	
		195	18.61	5.67	0.00	2.93	0.89	2.52	40.0	2.83	13.65	
		200	18.61	5.67	0.00	2.93	0.89	2.52	40.0	2.83	13.65	
		205	18.80	5.73	0.06	3.12	0.95	2.52	40.0	2.66	12.82	
		210	18.80	5.73	0.00	3.12	0.95	2.52	40.0	2.66	12.82	
		215	18.59	5.67	-0.06	2.91	0.89	2.52	40.0	2.85	13.75	
	220	18.61	5.67	0.01	2.93	0.89	2.52	40.0	2.83	13.65		
	225	18.80	5.73	0.06	3.12	0.95	2.52	40.0	2.66	12.82		
	230	18.80	5.73	0.00	3.12	0.95	2.52	40.0	2.66	12.82		
	235	18.59	5.67	-0.06	2.91	0.89	2.52	40.0	2.85	13.75		
	240	18.59	5.67	0.00	2.91	0.89	2.52	40.0	2.85	13.75		
	245	18.59	5.67	0.00	2.91	0.89	2.52	40.0	2.85	13.75		
	250	18.58	5.66	0.00	2.90	0.88	2.52	40.0	2.86	13.79		
	255	18.58	5.66	0.00	2.90	0.88	2.52	40.0	2.86	13.79		
	260	18.58	5.66	0.00	2.90	0.88	2.52	40.0	2.86	13.79		
	265	18.57	5.66	0.00	2.89	0.88	2.52	40.0	2.87	13.84		
Recovery	3:47 PM	270	18.57	5.66	0.00	2.89	0.88	2.52	40.0	2.87	13.84	

Project No: 13-019-01, Table C6 - Blackwater TW13-03, WPN 28415, 62 Hour Constant Rate Test, August 9, 2013.

Well depth = 40 ft (12.19 m)		Well diameter = 6 in		Measurement method =		Flow Meter		Pump Depth = 29 ft (8.83 m)		Specific Capacity	
Comments	Real Time	Time since pump started (minutes)	Water level measurement (btoc) (ft)	Water level measurement (btoc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	L/s/m	Usgpm/ft
STATIC	4:35 PM	0.00	15.85	0.00	0.00	0.00	0.00	0.00	0.00	--	--
		0.50	17.05	5.20	5.20	1.20	0.37	1.26	20.00	3.45	16.67
CR Test		1	17.03	5.19	-0.01	1.18	0.36	1.26	20.00	3.51	16.95
		1.5	17.01	5.18	-0.01	1.16	0.35	1.26	20.00	3.57	17.24
		2	17.65	5.38	0.20	1.80	0.55	1.96	31.00	3.56	17.22
		2.5	18.55	5.65	0.27	2.70	0.82	2.52	40.00	3.07	14.81
		3	18.50	5.64	-0.02	2.65	0.81	2.65	42.00	3.28	15.85
		3.5	18.57	5.66	0.02	2.72	0.83	2.84	45.00	3.42	16.54
		4	19.30	5.88	0.22	3.45	1.05	3.09	49.00	2.94	14.20
		4.5	19.90	6.07	0.18	4.05	1.23	3.15	50.00	2.56	12.35
		5	21.10	6.43	0.37	5.25	1.60	4.10	65.00	2.56	12.38
		6	21.30	6.49	0.06	5.45	1.66	4.10	65.00	2.47	11.93
		7	21.40	6.52	0.03	5.55	1.69	4.10	65.00	2.42	11.71
		8	22.00	6.71	0.18	6.15	1.87	4.42	70.00	2.36	11.38
		9	22.16	6.75	0.05	6.31	1.92	4.42	70.00	2.30	11.09
		10	22.19	6.76	0.01	6.34	1.93	4.42	70.00	2.29	11.04
		11	22.27	6.79	0.02	6.42	1.96	4.42	70.00	2.26	10.90
		12	22.30	6.80	0.01	6.45	1.97	4.42	70.00	2.25	10.85
		13	22.35	6.81	0.02	6.50	1.98	4.42	70.00	2.23	10.77
		14	22.35	6.81	0.00	6.50	1.98	4.42	70.00	2.23	10.77
		15	22.52	6.86	0.05	6.67	2.03	4.42	70.00	2.17	10.49
		20	22.64	6.90	0.04	6.79	2.07	4.42	70.00	2.13	10.31
		25	22.55	6.87	-0.03	6.70	2.04	4.42	70.00	2.16	10.45
		30	22.60	6.89	0.02	6.75	2.06	4.42	70.00	2.15	10.37
		35	22.65	6.90	0.02	6.80	2.07	4.42	70.00	2.13	10.29
		40	22.66	6.91	0.00	6.81	2.08	4.42	70.00	2.13	10.28
		45	22.67	6.91	0.00	6.82	2.08	4.42	70.00	2.13	10.27
		50	22.68	6.91	0.00	6.83	2.08	4.42	70.00	2.12	10.25
		55	22.68	6.91	0.00	6.83	2.08	4.42	70.00	2.12	10.25
	5:35 PM	60	22.70	6.92	0.01	6.85	2.09	4.42	70.00	2.11	10.22
		75	22.74	6.93	0.01	6.89	2.10	4.42	70.00	2.10	10.16
		90	22.73	6.93	0.00	6.88	2.10	4.42	70.00	2.11	10.17
		105	22.74	6.93	0.00	6.89	2.10	4.42	70.00	2.10	10.16
	6:35 PM	120	22.73	6.93	0.00	6.88	2.10	4.42	70.00	2.11	10.17
		135	22.74	6.93	0.00	6.89	2.10	4.42	70.00	2.10	10.16
		150	22.74	6.93	0.00	6.89	2.10	4.42	70.00	2.10	10.16
		165	22.72	6.93	-0.01	6.87	2.09	4.42	70.00	2.11	10.19
		180	22.75	6.93	0.01	6.90	2.10	4.42	70.00	2.10	10.14
		195	22.85	6.96	0.03	7.00	2.13	4.42	70.00	2.07	10.00
		210	22.95	7.00	0.03	7.10	2.16	4.42	70.00	2.04	9.86
		225	22.95	7.00	0.00	7.10	2.16	4.42	70.00	2.04	9.86
	8:35 PM	240	22.97	7.00	0.01	7.12	2.17	4.42	70.00	2.03	9.83
		270	22.97	7.00	0.00	7.12	2.17	4.42	70.00	2.03	9.83
		300	22.97	7.00	0.00	7.12	2.17	4.42	70.00	2.03	9.83
		330	23.03	7.02	0.02	7.18	2.19	4.42	70.00	2.02	9.75
		360	23.03	7.02	0.00	7.18	2.19	4.42	70.00	2.02	9.75
		420	23.10	7.04	0.02	7.25	2.21	4.42	70.00	2.00	9.66
		480	23.13	7.05	0.01	7.28	2.22	4.42	70.00	1.99	9.62
		660	23.30	7.10	0.05	7.45	2.27	4.42	70.00	1.94	9.40
		840	23.30	7.10	0.00	7.45	2.27	4.42	70.00	1.94	9.40
		1020	23.30	7.10	0.00	7.45	2.27	4.42	70.00	1.94	9.40
		1140	23.42	7.14	0.04	7.57	2.31	4.42	70.00	1.91	9.25
		1200	23.40	7.13	-0.01	7.55	2.30	4.42	70.00	1.92	9.27
		1260	23.50	7.16	0.03	7.65	2.33	4.42	70.00	1.89	9.15
		1440	23.51	7.17	0.00	7.66	2.33	4.42	70.00	1.89	9.14
		1620	23.57	7.18	0.02	7.72	2.35	4.42	70.00	1.88	9.07
		1800	23.60	7.19	0.01	7.75	2.36	4.42	70.00	1.87	9.03
		1980	23.65	7.21	0.02	7.80	2.38	4.42	70.00	1.86	8.97
		2160	23.66	7.21	0.00	7.81	2.38	4.42	70.00	1.86	8.96
		2340	23.71	7.23	0.02	7.86	2.40	4.42	70.00	1.84	8.91
		2400	23.71	7.23	0.00	7.86	2.40	4.42	70.00	1.84	8.91
		2460	23.72	7.23	0.00	7.87	2.40	4.42	70.00	1.84	8.89
		2520	23.72	7.23	0.00	7.87	2.40	4.42	70.00	1.84	8.89
		2640	23.74	7.24	0.01	7.89	2.40	4.42	70.00	1.84	8.87
		2820	23.77	7.25	0.01	7.92	2.41	4.42	70.00	1.83	8.84
		3000	23.78	7.25	0.00	7.93	2.42	4.42	70.00	1.83	8.83
		3180	23.88	7.28	0.03	8.03	2.45	4.42	70.00	1.80	8.72
		3360	23.88	7.28	0.00	8.03	2.45	4.42	70.00	1.80	8.72
		3540	23.88	7.28	0.00	8.03	2.45	4.42	70.00	1.80	8.72
Pump Shut off		3720	23.90	7.28	0.00	8.05	2.45	4.42	70.00	1.80	8.70
Recovery	8:00 AM	3720.05	23.90	7.28	0.00	8.05	2.45	0.00	0.00	0.00	0.00
		3721	16.20	4.94	0.00	0.35	0.11	0.00	0.00	0.00	0.00
		3721.5	16.08	4.90	0.00	0.23	0.07	0.00	0.00	0.00	0.00
		3722	16.07	4.90	0.00	0.22	0.07	0.00	0.00	0.00	0.00
		3722.5	16.07	4.90	0.00	0.22	0.07	0.00	0.00	0.00	0.00



<p>New Gold TW13-03</p>  <p>Consultants in Hydrogeology and Water Resources Management</p>	<p>TITLE Figure C7 - Step Test Hydrograph (25, 30 and 40 USgpm)</p>		
	<p>DRAWN AMF</p> <p>CHECKED BM</p> <p>REVIEWED DG</p>	<p>DATE August 9, 2013</p> <p>SCALE na</p> <p>FILE NO.</p>	<p>JOB NO. 13-019-01</p> <p>DWG. NO. na</p> <p>FIGURE NO. C7</p>



New Gold TW13-03

TITLE

Figure - C8 62 Hour Constant rate test (70 USgpm)



DRAWN AMF

DATE August 9-12, 2013

JOB NO. 13-019-01

CHECKED BM

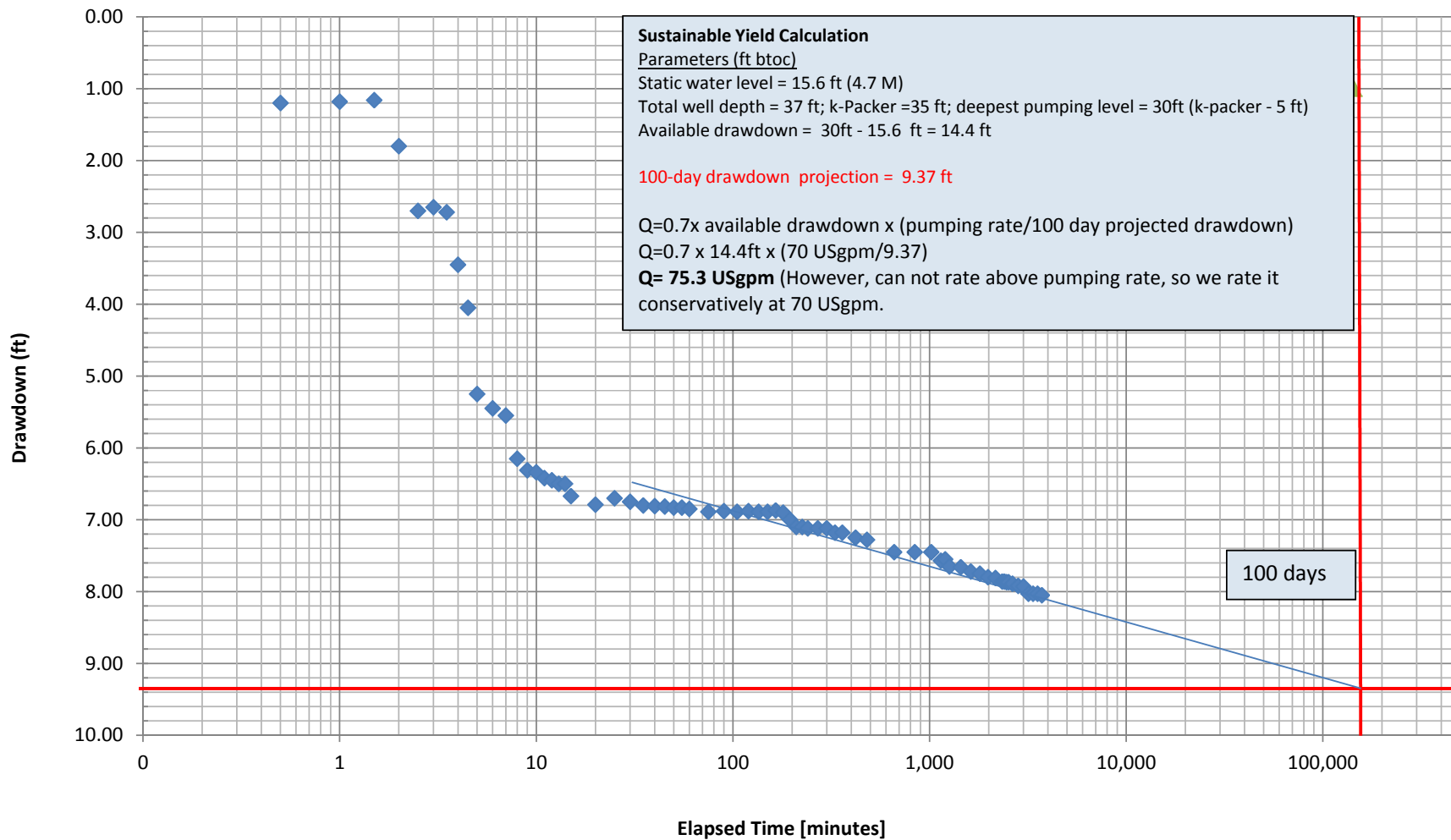
SCALE na

DWG. NO. na

REVIEWED DG

FILE NO.

FIGURE NO. C8



New Gold TW13-03

TITLE

Figure C9- 62 Hour Constant Rate Test (70 USgpm)



DRAWN AMF
 CHECKED BM
 REVIEWED DG

DATE August 9-12, 2013
 SCALE na
 FILE NO.

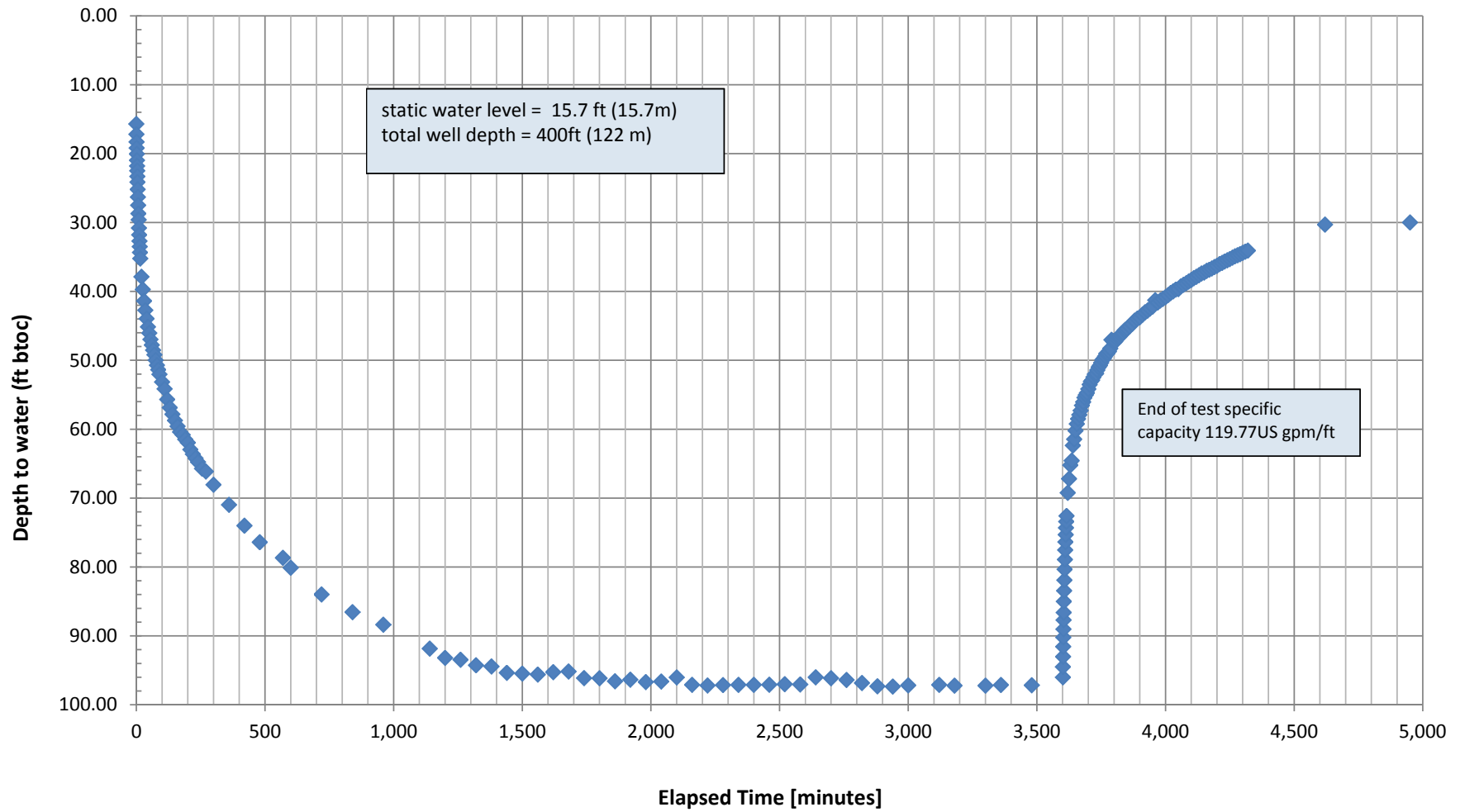
JOB NO. 13-019-01
 DWG. NO. na
 FIGURE NO. DG

Project No: 13-019-01, Table C7 - Blackwater TW13-04, WPN 28412, 60 Hour Constant Rate Test, August 9-12, 2013.

Well depth = 100 ft (30.4 m)		Well diameter = 6 in		Measurement method =		Flow Meter		Pump Depth = 380 ft (115 m)		Specific Capacity	
Comments	Real Time	Time since pump started (minutes)	Water level measurement (btoc) (ft)	Water level measurement (btoc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	L/s/m	USgpm/ft
STATIC	7:00 PM	0:00	15.70	0.00	0.00	0.00	0.00	0.00	0.00	--	--
CR Test		0:50	17.20	5.24	5.24	1.50	0.46	15.14	4.00	33.11	2.67
		1	18.30	5.58	0.34	2.60	0.79	15.14	4.00	19.10	1.54
		1.5	19.20	5.85	0.27	3.50	1.07	15.14	4.00	14.19	1.14
		2	20.05	6.11	0.26	4.35	1.33	15.14	4.00	11.42	0.92
		2.5	20.98	6.39	0.28	5.28	1.61	15.14	4.00	9.41	0.76
		3	21.80	6.64	0.25	6.10	1.86	15.14	4.00	8.14	0.66
		3.5	22.50	6.86	0.21	6.80	2.07	15.14	4.00	7.30	0.59
		4	23.31	7.10	0.25	7.61	2.32	15.14	4.00	6.53	0.53
		4.5	24.15	7.36	0.26	8.45	2.58	15.14	4.00	5.88	0.47
		5	25.20	7.68	0.32	9.50	2.90	15.14	4.00	5.23	0.42
		6	26.30	8.02	0.34	10.60	3.23	15.14	4.00	4.69	0.38
		7	27.50	8.38	0.37	11.80	3.60	15.14	4.00	4.21	0.34
		8	28.70	8.75	0.37	13.00	3.96	15.14	4.00	3.82	0.31
		9	29.60	9.02	0.27	13.90	4.24	15.14	4.00	3.57	0.29
		10	30.80	9.39	0.37	15.10	4.60	15.14	4.00	3.29	0.26
		11	31.80	9.69	0.30	16.10	4.91	15.14	4.00	3.09	0.25
		12	32.70	9.97	0.27	17.00	5.18	15.14	4.00	2.92	0.24
		13	33.51	10.21	0.25	17.81	5.43	15.14	4.00	2.79	0.22
		14	34.35	10.47	0.26	18.65	5.68	15.14	4.00	2.66	0.21
		15	35.23	10.74	0.27	19.53	5.95	15.14	4.00	2.54	0.20
		20	37.88	11.55	0.81	22.18	6.76	15.14	4.00	2.24	0.18
		25	39.71	12.10	0.56	24.01	7.32	15.14	4.00	2.07	0.17
		30	41.39	12.62	0.51	25.69	7.83	15.14	4.00	1.93	0.16
		35	42.74	13.03	0.41	27.04	8.24	15.14	4.00	1.84	0.15
		40	43.96	13.40	0.37	28.26	8.61	15.14	4.00	1.76	0.14
		45	45.15	13.78	0.36	29.45	8.98	15.14	4.00	1.69	0.14
		50	46.06	14.04	0.28	30.36	9.25	15.14	4.00	1.64	0.13
		55	46.97	14.32	0.28	31.27	9.53	15.14	4.00	1.59	0.13
		60	47.78	14.56	0.25	32.08	9.78	15.14	4.00	1.55	0.12
		65	48.52	14.79	0.23	32.82	10.00	15.14	4.00	1.51	0.12
		70	49.20	15.00	0.21	33.50	10.21	15.14	4.00	1.48	0.12
		75	49.99	15.24	0.24	34.29	10.45	15.14	4.00	1.45	0.12
		80	50.71	15.46	0.22	35.01	10.67	15.14	4.00	1.42	0.11
		85	51.37	15.66	0.20	35.67	10.87	15.14	4.00	1.39	0.11
		90	52.04	15.86	0.62	36.34	11.08	15.14	4.00	1.37	0.11
		100	53.14	16.20	0.34	37.44	11.41	15.14	4.00	1.33	0.11
		110	54.14	16.50	0.30	38.44	11.72	15.14	4.00	1.29	0.10
		120	55.68	16.97	0.47	39.98	12.19	15.14	4.00	1.24	0.10
		130	56.88	17.34	0.37	41.18	12.55	15.14	4.00	1.21	0.10
		140	57.84	17.63	0.29	42.14	12.84	15.14	4.00	1.18	0.09
		150	58.74	17.90	0.27	43.04	13.12	15.14	4.00	1.15	0.09
		160	59.57	18.16	0.25	43.87	13.37	15.14	4.00	1.13	0.09
		170	60.40	18.41	0.25	44.70	13.62	15.14	4.00	1.11	0.09
		180	60.83	18.54	0.13	45.13	13.76	15.14	4.00	1.10	0.09
		190	61.48	18.74	0.20	45.78	13.95	15.14	4.00	1.09	0.09
		200	61.95	18.88	0.14	46.25	14.10	15.14	4.00	1.07	0.09
		210	62.95	19.19	0.30	47.25	14.40	15.14	4.00	1.05	0.08
		220	63.62	19.39	0.20	47.92	14.61	15.14	4.00	1.04	0.08
		230	64.21	19.57	0.18	48.51	14.79	15.14	4.00	1.02	0.08
		240	64.78	19.74	0.17	49.08	14.96	15.14	4.00	1.01	0.08
		255	65.72	20.03	0.29	50.02	15.25	15.14	4.00	0.99	0.08
		270	66.13	20.16	0.12	50.43	15.37	15.14	4.00	0.98	0.08
		300	68.06	20.74	0.59	52.36	15.96	15.14	4.00	0.95	0.08
		360	70.97	21.63	0.89	55.27	16.85	15.14	4.00	0.90	0.07
		420	74.01	22.56	0.93	58.31	17.77	15.14	4.00	0.85	0.07
		480	76.41	23.29	0.73	60.71	18.50	15.14	4.00	0.82	0.07
		570	78.66	23.98	0.69	62.96	19.19	15.14	4.00	0.79	0.06
		600	80.10	24.41	0.44	64.40	19.63	15.14	4.00	0.77	0.06
		660	82.84	25.25	0.84	67.14	20.46	15.14	4.00	0.74	0.06
		720	83.99	25.60	0.35	68.29	20.81	15.14	4.00	0.73	0.06
		780	85.87	26.17	0.57	70.17	21.39	15.14	4.00	0.71	0.06
		810	86.32	26.31	0.14	70.62	21.52	15.14	4.00	0.70	0.06
		840	86.55	26.38	0.07	70.85	21.60	15.14	4.00	0.70	0.06
		900	87.62	26.71	0.33	71.92	21.92	15.14	4.00	0.69	0.06
		960	88.38	26.94	0.23	72.68	22.15	15.14	4.00	0.68	0.06
		1020	89.51	27.28	0.34	73.81	22.50	15.14	4.00	0.67	0.05
		1080	91.24	27.81	0.53	75.54	23.02	15.14	4.00	0.66	0.05
		1140	91.85	28.00	0.19	76.15	23.21	15.14	4.00	0.65	0.05
		1200	93.19	28.40	0.41	77.49	23.62	15.14	4.00	0.64	0.05
		1260	93.46	28.49	0.08	77.76	23.70	15.14	4.00	0.64	0.05
		1320	94.27	28.73	0.25	78.57	23.95	15.14	4.00	0.63	0.05
		1380	94.44	28.79	0.05	78.74	24.00	15.14	4.00	0.63	0.05
		1440	95.35	29.06	0.28	79.65	24.28	15.14	4.00	0.62	0.05
		1500	95.48	29.10	0.04	79.78	24.32	15.14	4.00	0.62	0.05
		1560	95.61	29.14	0.04	79.91	24.36	15.14	4.00	0.62	0.05
		1620	95.26	29.04	-0.11	79.56	24.25	15.14	4.00	0.62	0.05
		1680	95.16	29.00	-0.03	79.46	24.22	15.14	4.00	0.63	0.05
		1740	96.12	29.30	0.29	80.42	24.51	15.14	4.00	0.62	0.05
		1800	96.15	29.31	0.01	80.45	24.52	15.14	4.00	0.62	0.05
		1860	96.58	29.44	0.13	80.88	24.65	15.14	4.00	0.61	0.05
		1920	96.35	29.37	-0.07	80.65	24.58	15.14	4.00	0.62	0.05
		1980	96.70	29.47	0.11	81.00	24.69	15.14	4.00	0.61	0.05
		2040	96.63	29.45	-0.02	80.93	24.67	15.14	4.00	0.61	0.05
		2100	96.03	29.27	-0.18	80.33	24.48	15.14	4.00	0.62	0.05
		2160	97.11	29.60	0.33	81.41	24.81	15.14	4.00	0.61	0.05
		2220	97.19	29.62	0.02	81.49	24.84	15.14	4.00	0.61	0.05
		2280	97.15	29.61	-0.01	81.45	24.83	15.14	4.00	0.61	0.05
		2340	97.11	29.60	-0.01	81.41	24.81	15.14	4.00	0.61	0.05
		2400	97.11	29.60	0.00	81.41	24.81	15.14	4.00	0.61	0.05
		2460	97.09	29.59	-0.01	81.39	24.81	15.14	4.00	0.61	0.05
		2520	97.01	29.57	-0.02	81.31	24.78	15.14	4.00	0.61	0.05
		2580	97.04	29.58	0.01	81.34	24.79	15.14	4.00	0.61	0.05
		2640	96.01	29.26	-0.31	80.31	24.48	15.14	4.00	0.62	0.05
		2700	96.15	29.31	0.04	80.45	24.52	15.14	4.00	0.62	0.05
		2760	96.40	29.38	0.08	80.70	24.60	15.14	4.00	0.62	0.05
		2820	96.84	29.52	0.13	81.14	24.73	15.14	4.00	0.61	0.05
		2880	97.32	29.66	0.15	81.62	24.88	15.14	4.00	0.61	0.05
		2940	97.35	29.67	0.01	81.65	24.89	15.14	4.00	0.61	0.05
		3000	97.18								

Comments	Real Time	Time since pump started (minutes)	Water level measurement (btoc) (ft)	Water level measurement (btoc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	Specific Capacity	
										L/s/m	USgpm/ft
		3360	97.13	29.61	-0.02	81.43	24.82	15.14	4.00	0.61	0.05
		3120	97.10	29.60	-0.01	81.40	24.81	15.14	4.00	0.61	0.05
		3180	97.22	29.63	0.04	81.52	24.85	15.14	4.00	0.61	0.05
		3240	97.23	29.64	0.00	81.53	24.85	15.14	4.00	0.61	0.05
		3300	97.22	29.63	0.00	81.52	24.85	15.14	4.00	0.61	0.05
		3360	97.19	29.62	-0.01	81.49	24.84	15.14	4.00	0.61	0.05
		3420	97.19	29.62	0.00	81.49	24.84	15.14	4.00	0.61	0.05
		3480	97.16	29.61	-0.01	81.46	24.83	15.14	4.00	0.61	0.05
		3540	97.12	29.60	-0.01	81.42	24.82	15.14	4.00	0.61	0.05
6:00AM		3600	97.08	29.59	-0.01	81.38	24.80	15.14	4.00	0.61	0.05
Recovery		3600.5	97.61	29.75	0.16	81.91	24.97	0.00	0.00	0.00	0.00
		3601	96.01	29.26	-0.49	80.31	24.48	0.00	0.00	0.00	0.00
		3601.5	94.5	28.80	-0.46	78.80	24.02	0.00	0.00	0.00	0.00
		3602	93.02	28.35	-0.45	77.32	23.57	0.00	0.00	0.00	0.00
		3602.5	91.55	27.90	-0.45	75.85	23.12	0.00	0.00	0.00	0.00
		3603	90.22	27.50	-0.41	74.52	22.71	0.00	0.00	0.00	0.00
		3603.5	89.02	27.13	-0.37	73.32	22.35	0.00	0.00	0.00	0.00
		3604	87.71	26.73	-0.40	72.01	21.95	0.00	0.00	0.00	0.00
		3604.5	86.6	26.40	-0.34	70.90	21.61	0.00	0.00	0.00	0.00
		3605	85	25.91	-0.49	69.30	21.12	0.00	0.00	0.00	0.00
		3606	83.45	25.44	-0.47	67.75	20.65	0.00	0.00	0.00	0.00
		3607	81.91	24.97	-0.47	66.21	20.18	0.00	0.00	0.00	0.00
		3608	80.33	24.48	-0.48	64.63	19.70	0.00	0.00	0.00	0.00
		3609	78.91	24.05	-0.43	63.21	19.27	0.00	0.00	0.00	0.00
		3610	77.54	23.63	-0.42	61.84	18.85	0.00	0.00	0.00	0.00
		3611	76.37	23.28	-0.36	60.67	18.49	0.00	0.00	0.00	0.00
		3612	75.3	22.95	-0.33	59.60	18.17	0.00	0.00	0.00	0.00
		3613	74.32	22.65	-0.30	58.62	17.87	0.00	0.00	0.00	0.00
		3614	73.41	22.38	-0.28	57.71	17.59	0.00	0.00	0.00	0.00
		3615	72.58	22.12	-0.25	56.88	17.34	0.00	0.00	0.00	0.00
		3620	69.23	21.10	-1.02	53.53	16.32	0.00	0.00	0.00	0.00
		3625	67.19	20.48	-0.62	51.49	15.69	0.00	0.00	0.00	0.00
		3630	65.22	19.88	-0.60	49.52	15.09	0.00	0.00	0.00	0.00
		3635	64.56	19.68	-0.20	48.86	14.89	0.00	0.00	0.00	0.00
		3640	62.35	19.00	-0.67	46.65	14.22	0.00	0.00	0.00	0.00
		3645	61.45	18.73	-0.27	45.75	13.94	0.00	0.00	0.00	0.00
		3650	60.21	18.35	-0.38	44.51	13.57	0.00	0.00	0.00	0.00
		3655	59.24	18.06	-0.30	43.54	13.27	0.00	0.00	0.00	0.00
		3660	58.51	17.83	-0.22	42.81	13.05	0.00	0.00	0.00	0.00
		3665	57.91	17.65	-0.18	42.21	12.87	0.00	0.00	0.00	0.00
		3670	57.3	17.47	-0.19	41.60	12.68	0.00	0.00	0.00	0.00
		3675	56.55	17.24	-0.23	40.85	12.45	0.00	0.00	0.00	0.00
		3680	56.04	17.08	-0.16	40.34	12.30	0.00	0.00	0.00	0.00
		3685	55.41	16.89	-0.19	39.71	12.10	0.00	0.00	0.00	0.00
		3690	55.02	16.77	-0.12	39.32	11.98	0.00	0.00	0.00	0.00
		3695	54.72	16.68	-0.09	39.02	11.89	0.00	0.00	0.00	0.00
		3700	54.16	16.51	-0.17	38.46	11.72	0.00	0.00	0.00	0.00
		3705	53.51	16.31	-0.20	37.81	11.52	0.00	0.00	0.00	0.00
		3710	53.06	16.17	-0.14	37.36	11.39	0.00	0.00	0.00	0.00
		3715	52.89	16.12	-0.05	37.19	11.34	0.00	0.00	0.00	0.00
		3720	52.44	15.98	-0.14	36.74	11.20	0.00	0.00	0.00	0.00
		3725	52.01	15.85	-0.13	36.31	11.07	0.00	0.00	0.00	0.00
		3730	51.93	15.83	-0.02	36.23	11.04	0.00	0.00	0.00	0.00
		3735	51.42	15.67	-0.16	35.72	10.89	0.00	0.00	0.00	0.00
		3740	51.01	15.55	-0.12	35.31	10.76	0.00	0.00	0.00	0.00
		3745	50.73	15.46	-0.09	35.03	10.68	0.00	0.00	0.00	0.00
		3750	50.34	15.34	-0.12	34.64	10.56	0.00	0.00	0.00	0.00
		3755	49.9	15.21	-0.13	34.20	10.42	0.00	0.00	0.00	0.00
		3760	49.73	15.16	-0.05	34.03	10.37	0.00	0.00	0.00	0.00
		3765	49.4	15.06	-0.10	33.70	10.27	0.00	0.00	0.00	0.00
		3770	49.02	14.94	-0.12	33.32	10.16	0.00	0.00	0.00	0.00
		3775	48.97	14.93	-0.02	33.27	10.14	0.00	0.00	0.00	0.00
		3780	48.69	14.84	-0.09	32.99	10.06	0.00	0.00	0.00	0.00
		3785	48.27	14.71	-0.13	32.57	9.93	0.00	0.00	0.00	0.00
		3790	47.02	14.33	-0.38	31.32	9.55	0.00	0.00	0.00	0.00
		3795	47.16	14.37	0.04	31.46	9.59	0.00	0.00	0.00	0.00
		3800	47.38	14.44	0.07	31.68	9.66	0.00	0.00	0.00	0.00
		3805	47.24	14.40	-0.04	31.54	9.61	0.00	0.00	0.00	0.00
		3810	46.91	14.30	-0.10	31.21	9.51	0.00	0.00	0.00	0.00
		3815	46.73	14.24	-0.05	31.03	9.46	0.00	0.00	0.00	0.00
		3820	46.58	14.20	-0.05	30.88	9.41	0.00	0.00	0.00	0.00
		3825	46.34	14.12	-0.07	30.64	9.34	0.00	0.00	0.00	0.00
		3830	46.13	14.06	-0.06	30.43	9.28	0.00	0.00	0.00	0.00
		3835	46.01	14.02	-0.04	30.31	9.24	0.00	0.00	0.00	0.00
		3840	45.71	13.93	-0.09	30.01	9.15	0.00	0.00	0.00	0.00
		3845	45.56	13.89	-0.05	29.86	9.10	0.00	0.00	0.00	0.00
		3850	45.38	13.83	-0.05	29.68	9.05	0.00	0.00	0.00	0.00
		3860	45.09	13.74	-0.09	29.39	8.96	0.00	0.00	0.00	0.00
		3870	44.73	13.63	-0.11	29.03	8.85	0.00	0.00	0.00	0.00
		3880	44.24	13.48	-0.15	28.54	8.70	0.00	0.00	0.00	0.00
		3890	43.95	13.40	-0.09	28.25	8.61	0.00	0.00	0.00	0.00
		3900	43.76	13.34	-0.06	28.06	8.55	0.00	0.00	0.00	0.00
		3910	43.39	13.23	-0.11	27.69	8.44	0.00	0.00	0.00	0.00
		3920	43.03	13.12	-0.11	27.33	8.33	0.00	0.00	0.00	0.00
		3930	42.78	13.04	-0.08	27.08	8.25	0.00	0.00	0.00	0.00
		3940	42.48	12.95	-0.09	26.78	8.16	0.00	0.00	0.00	0.00
		3950	42.19	12.86	-0.09	26.49	8.07	0.00	0.00	0.00	0.00
		3960	41.28	12.58	-0.28	25.58	7.80	0.00	0.00	0.00	0.00
		3970	41.59	12.68	0.09	25.89	7.89	0.00	0.00	0.00	0.00
		3980	41.32	12.59	-0.08	25.62	7.81	0.00	0.00	0.00	0.00
		3990	41.08	12.52	-0.07	25.38	7.74	0.00	0.00	0.00	0.00
		4000	40.83	12.44	-0.08	25.13	7.66	0.00	0.00	0.00	0.00
		4010	40.55	12.36	-0.09	24.85	7.57	0.00	0.00	0.00	0.00
		4020	40.21	12.26	-0.10	24.51	7.47	0.00	0.00	0.00	0.00
		4030	39.98	12.19	-0.07	24.28	7.40	0.00	0.00	0.00	0.00
		4040	39.72	12.11	-0.08	24.02	7.32	0.00	0.00	0.00	0.00
		4050	39.66	12.09	-0.02	23.96	7.30	0.00	0.00	0.00	0.00
		4060	39.24	11.96	-0.13	23.54	7.17	0.00	0.00	0.00	0.00
		4070	39.02	11.89	-0.07	23.32	7.11	0.00	0.00	0.00	0.00
		4080	38.81	11.83	-0.06	23.11	7.04	0.00	0.00	0.00	0.00
		4090	38.57	11.76	-0.07	22.87	6.97	0.00	0.00	0.00	0.00
		4100	38.34	11.69	-0.07	22.64	6.90	0.00	0.00	0.00	0.00
		4110	38.07	11.60	-0.08	22.37	6.82	0.00	0.00	0.00	0.00
		4120	37.88	11.55	-0.06	22.18	6.76	0.00	0.00	0.00	0.00

Comments	Real Time	Time since pump started (minutes)	Water level measurement (btoc) (ft)	Water level measurement (btoc) (m)	Water level changes (m)	Drawdown (ft)	Drawdown (m)	Pumping Rate (l/s)	Pumping Rate (USgpm)	Specific Capacity	
										L/s/m	Usgpm/ft
		4130	37.64	11.47	-0.07	21.94	6.69	0.00	0.00	0.00	0.00
		4140	37.4	11.40	-0.07	21.70	6.61	0.00	0.00	0.00	0.00
		4150	37.27	11.36	-0.04	21.57	6.57	0.00	0.00	0.00	0.00
		4160	37.02	11.28	-0.08	21.32	6.50	0.00	0.00	0.00	0.00
		4170	36.85	11.23	-0.05	21.15	6.45	0.00	0.00	0.00	0.00
		4180	36.67	11.18	-0.05	20.97	6.39	0.00	0.00	0.00	0.00
		4190	36.45	11.11	-0.07	20.75	6.32	0.00	0.00	0.00	0.00
		4200	36.28	11.06	-0.05	20.58	6.27	0.00	0.00	0.00	0.00
		4210	36.02	10.98	-0.08	20.32	6.19	0.00	0.00	0.00	0.00
		4220	35.87	10.93	-0.05	20.17	6.15	0.00	0.00	0.00	0.00
		4230	35.66	10.87	-0.06	19.96	6.08	0.00	0.00	0.00	0.00
		4240	35.48	10.81	-0.05	19.78	6.03	0.00	0.00	0.00	0.00
		4250	35.31	10.76	-0.05	19.61	5.98	0.00	0.00	0.00	0.00
		4260	35.09	10.70	-0.07	19.39	5.91	0.00	0.00	0.00	0.00
		4270	34.9	10.64	-0.06	19.20	5.85	0.00	0.00	0.00	0.00
		4280	34.75	10.59	-0.05	19.05	5.81	0.00	0.00	0.00	0.00
		4290	34.596	10.54	-0.05	18.90	5.76	0.00	0.00	0.00	0.00
		4300	34.4	10.49	-0.06	18.70	5.70	0.00	0.00	0.00	0.00
		4310	34.24	10.44	-0.05	18.54	5.65	0.00	0.00	0.00	0.00
		4320	34.08	10.39	-0.05	18.38	5.60	0.00	0.00	0.00	0.00
		4620	30.3	9.24	-1.15	14.60	4.45	0.00	0.00	0.00	0.00
		4950	30	9.14	-0.09	14.30	4.36	0.00	0.00	0.00	0.00



Blackwater TW13-04

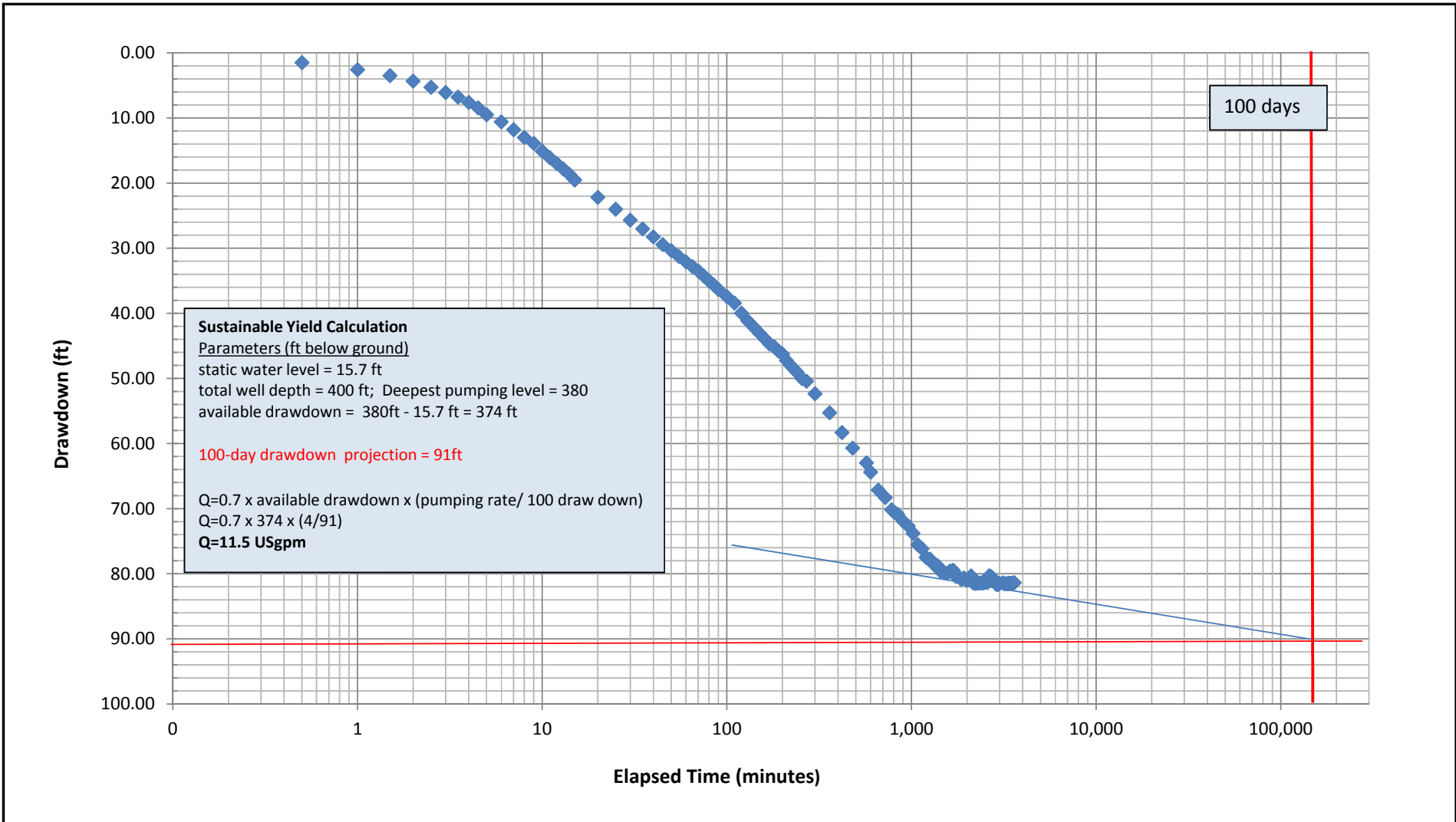
TITLE **Figure C10 - 60 Hour Constant Rate Test Hydrograph (4 USgpm)**




DRAWN AMF
CHECKED BM
REVIEWED DG

DATE August 9-12, 2013
SCALE na
FILE NO.

JOB NO. 13-019-01
DWG. NO. na
FIGURE NO. **C10**



<p>Blackwater TW13-04</p>	<p>TITLE Figure C11 - Semi-Log Hydrograph and 100-day Projection at 4 US gpm</p>		
	<p>DRAWN AMF</p>	<p>DATE August 9-12, 2013</p>	<p>JOB NO. 13-019-01</p>
	<p>CHECKED BM</p>	<p>SCALE na</p>	<p>DWG. NO. na</p>
	<p>REVIEWED DG</p>	<p>FILE NO.</p>	<p>FIGURE NO. C11</p>

Appendix D

Water Quality Summary Table and Laboratory Reports



Blackwater
Water Quality Results

Legend for Reports for Blackwater Water Quality Results

<	Less than reported detection limit
>	Greater than reported upper detection limit
A	Absent
BCAWQG DW	BC Approved Water Quality Guidelines for drinking water
BCWWQG DW	Working Water Quality Guidelines for British Columbia for drinking water
Calc	Calculated guideline or standard. The guideline or standard is dependent on the value of one or more other analytes, and is calculated from a formula or table.
GCDWQ AO	Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives
GCDWQ MAC	Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentrations
L	Laboratory reading type (Lab result)
m asl	metres above sea level
N	Narrative type of guideline or standard, or Result Note.
ND	Non-detect. Result is less than lower detection limit.
NG	No Guideline
NR	No Result
NS	No Standard
NT	Not Tested
OG	Overgrown
P	Present
PR	Presumptive
TK	Test kit reading type (Field result)
TNTC	Too numerous to count
	Highlighted value has a reported detection limit that is greater than the guideline or standard maximum.
<u>BCAWQG DW</u>	Highlighted value exceeds BCAWQG DW
<u>BCWWQG DW</u>	Highlighted value exceeds BCWWQG DW
GCDWQ AO	Highlighted value exceeds GCDWQ AO
GCDWQ MAC	Highlighted value exceeds GCDWQ MAC

Blackwater
Water Quality Results

Analyte	Unit	Guideline				TW13-01 08-Aug-13 3080562-01 Normal	TW13-02 08-Aug-13 3080562-03 Normal	TW13-03 12-Aug-13 3080691-01 Normal	TW13-04 12-Aug-13 3080691-02 Normal
		GCDWQ MAC	GCDWQ AO	BCAWQG DW	BCWWQG DW				
Monobromoacetic acid (Formation Potential)	mg/L	NG	NG	NG	NG	<0.002	<0.002		
Monochloroacetic acid (Formation Potential)	mg/L	NG	NG	NG	NG	<0.002	<0.002		
Trichloroacetic acid (Formation Potential)	mg/L	NG	NG	NG	NG	0.005	<0.002		
Related to HAA and THM Formation Potential									
Chlorine demand	mg/L	NG	NG	NG	NG	0.4	0.4		
Free chlorine, final	mg/L	NG	NG	NG	NG	3.9	4.5		
Free chlorine, initial dose	mg/L	NG	NG	NG	NG	4.3	4.9		
Incubation Temperature	°C	NG	NG	NG	NG	20	20		
Incubation Time	d	NG	NG	NG	NG	7	7		
Trihalomethane Formation Potential									
Bromodichloromethane (Formation Potential)	mg/L	NG	NG	NG	NG	<0.001	<0.001		
Bromoform (Formation Potential)	mg/L	NG	NG	NG	NG	<0.001	<0.001		
Chloroform (Formation Potential)	mg/L	NG	NG	NG	NG	0.005	0.003		
Dibromochloromethane (Formation Potential)	mg/L	NG	NG	NG	NG	<0.001	<0.001		
Total Trihalomethanes (Formation Potential)	mg/L	N ¹⁻¹⁵	NG	NG	NG	0.005	0.003		
Total Trihalomethanes (Formation Potential, as CHCl3)	mg/L	NG	NG	NG	NG	0.005	0.003		

Guideline Notes for Reports for Blackwater Water Quality Results

1. Notes for Guidelines for Canadian Drinking Water Quality - Maximum Acceptable Concentrations (GCDWQ MAC)

Note 1.1 for Turbidity:

Waterworks systems that use a surface water source or a groundwater source under the direct influence of surface water should filter the source water to meet health-based turbidity limits, as defined for specific treatment technologies. Where possible, filtration systems should be designed and operated to reduce turbidity levels as low as possible, with a treated water turbidity target of less than 0.1 NTU at all times. Where this is not achievable, the treated water turbidity levels from individual filters should meet the requirements described in GCDWQ. The health-based turbidity guideline does not apply to secure groundwater sources, i.e., those not under the direct influence of surface water. However, for effective operation of the distribution system, it is good practice to ensure that water entering the distribution system has low turbidity levels of around 1.0 NTU.

Note 1.2 for Arsenic (dissolved):

Every effort should be made to maintain arsenic levels in drinking water as low as reasonably achievable.

Note 1.3 for Cyanide (total):

The GCDWQ MAC for Cyanide (free) is 0.2 mg/L. A maximum of 0.2 mg/L was used, in this report, to identify exceedances for Cyanide (total) as a means for determining the potential for exceeding the Cyanide (free) guideline.

Note 1.4 for Turbidity:

Waterworks systems that use a surface water source or a groundwater source under the direct influence of surface water should filter the source water to meet health-based turbidity limits, as defined for specific treatment technologies. Where possible, filtration systems should be designed and operated to reduce turbidity levels as low as possible, with a treated water turbidity target of less than 0.1 NTU at all times. Where this is not achievable, the treated water turbidity levels from individual filters should meet the requirements described in GCDWQ. The health-based turbidity guideline does not apply to secure groundwater sources, i.e., those not under the direct influence of surface water. However, for effective operation of the distribution system, it is good practice to ensure that water entering the distribution system has low turbidity levels of around 1.0 NTU.

Note 1.5 for Haloacetic Acids–Total (HAA5) Formation Potential:

The Haloacetic Acids–Total (HAA5) Formation Potential test is used to assess the maximum tendency of the organic compounds in a given water supply to form five specific haloacetic acids upon disinfection. Haloacetic Acids–Total (HAA5) refers to the total of monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid and dibromoacetic acid. The maximum acceptable concentration (MAC) for total haloacetic acids (HAA5) in drinking water is 0.08 mg/L based on a locational running annual average of a minimum of quarterly samples taken in the distribution system.

Note 1.6 for E. coli (counts):

MAC is none detectable per 100 mL

Note 1.7 for E. coli (MPN):

MAC is none detectable per 100 mL

Note 1.8 for Fecal coliforms (counts):

The GCDWQ does not have a guideline for fecal coliforms. The GCDWQ were revised in 2006 when the guideline for fecal coliforms was deleted, and a guideline for E. coli was added. However the GCDWQ has a guideline for total coliforms that includes the following statement: "The MAC of total coliforms in water leaving a treatment plant in a public system and throughout semi-public and private supply systems is none detectable per 100 mL." Therefore a guideline of none detectable per 100 mL was used for fecal coliforms for this report.

Note that the Drinking Water Protection Regulation (2003), under the BC Drinking Water Protection Act, has a water quality standard for potable water for fecal coliforms of "No detectable fecal coliform bacteria per 100 ml".

Note 1.9 for Fecal coliforms (MPN):

The GCDWQ does not have a guideline for fecal coliforms. The GCDWQ were revised in 2006 when the guideline for fecal coliforms was deleted, and a guideline for E. coli was added. However the GCDWQ has a guideline for total coliforms that includes the following statement: "The MAC of total coliforms in water leaving a treatment plant in a public system and throughout semi-public and private supply systems is none detectable per 100 mL." Therefore a guideline of none detectable per 100 mL was used for fecal coliforms for this report.

Note that the Drinking Water Protection Regulation (2003), under the BC Drinking Water Protection Act, has a water quality standard for potable water for fecal coliforms of "No detectable fecal coliform bacteria per 100 ml".

Note 1.10 for Heterotrophic Plate Count (counts):

Blackwater

Water Quality Results

There is no guideline for heterotrophic plate count (HPC) bacteria. Following is an excerpt from "Guidance on the use of heterotrophic plate counts in Canadian drinking water supplies", Health Canada (2012), prepared by the Federal-Provincial-Territorial Committee on Drinking Water:

Measuring HPC is an analytic method that is a useful operational tool for monitoring general bacteriological water quality throughout the treatment process and in the distribution system. HPC results are not an indicator of water safety and, as such, should not be used as an indicator of potential adverse human health effects. Each drinking water system will have a baseline range of HPC bacteria levels depending on the site-specific characteristics. Unexpected increases in the HPC baseline range could indicate a change in the treatment process, a disruption or contamination in the distribution system, or a change in the general bacteriological quality of the water.

If an unusual, rapid, or unexpected increase in HPC bacteria concentrations does occur, the system should be inspected and the cause determined.

Note 1.11 for Total coliforms (counts):

The maximum acceptable concentration (MAC) of total coliforms in water leaving a treatment plant and in non-disinfected groundwater leaving the well is none detectable per 100 mL.

Total coliforms should be monitored in the distribution system because they are used to indicate changes in water quality. Detection of total coliforms from consecutive samples from the same site or from more than 10% of the samples collected in a given sampling period should be investigated.

Note 1.12 for Total coliforms (MPN):

The maximum acceptable concentration (MAC) of total coliforms in water leaving a treatment plant and in non-disinfected groundwater leaving the well is none detectable per 100 mL.

Total coliforms should be monitored in the distribution system because they are used to indicate changes in water quality. Detection of total coliforms from consecutive samples from the same site or from more than 10% of the samples collected in a given sampling period should be investigated.

Note 1.13 for Nitrate + Nitrite (as N) (calculated):

The MAC for Nitrate (as N) is 10 mg/L

Note 1.14 for Arsenic (total):

Every effort should be made to maintain arsenic levels in drinking water as low as reasonably achievable.

Note 1.15 for Total Trihalomethanes (Formation Potential):

The THMFP test is used to assess the maximum tendency of the organic compounds in a given water supply to form trihalomethanes (THMs) upon disinfection. Trihalomethanes refers to the total of chloroform, bromodichloromethane, dibromochloromethane and bromoform compounds. The maximum acceptable concentration (MAC) for trihalomethanes (THMs) in drinking water is 0.100 mg/L based on a locational running annual average of a minimum of quarterly samples taken at the point in the distribution system with the highest potential THM levels.

2. Notes for Guidelines for Canadian Drinking Water Quality - Aesthetic Objectives (GCDWQ AO)

Note 2.1 for Aluminum (dissolved):

This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants. The operational guidance value of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.

Note 2.2 for Sulphate:

There may be a laxative effect in some individuals when sulphate levels exceed 500 mg/L. Health authorities should be notified of drinking water sources containing above 500 mg/L.

Note 2.3 for Aluminum (total):

This is an operational guidance value, designed to apply only to drinking water treatment plants using aluminum-based coagulants. The operational guidance value of 0.1 mg/L applies to conventional treatment plants, and 0.2 mg/L applies to other types of treatment systems.

3. Notes for BC Approved Water Quality Guidelines for drinking water (BCAWQG DW)

General Notes:

The Water Quality Guidelines (Criteria) Reports by BC Ministry of Environment were used as references for the guidelines. (Internet address: http://www.env.gov.bc.ca/wat/wq/wq_guidelines.html). Overview Reports (BC MOE) were used as the references for the guidelines unless the note for specific analyte indicates that the Technical Appendix (BC MOE) was used. Drinking water guidelines are, in some cases, for raw water before treatment.

Note 3.1 for pH:

Designed to minimize solubilization of heavy metals and salts from water distribution pipes and the precipitation of carbonate salts in the distribution system, and maximize the effectiveness of chlorination. However, natural source water outside the guidelines may be safe to drink from a public health perspective.

Note 3.2 for Temperature:

The guideline for maximum temperature for drinking water is 15 degrees.

Note 3.3 for Turbidity:

Blackwater

Water Quality Results

Turbidity guidelines for raw drinking water follow;

- **Drinking Water - raw untreated:**

For raw waters of exceptional clarity (less than or equal to 5 NTU) which normally do not require treatment to reduce natural turbidity, induced turbidity should not exceed 1 NTU and the total turbidity should not exceed 5 NTU at any time.

- **Drinking Water - raw treated:**

For raw waters which normally require some form of treatment to reduce natural turbidity to a level that complies with the standard for finished water (5 NTU) in British Columbia, induced turbidity should not exceed 5 NTU when background turbidity is less than or equal to 50 NTU. When background is greater than 50 NTU, the induced turbidity should not be more than 10% of background.

Note 3.4 for Aluminum (dissolved):

The guideline maximum for dissolved aluminum is 0.2 mg/L (based on aesthetic considerations). This criterion would apply to both untreated raw water and raw water treated to remove suspended solids.

Note 3.5 for Arsenic (dissolved):

The interim guideline maximum for total arsenic in drinking water is 25 µg/L.

Note 3.6 for Boron (dissolved):

The guideline maximum for total boron in drinking water is 5 mg/L.

Note 3.7 for Copper (dissolved):

In raw drinking water with or without treatment, total copper should not exceed 500 µg/L.

Note 3.8 for Lead (dissolved):

In raw drinking water, with and without treatment, the total lead concentration should not exceed 50 µg/L at any time.

Note 3.9 for Mercury (dissolved):

The concentration of total mercury in raw drinking water should not exceed 1.0 µg/L at any time.

Note 3.10 for Molybdenum (dissolved):

The guideline maximum for total molybdenum in raw untreated drinking water is 0.25 mg/L.

Note 3.11 for Selenium (dissolved):

The guideline maximum for total selenium in drinking water is 10 µg/L.

Note 3.12 for Zinc (dissolved):

The guideline maximum for total zinc in drinking water is 5.0 mg/L.

Note 3.13 for Chloride:

The guideline maximum for chloride in drinking water (for aesthetic reasons) is 250 mg/L.

Note 3.14 for Colour:

The recommended guideline for true colour for drinking water supply (without treatment for colour removal) is 15mg/L Pt.

Note 3.15 for pH:

Designed to minimize solubilization of heavy metals and salts from water distribution pipes and the precipitation of carbonate salts in the distribution system, and maximize the effectiveness of chlorination. However, natural source water outside the guidelines may be safe to drink from a public health perspective.

Note 3.16 for Total organic carbon:

For systems with disinfection by chlorination, it is recommended that the total organic carbon (TOC) in raw drinking water or source water should not exceed 4 mg/L at any time. For systems that do not disinfect or which use other methods for disinfection (e.g., ozonation), the guideline does not apply.

Note 3.17 for Turbidity:

Turbidity guidelines for raw drinking water follow;

- **Drinking Water - raw untreated:**

For raw waters of exceptional clarity (less than or equal to 5 NTU) which normally do not require treatment to reduce natural turbidity, induced turbidity should not exceed 1 NTU and the total turbidity should not exceed 5 NTU at any time.

- **Drinking Water - raw treated:**

For raw waters which normally require some form of treatment to reduce natural turbidity to a level that complies with the standard for finished water (5 NTU) in British Columbia, induced turbidity should not exceed 5 NTU when background turbidity is less than or equal to 50 NTU. When background is greater than 50 NTU, the induced turbidity should not be more than 10% of background.

Note 3.18 for E. coli (counts):

The guideline for raw drinking water depends on the type of water treatment.

The guideline maximum for raw drinking water with no treatment is 0/100 mL.

The guideline maximum for raw drinking water with disinfection only is less than or equal to 10/100 mL 90th percentile.

The guideline maximum for raw drinking water with partial treatment is less than or equal to 100/100 mL 90th percentile.

The guideline maximum for raw drinking water with complete treatment is "none applicable". / The most stringent guideline (no water treatment) was used in this report.

Note 3.19 for E. coli (MPN):

Blackwater

Water Quality Results

The guideline for raw drinking water depends on the type of water treatment.
The guideline maximum for raw drinking water with no treatment is 0/100 mL.
The guideline maximum for raw drinking water with disinfection only is less than or equal to 10/100 mL 90th percentile.
The guideline maximum for raw drinking water with partial treatment is less than or equal to 100/100 mL 90th percentile.
The guideline maximum for raw drinking water with complete treatment is "none applicable". / The most stringent guideline (no water treatment) was used in this report.

Note 3.20 for Fecal coliforms (counts):

The guideline for raw drinking water depends on the type of water treatment.
The guideline maximum for raw drinking water with no treatment is 0/100 mL.
The guideline maximum for raw drinking water with disinfection only is less than or equal to 10/100 mL 90th percentile.
The guideline maximum for raw drinking water with partial treatment is less than or equal to 100/100 mL 90th percentile.
The guideline for raw drinking water with complete treatment is "none applicable". / The most stringent guideline (no water treatment) was used in this report.

Note 3.21 for Fecal coliforms (MPN):

The guideline for raw drinking water depends on the type of water treatment.
The guideline maximum for raw drinking water with no treatment is 0/100 mL.
The guideline maximum for raw drinking water with disinfection only is less than or equal to 10/100 mL 90th percentile.
The guideline maximum for raw drinking water with partial treatment is less than or equal to 100/100 mL 90th percentile.
The guideline for raw drinking water with complete treatment is "none applicable". / The most stringent guideline (no water treatment) was used in this report.

Note 3.22 for Nitrate (as N):

Overview Report Update, September 2009

Note 3.23 for Nitrate + Nitrite (as N) (calculated):

The guideline maximum for nitrate as nitrogen is 10 mg/l. Where nitrate and nitrite are present, the total nitrate+nitrite nitrogen should not exceed this value. Overview Report Update, September 2009

Note 3.24 for Nitrite (as N):

Overview Report Update, September 2009

Note 3.25 for Phosphorus (dissolved, by ICPMS/ICPOES):

For lakes used as a source of drinking water, the total phosphorous concentration should not exceed 10 µg/L. No guideline is recommended for streams. / The guideline for lakes was used for this report.

Note 3.26 for Phosphorus (total, by ICPMS/ICPOES):

For lakes used as a source of drinking water, the total phosphorous concentration should not exceed 10 µg/L. No guideline is recommended for streams. / The guideline for lakes was used for this report.

Note 3.27 for Phosphorus (dissolved, APHA 4500-P):

For lakes used as a source of drinking water, the total phosphorous concentration should not exceed 10 µg/L. No guideline is recommended for streams. / The guideline for lakes was used for this report.

Note 3.28 for Arsenic (total):

The interim guideline maximum for total arsenic in drinking water is 25 µg/L.

Note 3.29 for Copper (total):

In raw drinking water with or without treatment, total copper should not exceed 500 µg/L.

Note 3.30 for Lead (total):

In raw drinking water, with and without treatment, the total lead concentration should not exceed 50 µg/L at any time.

Note 3.31 for Mercury (total):

The concentration of total mercury in raw drinking water should not exceed 1.0 µg/L at any time.

Note 3.32 for Molybdenum (total):

The guideline maximum for total molybdenum in raw untreated drinking water is 0.25 mg/L.

Note 3.33 for Selenium (total):

The guideline maximum for total selenium in drinking water is 10 µg/L.

Note 3.34 for Zinc (total):

The guideline maximum for total zinc in drinking water is 5.0 mg/L.

4. Notes for Working Water Quality Guidelines for British Columbia for drinking water (BCWWQG DW)

Note 4.1 for Beryllium (dissolved):

The working guideline maximum for total beryllium in drinking water is 4 µg/L. (This is the USEPA drinking water maximum contaminant level for beryllium.)

Note 4.2 for Thallium (dissolved):

The working guideline maximum for total thallium in drinking water is 2 µg/L. (This is the USEPA drinking water maximum contaminant level for thallium.)

Note 4.3 for Beryllium (total):

The working guideline maximum for total beryllium in drinking water is 4 µg/L. (This is the USEPA drinking water maximum contaminant level for beryllium.)

Note 4.4 for Thallium (total):

The working guideline maximum for total thallium in drinking water is 2 µg/L. (This is the USEPA drinking water maximum contaminant level for thallium.)

REPORTED TO Western Water Associates Ltd
106 - 5145 26th Street
Vernon, BC V1T 8G4

TEL (250) 541-1030
FAX (250) 575-4764

ATTENTION Bryer Manwell

WORK ORDER 3080562

PO NUMBER

RECEIVED / TEMP Aug-13-13 13:50 / 5.0 °C

PROJECT Approval of New Sources-IHA (Bryer Manwell)

REPORTED Aug-14-13

PROJECT INFO

COC NUMBER B14441

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition 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.

Issued By:

DRAFT REPORT
DATA SUBJECT TO CHANGE

Please contact CARO if more information is needed or to provide feedback on our services.

Locations:

#110 4011 Viking Way
Richmond, BC V6V 2K9
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#102 3677 Highway 97N
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Aug-14-13

Analysis Description	Method Reference (* = modified from)		Location
	Preparation	Analysis	
Aggressiveness Index	N/A	[CALC]	Kelowna
Alkalinity, speciated	N/A	APHA 2320 B	Kelowna
Ammonia-N, total colorimetric	N/A	APHA 4500-NH3 G	Kelowna
Background Colonies (MF)	N/A	APHA 9222	Kelowna
Carbon, Total Organic in Water	N/A	APHA 5310 B	Kelowna
Chloride in Water by IC	N/A	APHA 4110 B	Kelowna
Colour, True at 410 nm	N/A	APHA 2120 C *	Kelowna
Conductivity in Water	N/A	APHA 2510 B	Kelowna
Conductivity, field	N/A	N/A	SITE
Cyanide, Total in Liquids	APHA 4500-CN C	APHA 4500-CN E	Kelowna
Dissolved Metals	APHA 3030 B	APHA 3125 B	Richmond
E. coli (by CCA)	N/A	APHA 9222 *	Kelowna
Fecal Coliforms (MF)	N/A	APHA 9222 D	Kelowna
Fluoride in Water by IC	N/A	APHA 4110 B	Kelowna
Free Chlorine, Final Dose	N/A	APHA 4500-Cl G	Kelowna
Free Chlorine, Initial Dose	N/A	APHA 4500-Cl G	Kelowna
Haloacetic Acids	N/A	EPA 552.3 (2003)	Richmond
Heterotrophic Plate Count in Water	N/A	APHA 9215 D	Kelowna
Iron Related Bacteria	N/A	BART DBLSOP06	Kelowna
Langelier Index	N/A	APHA 2330 B	Kelowna
Nitrate-N in Water by IC	N/A	APHA 4110 B	Kelowna
Nitrite-N in Water by IC	N/A	APHA 4110 B	Kelowna
pH in Water	N/A	APHA 4500-H+ B	Kelowna
pH-Field	N/A	N/A	SITE
Sulfate in Water by IC	N/A	APHA 4110 B	Kelowna
Sulfate Reducing Bacteria	N/A	BART DBSLW05	Kelowna
Sulfide	N/A	APHA 4500-S2 D	Kelowna
Temperature (Field)	N/A	N/A	SITE
THMFP Incubation Temperature	N/A	APHA 5710 B	Kelowna
THMFP Incubation Time	N/A	APHA 5710 B	Kelowna
Total Coliforms (by CCA)	N/A	APHA 9222 *	Kelowna
Total Dissolved Solids	N/A	APHA 2540 C	Kelowna
Total Kjeldahl Nitrogen	N/A	EPA 351.2 (1993) *	Kelowna
Total Recoverable Metals	APHA 3030E *	APHA 3125 B	Richmond
Transmissivity at 254nm - Unfiltered	N/A	APHA 5910 B *	Kelowna
Trihalomethanes	EPA 5030B / 5021A	APHA 6200 B	Richmond
Turbidity	N/A	APHA 2130 B	Kelowna
Turbidity, Field	N/A	N/A	SITE

Note: The numbers in brackets represent the year that the method was published/approved

Method Reference Descriptions:

BART Drycon Bioconcepts Inc. Biological Activity Reaction Tests
 APHA Standard Methods for the Examination of Water and Wastewater, American Public Health Association
 EPA United States Environmental Protection Agency Test Methods
 EPA United States Environmental Protection Agency Test Methods

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Approval of New Sources-IHA (Bryer Manwell)

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Aug-14-13

Glossary of Terms:

MRL	Method Reporting Limit
<	Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences
AO	Aesthetic objective
MAC	Maximum acceptable concentration (health-related guideline)
%	Percent W/W
CFU/100mL	Colony Forming Units per 100 mL
CFU/mL	Colony Forming Units per millilitre
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units

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Aug-14-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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DRAFT: General Parameters

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15

Carbon, Total Organic	< 0.5		0.5	mg/L	N/A	Aug-14-13	
Nitrogen, Ammonia as N, Total	< 0.020		0.020	mg/L	N/A	Aug-12-13	HT
Turbidity	0.2	See Guidelines	0.1	NTU	N/A	Aug-11-13	
UV Transmittance @ 254nm - Unfiltered	99.8		0.1	%	N/A	Aug-13-13	

Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30

Carbon, Total Organic	< 0.5		0.5	mg/L	N/A	Aug-14-13	
Nitrogen, Ammonia as N, Total	< 0.020		0.020	mg/L	N/A	Aug-12-13	HT
Turbidity	5.2	See Guidelines	0.1	NTU	N/A	Aug-11-13	
UV Transmittance @ 254nm - Unfiltered	96.4		0.1	%	N/A	Aug-13-13	

DRAFT: Calculated Parameters

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15

Nitrogen, Organic	< 0.020		0.020	mg/L	N/A	N/A	
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Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30

Nitrogen, Organic	< 0.020		0.020	mg/L	N/A	N/A	
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DRAFT: Microbiological Parameters

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15

Coliforms, Total	< 1	MAC < 1	1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Coliforms, Fecal	< 1		1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Background Colonies	21		1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Heterotrophic Plate Count	1		1	CFU/mL	Aug-09-13	Aug-12-13	HT
E. coli	< 1	MAC < 1	1	CFU/100mL	Aug-09-13	Aug-10-13	HT

Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30

Coliforms, Total	< 1	MAC < 1	1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Coliforms, Fecal	< 1		1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Background Colonies	< 1		1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Heterotrophic Plate Count	1		1	CFU/mL	Aug-09-13	Aug-12-13	HT
E. coli	< 1	MAC < 1	1	CFU/100mL	Aug-09-13	Aug-10-13	HT

Sample / Analysis Qualifiers:

HT Sample prepared / analyzed outside of the recommended holding time.

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Aug-14-13

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):** Laboratory reagent water is carried through sample preparation and analysis steps. Method Blanks indicate that results are free from contamination, i.e. not biased high from sources such as the sample container or the laboratory environment
- **Duplicate (Dup):** Preparation and analysis of a replicate aliquot of a sample. Duplicates provide a measure of the analytical method's precision, i.e. how reproducible a result is. Duplicates are only reported if they are associated with your sample data.
- **Blank Spike (BS):** A known amount of standard is carried through sample preparation and analysis steps. Blank Spikes, also known as laboratory control samples (LCS), are prepared from a different source of standard than used for the calibration. They ensure that the calibration is acceptable (i.e. not biased high or low) and also provide a measure of the analytical method's accuracy (i.e. closeness of the result to a target value).
- **Standard Reference Material (SRM):** A material of similar matrix to the samples, externally certified for the parameter(s) listed. Standard Reference Materials ensure that the preparation steps in the method are 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 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	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
---------	--------	-----------	-------------	---------------	-------	-----------	-----	-----------	-------

DRAFT: General Parameters, Batch B3H0265

Blank (B3H0265-BLK1)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	< 0.020	0.020 mg/L							
Blank (B3H0265-BLK2)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	< 0.020	0.020 mg/L							
Blank (B3H0265-BLK3)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	< 0.020	0.020 mg/L							
Blank (B3H0265-BLK4)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	< 0.020	0.020 mg/L							
LCS (B3H0265-BS1)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	9.89	0.020 mg/L	10.0		99	86-111			
LCS (B3H0265-BS2)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	9.98	0.020 mg/L	10.0		100	86-111			
LCS (B3H0265-BS3)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	9.82	0.020 mg/L	10.0		98	86-111			
LCS (B3H0265-BS4)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	9.93	0.020 mg/L	10.0		99	86-111			

DRAFT: General Parameters, Batch B3H0309

Blank (B3H0309-BLK1)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
Blank (B3H0309-BLK2)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
Blank (B3H0309-BLK3)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
Blank (B3H0309-BLK4)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							

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Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-14-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
DRAFT: General Parameters, Batch B3H0309, Continued									
Blank (B3H0309-BLK5)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
LCS (B3H0309-BS1)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	40.8	0.1 NTU	40.0		102	85-115			
LCS (B3H0309-BS2)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	40.6	0.1 NTU	40.0		102	85-115			
LCS (B3H0309-BS3)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	40.8	0.1 NTU	40.0		102	85-115			
LCS (B3H0309-BS4)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	39.8	0.1 NTU	40.0		100	85-115			
LCS (B3H0309-BS5)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	39.7	0.1 NTU	40.0		99	85-115			
DRAFT: General Parameters, Batch B3H0402									
Blank (B3H0402-BLK1)			Prepared: Aug-13-13, Analyzed: Aug-13-13						
UV Transmittance @ 254nm - Unfiltered	< 0.1	0.1 %							
Reference (B3H0402-SRM1)			Prepared: Aug-13-13, Analyzed: Aug-13-13						
UV Transmittance @ 254nm - Unfiltered	81.8	0.1 %	79.8		103	90-110			
DRAFT: General Parameters, Batch B3H0421									
Blank (B3H0421-BLK1)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Carbon, Total Organic	< 0.5	0.5 mg/L							
Blank (B3H0421-BLK2)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Carbon, Total Organic	< 0.5	0.5 mg/L							
LCS (B3H0421-BS1)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Carbon, Total Organic	10.3	0.5 mg/L	10.0		103	80-120			
LCS (B3H0421-BS2)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Carbon, Total Organic	8.7	0.5 mg/L	10.0		87	80-120			
Duplicate (B3H0421-DUP2)			Source: 3080562-01			Prepared: Aug-14-13, Analyzed: Aug-14-13			
Carbon, Total Organic	< 0.5	0.5 mg/L		< 0.5				15	
DRAFT: Microbiological Parameters, Batch B3H0277									
Blank (B3H0277-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK2)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK3)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK4)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-14-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
DRAFT: Microbiological Parameters, Batch B3H0277, Continued									
Blank (B3H0277-BLK5)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK6)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK7)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK8)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK9)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							

DRAFT: Microbiological Parameters, Batch B3H0282

Blank (B3H0282-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Fecal	< 1	1 CFU/100mL							
Blank (B3H0282-BLK2)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Fecal	< 1	1 CFU/100mL							

DRAFT: Microbiological Parameters, Batch B3H0283

Blank (B3H0283-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-12-13						
Heterotrophic Plate Count	< 1	1 CFU/mL							
Blank (B3H0283-BLK2)			Prepared: Aug-09-13, Analyzed: Aug-12-13						
Heterotrophic Plate Count	1	1 CFU/mL							MIC27
Blank (B3H0283-BLK3)			Prepared: Aug-09-13, Analyzed: Aug-12-13						
Heterotrophic Plate Count	< 1	1 CFU/mL							
Duplicate (B3H0283-DUP8)			Source: 3080562-01		Prepared: Aug-09-13, Analyzed: Aug-12-13				
Heterotrophic Plate Count	4	1 CFU/mL		1					63
Duplicate (B3H0283-DUP9)			Source: 3080562-03		Prepared: Aug-09-13, Analyzed: Aug-12-13				
Heterotrophic Plate Count	< 1	1 CFU/mL		1					63

QC Qualifiers:

MIC27 Method blank exceeds the RDL but results are considered valid based upon additional method QC.

REPORTED TO Western Water Associates Ltd
106 - 5145 26th Street
Vernon, BC V1T 8G4

TEL (250) 541-1030
FAX (250) 575-4764

ATTENTION Bryer Manwell

WORK ORDER 3080562

PO NUMBER

RECEIVED / TEMP Aug-13-13 13:50 / 5.0 °C

PROJECT Approval of New Sources-IHA (Bryer Manwell)

REPORTED Aug-19-13

PROJECT INFO

COC NUMBER B14441

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition 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.

Issued By:

DRAFT REPORT
DATA SUBJECT TO CHANGE

Please contact CARO if more information is needed or to provide feedback on our services.

Locations:

#110 4011 Viking Way
Richmond, BC V6V 2K9
Tel: 604-279-1499 Fax: 604-279-1599

#102 3677 Highway 97N
Kelowna, BC V1X 5C3
Tel: 250-765-9646 Fax: 250-765-3893

17225 109 Avenue
Edmonton, AB T5S 1H7
Tel: 780-489-9100 Fax: 780-489-9700

www.caro.ca

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analysis Description	Method Reference (* = modified from)		Location
	Preparation	Analysis	
Aggressiveness Index	N/A	[CALC]	Kelowna
Alkalinity, speciated	N/A	APHA 2320 B	Kelowna
Alkalinity, total	N/A	APHA 2320 B	Kelowna
Ammonia-N, total colorimetric	N/A	APHA 4500-NH3 G	Kelowna
Background Colonies (MF)	N/A	APHA 9222	Kelowna
Carbon, Total Organic in Water	N/A	APHA 5310 B	Kelowna
Chloride in Water by IC	N/A	APHA 4110 B	Kelowna
Colour, True at 410 nm	N/A	APHA 2120 C *	Kelowna
Conductivity in Water	N/A	APHA 2510 B	Kelowna
Conductivity, field	N/A	N/A	SITE
Cyanide, Total in Liquids	APHA 4500-CN C	APHA 4500-CN E	Kelowna
Dissolved Metals	APHA 3030 B	APHA 3125 B	Richmond
E. coli (by CCA)	N/A	APHA 9222 *	Kelowna
Fecal Coliforms (MF)	N/A	APHA 9222 D	Kelowna
Fluoride in Water by IC	N/A	APHA 4110 B	Kelowna
Free Chlorine, Final Dose	N/A	APHA 4500-CI G	Kelowna
Free Chlorine, Initial Dose	N/A	APHA 4500-CI G	Kelowna
Haloacetic Acids	N/A	EPA 552.3 (2003)	Richmond
Hardness as CaCO3 (CALC)	N/A	APHA 2340 B	Richmond
Heterotrophic Plate Count in Water	N/A	APHA 9215 D	Kelowna
Iron Related Bacteria	N/A	BART DBLSOP06	Kelowna
Langelier Index	N/A	APHA 2330 B	Kelowna
Nitrate-N in Water by IC	N/A	APHA 4110 B	Kelowna
Nitrite-N in Water by IC	N/A	APHA 4110 B	Kelowna
Oxidation-Reduction Potential	N/A	N/A	SITE
pH in Water	N/A	APHA 4500-H+ B	Kelowna
pH-Field	N/A	N/A	SITE
Potability, IH Comprehensive Pkg	N/A	APHA 1030 E	Kelowna
Sulfate in Water by IC	N/A	APHA 4110 B	Kelowna
Sulfate Reducing Bacteria	N/A	BART DBSLW05	Kelowna
Sulfide	N/A	APHA 4500-S2 D	Kelowna
Temperature (Field)	N/A	N/A	SITE
THMFP Incubation Temperature	N/A	APHA 5710 B	Kelowna
THMFP Incubation Time	N/A	APHA 5710 B	Kelowna
Total Coliforms (by CCA)	N/A	APHA 9222 *	Kelowna
Total Dissolved Solids	N/A	APHA 2540 C	Kelowna
Total Kjeldahl Nitrogen	N/A	EPA 351.2 (1993) *	Kelowna
Total Recoverable Metals	APHA 3030E *	APHA 3125 B	Richmond
Transmissivity at 254nm - Unfiltered	N/A	APHA 5910 B *	Kelowna
Trihalomethanes	EPA 5030B / 5021A	APHA 6200 B	Richmond
Turbidity	N/A	APHA 2130 B	Kelowna
Turbidity, Field	N/A	N/A	SITE

Note: The numbers in brackets represent the year that the method was published/approved

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Method Reference Descriptions:

BART	Drycon Bioconcepts Inc. Biological Activity Reaction Tests
APHA	Standard Methods for the Examination of Water and Wastewater, American Public Health Association
EPA	United States Environmental Protection Agency Test Methods
EPA	United States Environmental Protection Agency Test Methods

Glossary of Terms:

MRL	Method Reporting Limit
<	Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences
AO	Aesthetic objective
MAC	Maximum acceptable concentration (health-related guideline)
%	Percent W/W
CFU/100mL	Colony Forming Units per 100 mL
CFU/mL	Colony Forming Units per millilitre
Color Unit	Colour referenced against a platinum cobalt standard
mg/L	Milligrams per litre
NTU	Nephelometric Turbidity Units
pH units	pH < 7 = acidic, pH > 7 = basic
uS/cm	Microsiemens per centimeter

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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DRAFT: Anions

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15

Alkalinity, Total as CaCO ₃	49			1 mg/L	N/A	Aug-09-13	
Alkalinity, Phenolphthalein as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Alkalinity, Carbonate as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Alkalinity, Bicarbonate as CaCO ₃	49			1 mg/L	N/A	Aug-09-13	
Alkalinity, Hydroxide as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Chloride	0.12	AO ≤ 250		0.10 mg/L	N/A	Aug-10-13	
Fluoride	< 0.10	MAC = 1.5		0.10 mg/L	N/A	Aug-10-13	
Nitrogen, Nitrate as N	0.051	MAC = 10		0.010 mg/L	N/A	Aug-10-13	
Nitrogen, Nitrite as N	< 0.010	MAC = 1		0.010 mg/L	N/A	Aug-10-13	
Sulfate	2.5	AO ≤ 500		1.0 mg/L	N/A	Aug-10-13	

Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30

Alkalinity, Total as CaCO ₃	66			1 mg/L	N/A	Aug-09-13	
Alkalinity, Phenolphthalein as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Alkalinity, Carbonate as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Alkalinity, Bicarbonate as CaCO ₃	66			1 mg/L	N/A	Aug-09-13	
Alkalinity, Hydroxide as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Chloride	0.15	AO ≤ 250		0.10 mg/L	N/A	Aug-10-13	
Fluoride	< 0.10	MAC = 1.5		0.10 mg/L	N/A	Aug-10-13	
Nitrogen, Nitrate as N	0.045	MAC = 10		0.010 mg/L	N/A	Aug-10-13	
Nitrogen, Nitrite as N	< 0.010	MAC = 1		0.010 mg/L	N/A	Aug-10-13	
Sulfate	2.8	AO ≤ 500		1.0 mg/L	N/A	Aug-10-13	

DRAFT: General Parameters

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15

Carbon, Total Organic	< 0.5			0.5 mg/L	N/A	Aug-14-13	
Colour, True	< 5	AO ≤ 15		5 Color Unit	N/A	Aug-09-13	
Conductivity (EC)	104			2 uS/cm	N/A	Aug-09-13	
Nitrogen, Ammonia as N, Total	< 0.020			0.020 mg/L	N/A	Aug-12-13	HT
Nitrogen, Total Kjeldahl	< 0.05			0.05 mg/L	Aug-09-13	Aug-13-13	
Solids, Total Dissolved	65	AO ≤ 500		5 mg/L	N/A	Aug-13-13	
Sulfide	< 0.05	AO ≤ 0.05		0.05 mg/L	N/A	Aug-15-13	
Turbidity	0.2	See Guidelines		0.1 NTU	N/A	Aug-11-13	
UV Transmittance @ 254nm - Unfiltered	99.8			0.1 %	N/A	Aug-13-13	

Sample ID: TW13-01 (THMFP) (3080562-02) [Water] Sampled: Aug-08-13 17:30

pH	7.86	AO = 6.5 - 8.5		0.01 pH units	N/A	Aug-09-13	
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Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30

Carbon, Total Organic	< 0.5			0.5 mg/L	N/A	Aug-14-13	
Colour, True	< 5	AO ≤ 15		5 Color Unit	N/A	Aug-09-13	
Conductivity (EC)	136			2 uS/cm	N/A	Aug-09-13	
Nitrogen, Ammonia as N, Total	< 0.020			0.020 mg/L	N/A	Aug-12-13	HT
Nitrogen, Total Kjeldahl	< 0.05			0.05 mg/L	Aug-09-13	Aug-13-13	
Solids, Total Dissolved	75	AO ≤ 500		5 mg/L	N/A	Aug-13-13	

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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DRAFT: General Parameters, Continued

Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30, Continued

Sulfide	< 0.05	AO ≤ 0.05	0.05	mg/L	N/A	Aug-15-13	
Turbidity	5.2	See Guidelines	0.1	NTU	N/A	Aug-11-13	
UV Transmittance @ 254nm - Unfiltered	96.4		0.1	%	N/A	Aug-13-13	

Sample ID: TW13-02 (THMFP) (3080562-04) [Water] Sampled: Aug-08-13 16:15

pH	8.07	AO = 6.5 - 8.5	0.01	pH units	N/A	Aug-09-13	
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DRAFT: Calculated Parameters

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15

Hardness, Total (Total as CaCO ₃)	44.9		0.50	mg/L	N/A	N/A	
Hardness, Total (Diss. as CaCO ₃)	42.2		0.50	mg/L	N/A	N/A	
Nitrogen, Organic	< 0.050		0.050	mg/L	N/A	N/A	

Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30

Hardness, Total (Total as CaCO ₃)	65.9		0.50	mg/L	N/A	N/A	
Hardness, Total (Diss. as CaCO ₃)	58.6		0.50	mg/L	N/A	N/A	
Nitrogen, Organic	< 0.050		0.050	mg/L	N/A	N/A	

DRAFT: Dissolved Metals

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15

Aluminum, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Antimony, dissolved	0.0005		0.0001	mg/L	N/A	Aug-15-13	
Arsenic, dissolved	0.0023		0.0005	mg/L	N/A	Aug-15-13	
Barium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Beryllium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Bismuth, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Boron, dissolved	< 0.004		0.004	mg/L	N/A	Aug-15-13	
Cadmium, dissolved	< 0.00001		0.00001	mg/L	N/A	Aug-15-13	
Calcium, dissolved	12.0		0.2	mg/L	N/A	Aug-15-13	
Chromium, dissolved	0.0030		0.0005	mg/L	N/A	Aug-15-13	
Cobalt, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-15-13	
Copper, dissolved	0.0003		0.0002	mg/L	N/A	Aug-15-13	
Iron, dissolved	< 0.010		0.010	mg/L	N/A	Aug-15-13	
Lead, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Lithium, dissolved	0.0003		0.0001	mg/L	N/A	Aug-15-13	
Magnesium, dissolved	2.99		0.01	mg/L	N/A	Aug-15-13	
Manganese, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Mercury, dissolved	< 0.00002		0.00002	mg/L	N/A	Aug-15-13	
Molybdenum, dissolved	0.0017		0.0001	mg/L	N/A	Aug-15-13	
Nickel, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Phosphorus, dissolved	0.09		0.02	mg/L	N/A	Aug-15-13	
Potassium, dissolved	0.64		0.02	mg/L	N/A	Aug-15-13	
Selenium, dissolved	< 0.0005		0.0005	mg/L	N/A	Aug-15-13	

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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DRAFT: Dissolved Metals, Continued

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15, Continued

Silicon, dissolved	8.5		0.5	mg/L	N/A	Aug-15-13	
Silver, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-15-13	
Sodium, dissolved	4.33		0.02	mg/L	N/A	Aug-15-13	
Strontium, dissolved	0.085		0.001	mg/L	N/A	Aug-15-13	
Sulfur, dissolved	< 1		1	mg/L	N/A	Aug-15-13	
Tellurium, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Thallium, dissolved	< 0.00002		0.00002	mg/L	N/A	Aug-15-13	
Thorium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Tin, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Titanium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Uranium, dissolved	0.00019		0.00002	mg/L	N/A	Aug-15-13	
Vanadium, dissolved	0.004		0.001	mg/L	N/A	Aug-15-13	
Zinc, dissolved	< 0.004		0.004	mg/L	N/A	Aug-15-13	
Zirconium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	

Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30

Aluminum, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Antimony, dissolved	0.0004		0.0001	mg/L	N/A	Aug-15-13	
Arsenic, dissolved	0.0029		0.0005	mg/L	N/A	Aug-15-13	
Barium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Beryllium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Bismuth, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Boron, dissolved	< 0.004		0.004	mg/L	N/A	Aug-15-13	
Cadmium, dissolved	0.00001		0.00001	mg/L	N/A	Aug-15-13	
Calcium, dissolved	16.5		0.2	mg/L	N/A	Aug-15-13	
Chromium, dissolved	0.0028		0.0005	mg/L	N/A	Aug-15-13	
Cobalt, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-15-13	
Copper, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Iron, dissolved	< 0.010		0.010	mg/L	N/A	Aug-15-13	
Lead, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Lithium, dissolved	0.0004		0.0001	mg/L	N/A	Aug-15-13	
Magnesium, dissolved	4.24		0.01	mg/L	N/A	Aug-15-13	
Manganese, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Mercury, dissolved	< 0.00002		0.00002	mg/L	N/A	Aug-15-13	
Molybdenum, dissolved	0.0033		0.0001	mg/L	N/A	Aug-15-13	
Nickel, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Phosphorus, dissolved	0.08		0.02	mg/L	N/A	Aug-15-13	
Potassium, dissolved	0.75		0.02	mg/L	N/A	Aug-15-13	
Selenium, dissolved	< 0.0005		0.0005	mg/L	N/A	Aug-15-13	
Silicon, dissolved	10.2		0.5	mg/L	N/A	Aug-15-13	
Silver, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-15-13	
Sodium, dissolved	4.52		0.02	mg/L	N/A	Aug-15-13	
Strontium, dissolved	0.117		0.001	mg/L	N/A	Aug-15-13	
Sulfur, dissolved	< 1		1	mg/L	N/A	Aug-15-13	
Tellurium, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Thallium, dissolved	< 0.00002		0.00002	mg/L	N/A	Aug-15-13	

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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DRAFT: Dissolved Metals, Continued

Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30, Continued

Thorium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Tin, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Titanium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Uranium, dissolved	0.00049		0.00002	mg/L	N/A	Aug-15-13	
Vanadium, dissolved	0.005		0.001	mg/L	N/A	Aug-15-13	
Zinc, dissolved	< 0.004		0.004	mg/L	N/A	Aug-15-13	
Zirconium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	

DRAFT: Total Recoverable Metals

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15

Aluminum, total	0.006	AO ≤ 0.1	0.005	mg/L	Aug-12-13	Aug-14-13	
Antimony, total	0.0002	MAC = 0.006	0.0001	mg/L	Aug-12-13	Aug-14-13	
Arsenic, total	0.0026	MAC = 0.01	0.0005	mg/L	Aug-12-13	Aug-14-13	
Barium, total	< 0.005	MAC = 1	0.005	mg/L	Aug-12-13	Aug-14-13	
Beryllium, total	< 0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	
Bismuth, total	< 0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	
Boron, total	< 0.004	MAC = 5	0.004	mg/L	Aug-12-13	Aug-14-13	
Cadmium, total	< 0.00001	MAC = 0.005	0.00001	mg/L	Aug-12-13	Aug-14-13	
Calcium, total	12.7		0.2	mg/L	Aug-12-13	Aug-14-13	
Chromium, total	0.0029	MAC = 0.05	0.0005	mg/L	Aug-12-13	Aug-14-13	
Cobalt, total	< 0.00005		0.00005	mg/L	Aug-12-13	Aug-14-13	
Copper, total	0.0004	AO ≤ 1	0.0002	mg/L	Aug-12-13	Aug-14-13	
Iron, total	0.01	AO ≤ 0.3	0.01	mg/L	Aug-12-13	Aug-14-13	
Lead, total	< 0.0001	MAC = 0.01	0.0001	mg/L	Aug-12-13	Aug-14-13	
Lithium, total	0.0003		0.0001	mg/L	Aug-12-13	Aug-14-13	
Magnesium, total	3.17		0.01	mg/L	Aug-12-13	Aug-14-13	
Manganese, total	0.0002	AO ≤ 0.05	0.0002	mg/L	Aug-12-13	Aug-14-13	
Mercury, total	< 0.00002	MAC = 0.001	0.00002	mg/L	Aug-12-13	Aug-14-13	
Molybdenum, total	0.0018		0.0001	mg/L	Aug-12-13	Aug-14-13	
Nickel, total	< 0.0002		0.0002	mg/L	Aug-12-13	Aug-14-13	
Phosphorus, total	0.111		0.020	mg/L	Aug-12-13	Aug-14-13	
Potassium, total	0.67		0.02	mg/L	Aug-12-13	Aug-14-13	
Selenium, total	< 0.0005	MAC = 0.01	0.0005	mg/L	Aug-12-13	Aug-14-13	
Silicon, total	8.6		0.5	mg/L	Aug-12-13	Aug-14-13	
Silver, total	< 0.00005		0.00005	mg/L	Aug-12-13	Aug-14-13	
Sodium, total	4.55	AO ≤ 200	0.02	mg/L	Aug-12-13	Aug-14-13	
Strontium, total	0.091		0.001	mg/L	Aug-12-13	Aug-14-13	
Sulfur, total	< 1		1	mg/L	Aug-12-13	Aug-14-13	
Tellurium, total	< 0.0002		0.0002	mg/L	Aug-12-13	Aug-14-13	
Thallium, total	< 0.00002		0.00002	mg/L	Aug-12-13	Aug-14-13	
Thorium, total	< 0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	
Tin, total	< 0.0002		0.0002	mg/L	Aug-12-13	Aug-14-13	
Titanium, total	< 0.005		0.005	mg/L	Aug-12-13	Aug-14-13	
Uranium, total	0.00021	MAC = 0.02	0.00002	mg/L	Aug-12-13	Aug-14-13	

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Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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DRAFT: Total Recoverable Metals, Continued

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15, Continued

Vanadium, total	0.004		0.001	mg/L	Aug-12-13	Aug-14-13	
Zinc, total	< 0.004	AO ≤ 5	0.004	mg/L	Aug-12-13	Aug-14-13	
Zirconium, total	< 0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	

Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30

Aluminum, total	1.14	AO ≤ 0.1	0.005	mg/L	Aug-12-13	Aug-14-13	
Antimony, total	0.0003	MAC = 0.006	0.0001	mg/L	Aug-12-13	Aug-14-13	
Arsenic, total	0.0036	MAC = 0.01	0.0005	mg/L	Aug-12-13	Aug-14-13	
Barium, total	0.020	MAC = 1	0.005	mg/L	Aug-12-13	Aug-14-13	
Beryllium, total	0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	
Bismuth, total	< 0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	
Boron, total	< 0.004	MAC = 5	0.004	mg/L	Aug-12-13	Aug-14-13	
Cadmium, total	0.00002	MAC = 0.005	0.00001	mg/L	Aug-12-13	Aug-14-13	
Calcium, total	18.3		0.2	mg/L	Aug-12-13	Aug-14-13	
Chromium, total	0.0047	MAC = 0.05	0.0005	mg/L	Aug-12-13	Aug-14-13	
Cobalt, total	0.00084		0.00005	mg/L	Aug-12-13	Aug-14-13	
Copper, total	0.0042	AO ≤ 1	0.0002	mg/L	Aug-12-13	Aug-14-13	
Iron, total	1.57	AO ≤ 0.3	0.01	mg/L	Aug-12-13	Aug-14-13	
Lead, total	0.0012	MAC = 0.01	0.0001	mg/L	Aug-12-13	Aug-14-13	
Lithium, total	0.0008		0.0001	mg/L	Aug-12-13	Aug-14-13	
Magnesium, total	4.89		0.01	mg/L	Aug-12-13	Aug-14-13	
Manganese, total	0.0158	AO ≤ 0.05	0.0002	mg/L	Aug-12-13	Aug-14-13	
Mercury, total	0.00002	MAC = 0.001	0.00002	mg/L	Aug-12-13	Aug-14-13	
Molybdenum, total	0.0033		0.0001	mg/L	Aug-12-13	Aug-14-13	
Nickel, total	0.0018		0.0002	mg/L	Aug-12-13	Aug-14-13	
Phosphorus, total	0.177		0.020	mg/L	Aug-12-13	Aug-14-13	
Potassium, total	1.05		0.02	mg/L	Aug-12-13	Aug-14-13	
Selenium, total	< 0.0005	MAC = 0.01	0.0005	mg/L	Aug-12-13	Aug-14-13	
Silicon, total	12.5		0.5	mg/L	Aug-12-13	Aug-14-13	
Silver, total	< 0.00005		0.00005	mg/L	Aug-12-13	Aug-14-13	
Sodium, total	4.82	AO ≤ 200	0.02	mg/L	Aug-12-13	Aug-14-13	
Strontium, total	0.133		0.001	mg/L	Aug-12-13	Aug-14-13	
Sulfur, total	< 1		1	mg/L	Aug-12-13	Aug-14-13	
Tellurium, total	< 0.0002		0.0002	mg/L	Aug-12-13	Aug-14-13	
Thallium, total	0.00002		0.00002	mg/L	Aug-12-13	Aug-14-13	
Thorium, total	0.0002		0.0001	mg/L	Aug-12-13	Aug-14-13	
Tin, total	< 0.0002		0.0002	mg/L	Aug-12-13	Aug-14-13	
Titanium, total	0.059		0.005	mg/L	Aug-12-13	Aug-14-13	
Uranium, total	0.00068	MAC = 0.02	0.00002	mg/L	Aug-12-13	Aug-14-13	
Vanadium, total	0.009		0.001	mg/L	Aug-12-13	Aug-14-13	
Zinc, total	0.008	AO ≤ 5	0.004	mg/L	Aug-12-13	Aug-14-13	
Zirconium, total	0.0002		0.0001	mg/L	Aug-12-13	Aug-14-13	

DRAFT: Microbiological Parameters

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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DRAFT: Microbiological Parameters, Continued

Sample ID: TW13-01 (3080562-01) [Water] Sampled: Aug-08-13 05:15

Coliforms, Total	< 1	MAC < 1		1 CFU/100mL	Aug-09-13	Aug-10-13	HT
Coliforms, Fecal	< 1			1 CFU/100mL	Aug-09-13	Aug-10-13	HT
Background Colonies	21			1 CFU/100mL	Aug-09-13	Aug-10-13	HT
Heterotrophic Plate Count	1			1 CFU/mL	Aug-09-13	Aug-12-13	HT
E. coli	< 1	MAC < 1		1 CFU/100mL	Aug-09-13	Aug-10-13	HT

Sample ID: TW13-02 (3080562-03) [Water] Sampled: Aug-08-13 05:30

Coliforms, Total	< 1	MAC < 1		1 CFU/100mL	Aug-09-13	Aug-10-13	HT
Coliforms, Fecal	< 1			1 CFU/100mL	Aug-09-13	Aug-10-13	HT
Background Colonies	< 1			1 CFU/100mL	Aug-09-13	Aug-10-13	HT
Heterotrophic Plate Count	1			1 CFU/mL	Aug-09-13	Aug-12-13	HT
E. coli	< 1	MAC < 1		1 CFU/100mL	Aug-09-13	Aug-10-13	HT

Sample / Analysis Qualifiers:

HT The sample was prepared / analyzed past the recommended holding time.

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WORK ORDER REPORTED 3080562
Aug-19-13

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):** Laboratory reagent water is carried through sample preparation and analysis steps. Method Blanks indicate that results are free from contamination, i.e. not biased high from sources such as the sample container or the laboratory environment
- **Duplicate (Dup):** Preparation and analysis of a replicate aliquot of a sample. Duplicates provide a measure of the analytical method's precision, i.e. how reproducible a result is. Duplicates are only reported if they are associated with your sample data.
- **Blank Spike (BS):** A known amount of standard is carried through sample preparation and analysis steps. Blank Spikes, also known as laboratory control samples (LCS), are prepared from a different source of standard than used for the calibration. They ensure that the calibration is acceptable (i.e. not biased high or low) and also provide a measure of the analytical method's accuracy (i.e. closeness of the result to a target value).
- **Standard Reference Material (SRM):** A material of similar matrix to the samples, externally certified for the parameter(s) listed. Standard Reference Materials ensure that the preparation steps in the method are 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 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	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
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DRAFT: Anions, Batch B3H0301

Blank (B3H0301-BLK1)

Prepared: Aug-09-13, Analyzed: Aug-09-13

Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrogen, Nitrate as N	< 0.010	0.010 mg/L							
Nitrogen, Nitrite as N	< 0.010	0.010 mg/L							
Sulfate	< 1.0	1.0 mg/L							

Blank (B3H0301-BLK2)

Prepared: Aug-09-13, Analyzed: Aug-09-13

Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrogen, Nitrate as N	< 0.010	0.010 mg/L							
Nitrogen, Nitrite as N	< 0.010	0.010 mg/L							
Sulfate	< 1.0	1.0 mg/L							

LCS (B3H0301-BS1)

Prepared: Aug-09-13, Analyzed: Aug-09-13

Chloride	15.7	0.10 mg/L	16.0		98	85-115			
Fluoride	3.69	0.10 mg/L	4.00		92	85-115			
Nitrogen, Nitrate as N	3.80	0.010 mg/L	4.00		95	85-115			
Nitrogen, Nitrite as N	1.82	0.010 mg/L	2.00		91	85-115			
Sulfate	15.5	1.0 mg/L	16.0		97	85-115			

LCS (B3H0301-BS2)

Prepared: Aug-09-13, Analyzed: Aug-09-13

Chloride	15.6	0.10 mg/L	16.0		98	85-115			
Fluoride	3.70	0.10 mg/L	4.00		92	85-115			
Nitrogen, Nitrate as N	3.80	0.010 mg/L	4.00		95	85-115			
Nitrogen, Nitrite as N	1.89	0.010 mg/L	2.00		95	85-115			
Sulfate	15.6	1.0 mg/L	16.0		97	85-115			

DRAFT: Anions, Batch B3H0312

Blank (B3H0312-BLK1)

Prepared: Aug-09-13, Analyzed: Aug-09-13

Alkalinity, Total as CaCO3	< 1	1 mg/L							
Alkalinity, Phenolphthalein as CaCO3	< 1	1 mg/L							
Alkalinity, Carbonate as CaCO3	< 1	1 mg/L							
Alkalinity, Bicarbonate as CaCO3	< 1	1 mg/L							

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WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
DRAFT: Anions, Batch B3H0312, Continued									
Blank (B3H0312-BLK1), Continued			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Alkalinity, Hydroxide as CaCO3	< 1	1 mg/L							
LCS (B3H0312-BS1)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Alkalinity, Total as CaCO3	101	1 mg/L	100		101	96-108			
Duplicate (B3H0312-DUP1)			Source: 3080562-01 Prepared: Aug-09-13, Analyzed: Aug-09-13						
Alkalinity, Total as CaCO3	49	1 mg/L		49			1	10	
Alkalinity, Phenolphthalein as CaCO3	< 1	1 mg/L		< 1				10	
Alkalinity, Carbonate as CaCO3	< 1	1 mg/L		< 1				10	
Alkalinity, Bicarbonate as CaCO3	49	1 mg/L		49			1	10	
Alkalinity, Hydroxide as CaCO3	< 1	1 mg/L		< 1				10	
DRAFT: Dissolved Metals, Batch B3H0378									
Blank (B3H0378-BLK1)			Prepared: Aug-15-13, Analyzed: Aug-15-13						
Aluminum, dissolved	< 0.005	0.005 mg/L							
Antimony, dissolved	< 0.0001	0.0001 mg/L							
Arsenic, dissolved	< 0.0005	0.0005 mg/L							
Barium, dissolved	< 0.005	0.005 mg/L							
Beryllium, dissolved	< 0.0001	0.0001 mg/L							
Bismuth, dissolved	< 0.0001	0.0001 mg/L							
Boron, dissolved	< 0.004	0.004 mg/L							
Cadmium, dissolved	< 0.00001	0.00001 mg/L							
Calcium, dissolved	< 0.2	0.2 mg/L							
Chromium, dissolved	< 0.0005	0.0005 mg/L							
Cobalt, dissolved	< 0.00005	0.00005 mg/L							
Copper, dissolved	< 0.0002	0.0002 mg/L							
Iron, dissolved	< 0.010	0.010 mg/L							
Lead, dissolved	< 0.0001	0.0001 mg/L							
Lithium, dissolved	< 0.0001	0.0001 mg/L							
Magnesium, dissolved	< 0.01	0.01 mg/L							
Manganese, dissolved	< 0.0002	0.0002 mg/L							
Mercury, dissolved	< 0.00002	0.00002 mg/L							
Molybdenum, dissolved	< 0.0001	0.0001 mg/L							
Nickel, dissolved	< 0.0002	0.0002 mg/L							
Phosphorus, dissolved	< 0.02	0.02 mg/L							
Potassium, dissolved	< 0.02	0.02 mg/L							
Selenium, dissolved	< 0.0005	0.0005 mg/L							
Silicon, dissolved	< 0.5	0.5 mg/L							
Silver, dissolved	< 0.00005	0.00005 mg/L							
Sodium, dissolved	< 0.02	0.02 mg/L							
Strontium, dissolved	< 0.001	0.001 mg/L							
Sulfur, dissolved	< 1	1 mg/L							
Tellurium, dissolved	< 0.0002	0.0002 mg/L							
Thallium, dissolved	< 0.00002	0.00002 mg/L							
Thorium, dissolved	< 0.0001	0.0001 mg/L							
Tin, dissolved	< 0.0002	0.0002 mg/L							
Titanium, dissolved	< 0.005	0.005 mg/L							
Uranium, dissolved	< 0.00002	0.00002 mg/L							
Vanadium, dissolved	< 0.001	0.001 mg/L							
Zinc, dissolved	< 0.004	0.004 mg/L							
Zirconium, dissolved	< 0.0001	0.0001 mg/L							
Reference (B3H0378-SRM1)			Prepared: Aug-15-13, Analyzed: Aug-15-13						
Aluminum, dissolved	0.274	0.005 mg/L	0.233		117	58-142			
Antimony, dissolved	0.0485	0.0001 mg/L	0.0430		113	75-125			
Arsenic, dissolved	0.447	0.0005 mg/L	0.438		102	81-119			

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WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
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DRAFT: Dissolved Metals, Batch B3H0378, Continued

Reference (B3H0378-SRM1), Continued

Prepared: Aug-15-13, Analyzed: Aug-15-13

Barium, dissolved	3.37	0.005 mg/L	3.35		100	83-117			
Beryllium, dissolved	0.209	0.0001 mg/L	0.213		98	80-120			
Boron, dissolved	1.91	0.004 mg/L	1.74		110	74-117			
Cadmium, dissolved	0.233	0.00001 mg/L	0.224		104	83-117			
Calcium, dissolved	8.0	0.2 mg/L	7.69		104	76-124			
Chromium, dissolved	0.478	0.0005 mg/L	0.437		109	81-119			
Cobalt, dissolved	0.145	0.00005 mg/L	0.128		113	76-124			
Copper, dissolved	0.902	0.0002 mg/L	0.844		107	84-116			
Iron, dissolved	1.35	0.010 mg/L	1.29		105	74-126			
Lead, dissolved	0.118	0.0001 mg/L	0.112		105	72-128			
Lithium, dissolved	0.106	0.0001 mg/L	0.104		102	60-140			
Magnesium, dissolved	7.48	0.01 mg/L	6.92		108	81-119			
Manganese, dissolved	0.376	0.0002 mg/L	0.345		109	84-116			
Molybdenum, dissolved	0.464	0.0001 mg/L	0.426		109	83-117			
Nickel, dissolved	0.899	0.0002 mg/L	0.840		107	74-126			
Phosphorus, dissolved	0.49	0.02 mg/L	0.495		99	68-132			
Potassium, dissolved	3.39	0.02 mg/L	3.19		106	74-126			
Selenium, dissolved	0.0332	0.0005 mg/L	0.0331		100	70-130			
Sodium, dissolved	19.7	0.02 mg/L	19.1		103	72-128			
Strontium, dissolved	0.936	0.001 mg/L	0.916		102	84-113			
Thallium, dissolved	0.0424	0.00002 mg/L	0.0393		108	57-143			
Uranium, dissolved	0.266	0.00002 mg/L	0.266		100	85-115			
Vanadium, dissolved	0.889	0.001 mg/L	0.869		102	87-113			
Zinc, dissolved	0.916	0.004 mg/L	0.881		104	72-128			

DRAFT: General Parameters, Batch B3H0265

Blank (B3H0265-BLK1)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total < 0.020 0.020 mg/L

Blank (B3H0265-BLK2)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total < 0.020 0.020 mg/L

Blank (B3H0265-BLK3)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total < 0.020 0.020 mg/L

Blank (B3H0265-BLK4)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total < 0.020 0.020 mg/L

LCS (B3H0265-BS1)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total 9.89 0.020 mg/L 10.0 99 86-111

LCS (B3H0265-BS2)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total 9.98 0.020 mg/L 10.0 100 86-111

LCS (B3H0265-BS3)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total 9.82 0.020 mg/L 10.0 98 86-111

LCS (B3H0265-BS4)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total 9.93 0.020 mg/L 10.0 99 86-111

DRAFT: General Parameters, Batch B3H0309

Blank (B3H0309-BLK1)

Prepared: Aug-11-13, Analyzed: Aug-11-13

Turbidity < 0.1 0.1 NTU

Blank (B3H0309-BLK2)

Prepared: Aug-11-13, Analyzed: Aug-11-13

Turbidity < 0.1 0.1 NTU

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
DRAFT: General Parameters, Batch B3H0309, Continued									
Blank (B3H0309-BLK3)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
Blank (B3H0309-BLK4)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
Blank (B3H0309-BLK5)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
LCS (B3H0309-BS1)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	40.8	0.1 NTU	40.0		102	85-115			
LCS (B3H0309-BS2)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	40.6	0.1 NTU	40.0		102	85-115			
LCS (B3H0309-BS3)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	40.8	0.1 NTU	40.0		102	85-115			
LCS (B3H0309-BS4)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	39.8	0.1 NTU	40.0		100	85-115			
LCS (B3H0309-BS5)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	39.7	0.1 NTU	40.0		99	85-115			
DRAFT: General Parameters, Batch B3H0313									
Blank (B3H0313-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	< 2	2 uS/cm							
Blank (B3H0313-BLK2)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	< 2	2 uS/cm							
Blank (B3H0313-BLK3)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	< 2	2 uS/cm							
LCS (B3H0313-BS4)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	1410	2 uS/cm	1410		100	93-104			
LCS (B3H0313-BS5)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	1410	2 uS/cm	1410		100	93-104			
LCS (B3H0313-BS6)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	1410	2 uS/cm	1410		100	93-104			
Duplicate (B3H0313-DUP3)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	104	2 uS/cm		104			< 1	5	
pH	7.93	0.01 pH units		7.88			< 1	5	
Reference (B3H0313-SRM1)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
pH	6.99	0.01 pH units	7.00		100	98-102			
Reference (B3H0313-SRM2)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
pH	6.99	0.01 pH units	7.00		100	98-102			
Reference (B3H0313-SRM3)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
pH	6.98	0.01 pH units	7.00		100	98-102			
DRAFT: General Parameters, Batch B3H0318									
Blank (B3H0318-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Colour, True	< 5	5 Color Unit							

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes	
DRAFT: General Parameters, Batch B3H0318, Continued										
Blank (B3H0318-BLK2)			Prepared: Aug-09-13, Analyzed: Aug-09-13							
Colour, True	< 5	5 Color Unit								
LCS (B3H0318-BS1)			Prepared: Aug-09-13, Analyzed: Aug-09-13							
Colour, True	11	5 Color Unit	10.0		105	81-118				
LCS (B3H0318-BS2)			Prepared: Aug-09-13, Analyzed: Aug-09-13							
Colour, True	10	5 Color Unit	10.0		104	81-118				
DRAFT: General Parameters, Batch B3H0354										
Blank (B3H0354-BLK1)			Prepared: Aug-12-13, Analyzed: Aug-13-13							
Nitrogen, Total Kjeldahl	< 0.05	0.05 mg/L								
Blank (B3H0354-BLK2)			Prepared: Aug-12-13, Analyzed: Aug-13-13							
Nitrogen, Total Kjeldahl	< 0.05	0.05 mg/L								
Blank (B3H0354-BLK3)			Prepared: Aug-12-13, Analyzed: Aug-13-13							
Nitrogen, Total Kjeldahl	< 0.05	0.05 mg/L								
LCS (B3H0354-BS1)			Prepared: Aug-12-13, Analyzed: Aug-13-13							
Nitrogen, Total Kjeldahl	10.4	0.05 mg/L	10.0		104	89-116				
LCS (B3H0354-BS2)			Prepared: Aug-12-13, Analyzed: Aug-13-13							
Nitrogen, Total Kjeldahl	10.3	0.05 mg/L	10.0		103	89-116				
LCS (B3H0354-BS3)			Prepared: Aug-12-13, Analyzed: Aug-13-13							
Nitrogen, Total Kjeldahl	10.7	0.05 mg/L	10.0		107	89-116				
DRAFT: General Parameters, Batch B3H0402										
Blank (B3H0402-BLK1)			Prepared: Aug-13-13, Analyzed: Aug-13-13							
UV Transmittance @ 254nm - Unfiltered	< 0.1	0.1 %								
Reference (B3H0402-SRM1)			Prepared: Aug-13-13, Analyzed: Aug-13-13							
UV Transmittance @ 254nm - Unfiltered	81.8	0.1 %	79.8		103	90-110				
DRAFT: General Parameters, Batch B3H0421										
Blank (B3H0421-BLK1)			Prepared: Aug-14-13, Analyzed: Aug-14-13							
Carbon, Total Organic	< 0.5	0.5 mg/L								
Blank (B3H0421-BLK2)			Prepared: Aug-14-13, Analyzed: Aug-14-13							
Carbon, Total Organic	< 0.5	0.5 mg/L								
LCS (B3H0421-BS1)			Prepared: Aug-14-13, Analyzed: Aug-14-13							
Carbon, Total Organic	10.3	0.5 mg/L	10.0		103	80-120				
LCS (B3H0421-BS2)			Prepared: Aug-14-13, Analyzed: Aug-14-13							
Carbon, Total Organic	8.7	0.5 mg/L	10.0		87	80-120				
Duplicate (B3H0421-DUP2)			Source: 3080562-01				Prepared: Aug-14-13, Analyzed: Aug-14-13			
Carbon, Total Organic	< 0.5	0.5 mg/L		< 0.5				15		
DRAFT: General Parameters, Batch B3H0429										
Blank (B3H0429-BLK1)			Prepared: Aug-15-13, Analyzed: Aug-15-13							
Solids, Total Dissolved	< 5	5 mg/L								

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
DRAFT: General Parameters, Batch B3H0429, Continued									
Blank (B3H0429-BLK2)			Prepared: Jan-01-00, Analyzed: Jan-01-00						
Solids, Total Dissolved	< 5	5 mg/L							
Reference (B3H0429-SRM1)			Prepared: Aug-15-13, Analyzed: Aug-15-13						
Solids, Total Dissolved	235	5 mg/L	240		98	85-115			
Reference (B3H0429-SRM2)			Prepared: Aug-15-13, Analyzed: Aug-15-13						
Solids, Total Dissolved	235	5 mg/L	240		98	85-115			
DRAFT: General Parameters, Batch B3H0518									
Blank (B3H0518-BLK1)			Prepared: Aug-15-13, Analyzed: Aug-15-13						
Sulfide	< 0.05	0.05 mg/L							
LCS (B3H0518-BS1)			Prepared: Aug-15-13, Analyzed: Aug-15-13						
Sulfide	0.10	0.05 mg/L	0.100		100	74-123			
DRAFT: Microbiological Parameters, Batch B3H0277									
Blank (B3H0277-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK2)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK3)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK4)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK5)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK6)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK7)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK8)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK9)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
DRAFT: Microbiological Parameters, Batch B3H0282									
Blank (B3H0282-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Fecal	< 1	1 CFU/100mL							

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result	MRL	Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
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DRAFT: Microbiological Parameters, Batch B3H0282, Continued

Blank (B3H0282-BLK2)

Prepared: Aug-09-13, Analyzed: Aug-10-13

Coliforms, Fecal	< 1	1	CFU/100mL							
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DRAFT: Microbiological Parameters, Batch B3H0283

Blank (B3H0283-BLK1)

Prepared: Aug-09-13, Analyzed: Aug-12-13

Heterotrophic Plate Count	< 1	1	CFU/mL							
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Blank (B3H0283-BLK2)

Prepared: Aug-09-13, Analyzed: Aug-12-13

Heterotrophic Plate Count	1	1	CFU/mL							MIC27
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Blank (B3H0283-BLK3)

Prepared: Aug-09-13, Analyzed: Aug-12-13

Heterotrophic Plate Count	< 1	1	CFU/mL							
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Duplicate (B3H0283-DUP8)

Source: 3080562-01

Prepared: Aug-09-13, Analyzed: Aug-12-13

Heterotrophic Plate Count	4	1	CFU/mL		1					63
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Duplicate (B3H0283-DUP9)

Source: 3080562-03

Prepared: Aug-09-13, Analyzed: Aug-12-13

Heterotrophic Plate Count	< 1	1	CFU/mL		1					63
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DRAFT: Total Recoverable Metals, Batch B3H0380

Blank (B3H0380-BLK1)

Prepared: Aug-12-13, Analyzed: Aug-14-13

Aluminum, total	< 0.005	0.005	mg/L							
Antimony, total	< 0.0001	0.0001	mg/L							
Arsenic, total	< 0.0005	0.0005	mg/L							
Barium, total	< 0.005	0.005	mg/L							
Beryllium, total	< 0.0001	0.0001	mg/L							
Bismuth, total	< 0.0001	0.0001	mg/L							
Boron, total	< 0.004	0.004	mg/L							
Cadmium, total	< 0.00001	0.00001	mg/L							
Calcium, total	< 0.2	0.2	mg/L							
Chromium, total	< 0.0005	0.0005	mg/L							
Cobalt, total	< 0.00005	0.00005	mg/L							
Copper, total	< 0.0002	0.0002	mg/L							
Iron, total	< 0.01	0.01	mg/L							
Lead, total	< 0.0001	0.0001	mg/L							
Lithium, total	< 0.0001	0.0001	mg/L							
Magnesium, total	< 0.01	0.01	mg/L							
Manganese, total	< 0.0002	0.0002	mg/L							
Mercury, total	< 0.00002	0.00002	mg/L							
Molybdenum, total	< 0.0001	0.0001	mg/L							
Nickel, total	< 0.0002	0.0002	mg/L							
Phosphorus, total	< 0.020	0.020	mg/L							
Potassium, total	< 0.02	0.02	mg/L							
Selenium, total	< 0.0005	0.0005	mg/L							
Silicon, total	< 0.5	0.5	mg/L							
Silver, total	< 0.00005	0.00005	mg/L							
Sodium, total	< 0.02	0.02	mg/L							
Strontium, total	< 0.001	0.001	mg/L							
Sulfur, total	< 1	1	mg/L							
Tellurium, total	< 0.0002	0.0002	mg/L							
Thallium, total	< 0.00002	0.00002	mg/L							
Thorium, total	< 0.0001	0.0001	mg/L							
Tin, total	< 0.0002	0.0002	mg/L							
Titanium, total	< 0.005	0.005	mg/L							
Uranium, total	< 0.00002	0.00002	mg/L							
Vanadium, total	< 0.001	0.001	mg/L							

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-19-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
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DRAFT: Total Recoverable Metals, Batch B3H0380, Continued

Blank (B3H0380-BLK1), Continued

Prepared: Aug-12-13, Analyzed: Aug-14-13

Zinc, total	< 0.004	0.004 mg/L							
Zirconium, total	< 0.0001	0.0001 mg/L							

Reference (B3H0380-SRM1)

Prepared: Aug-12-13, Analyzed: Aug-14-13

Aluminum, total	0.283	0.005 mg/L	0.296		96	81-129			
Antimony, total	0.0531	0.0001 mg/L	0.0505		105	88-114			
Arsenic, total	0.119	0.0005 mg/L	0.122		97	88-114			
Barium, total	0.729	0.005 mg/L	0.777		94	72-104			
Beryllium, total	0.0454	0.0001 mg/L	0.0488		93	76-131			
Boron, total	3.38	0.004 mg/L	3.40		100	75-121			
Cadmium, total	0.0480	0.00001 mg/L	0.0490		98	89-111			
Calcium, total	9.8	0.2 mg/L	10.2		96	86-121			
Chromium, total	0.248	0.0005 mg/L	0.242		103	89-114			
Cobalt, total	0.0397	0.00005 mg/L	0.0366		108	91-113			
Copper, total	0.495	0.0002 mg/L	0.487		102	91-115			
Iron, total	0.50	0.01 mg/L	0.469		107	77-124			
Lead, total	0.196	0.0001 mg/L	0.193		102	92-113			
Lithium, total	0.365	0.0001 mg/L	0.390		94	85-115			
Magnesium, total	3.46	0.01 mg/L	3.31		104	78-120			
Manganese, total	0.111	0.0002 mg/L	0.109		102	90-114			
Mercury, total	0.00482	0.00002 mg/L	0.00456		106	50-150			
Molybdenum, total	0.200	0.0001 mg/L	0.197		101	90-111			
Nickel, total	0.243	0.0002 mg/L	0.242		101	90-111			
Phosphorus, total	0.204	0.020 mg/L	0.233		87	85-115			
Potassium, total	6.22	0.02 mg/L	5.93		105	84-113			
Selenium, total	0.114	0.0005 mg/L	0.115		99	85-115			
Sodium, total	7.54	0.02 mg/L	7.64		99	82-123			
Strontium, total	0.378	0.001 mg/L	0.363		104	88-112			
Thallium, total	0.0801	0.00002 mg/L	0.0794		101	91-114			
Uranium, total	0.0199	0.00002 mg/L	0.0192		104	85-120			
Vanadium, total	0.377	0.001 mg/L	0.376		100	86-111			
Zinc, total	2.36	0.004 mg/L	2.42		98	85-111			

QC Qualifiers:

MIC27 Method blank exceeds the RDL but results are considered valid based upon additional method QC.

REPORTED TO Western Water Associates Ltd
106 - 5145 26th Street
Vernon, BC V1T 8G4

TEL (250) 541-1030
FAX (250) 575-4764

ATTENTION Bryer Manwell

WORK ORDER 3080562

PO NUMBER

RECEIVED / TEMP Aug-13-13 13:50 / 5.0 °C

PROJECT Approval of New Sources-IHA (Bryer Manwell)

REPORTED Aug-28-13

PROJECT INFO

COC NUMBER B14441

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition 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.



Issued By:

Jennifer Shanko, ASCT
Administration Coordinator

Please contact CARO if more information is needed or to provide feedback on our services.

Locations:

#110 4011 Viking Way
Richmond, BC V6V 2K9
Tel: 604-279-1499 Fax: 604-279-1599

#102 3677 Highway 97N
Kelowna, BC V1X 5C3
Tel: 250-765-9646 Fax: 250-765-3893

17225 109 Avenue
Edmonton, AB T5S 1H7
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www.caro.ca

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analysis Description	Method Reference (* = modified from)		Location
	Preparation	Analysis	
Aggressiveness Index	N/A	[CALC]	Kelowna
Alkalinity, speciated	N/A	APHA 2320 B	Kelowna
Ammonia-N, total colorimetric	N/A	APHA 4500-NH3 G	Kelowna
Background Colonies (MF)	N/A	APHA 9222	Kelowna
Carbon, Total Organic in Water	N/A	APHA 5310 B	Kelowna
Chloride in Water by IC	N/A	APHA 4110 B	Kelowna
Colour, True at 410 nm	N/A	APHA 2120 C *	Kelowna
Conductivity in Water	N/A	APHA 2510 B	Kelowna
Conductivity, field	N/A	N/A	SITE
Cyanide, Total in Liquids	APHA 4500-CN C	APHA 4500-CN E	Kelowna
Dissolved Metals	APHA 3030 B	APHA 3125 B	Richmond
E. coli (by CCA)	N/A	APHA 9222 *	Kelowna
Fecal Coliforms (MF)	N/A	APHA 9222 D	Kelowna
Fluoride in Water by IC	N/A	APHA 4110 B	Kelowna
Free Chlorine, Final Dose	N/A	APHA 4500-Cl G	Kelowna
Free Chlorine, Initial Dose	N/A	APHA 4500-Cl G	Kelowna
Haloacetic Acids	N/A	EPA 552.3 (2003)	Richmond
Hardness as CaCO3 (CALC)	N/A	APHA 2340 B	Richmond
Heterotrophic Plate Count in Water	N/A	APHA 9215 D	Kelowna
Iron Related Bacteria	N/A	BART DBLSOP06	Kelowna
Langelier Index	N/A	APHA 2330 B	Kelowna
Nitrate-N in Water by IC	N/A	APHA 4110 B	Kelowna
Nitrite-N in Water by IC	N/A	APHA 4110 B	Kelowna
Oxidation-Reduction Potential	N/A	N/A	SITE
pH in Water	N/A	APHA 4500-H+ B	Kelowna
pH-Field	N/A	N/A	SITE
Sulfate in Water by IC	N/A	APHA 4110 B	Kelowna
Sulfate Reducing Bacteria	N/A	BART DBSLW05	Kelowna
Sulfide	N/A	APHA 4500-S2 D	Kelowna
Temperature (Field)	N/A	N/A	SITE
THM Formation Potential Pkg	N/A	APHA 5710 B	Kelowna
THMFP Incubation Temperature	N/A	APHA 5710 B	Kelowna
THMFP Incubation Time	N/A	APHA 5710 B	Kelowna
Total Coliforms (by CCA)	N/A	APHA 9222 *	Kelowna
Total Dissolved Solids	N/A	APHA 2540 C	Kelowna
Total Kjeldahl Nitrogen	N/A	EPA 351.2 (1993) *	Kelowna
Total Recoverable Metals	APHA 3030E *	APHA 3125 B	Richmond
Transmissivity at 254nm - Unfiltered	N/A	APHA 5910 B *	Kelowna
Trihalomethanes	EPA 5030B / 5021A	APHA 6200 B	Richmond
Turbidity	N/A	APHA 2130 B	Kelowna
Turbidity, Field	N/A	N/A	SITE

Note: The numbers in brackets represent the year that the method was published/approved

Method Reference Descriptions:

BART Drycon Bioconcepts Inc. Biological Activity Reaction Tests
 APHA Standard Methods for the Examination of Water and Wastewater, American Public Health Association
 EPA United States Environmental Protection Agency Test Methods
 EPA United States Environmental Protection Agency Test Methods

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Glossary of Terms:

MRL	Method Reporting Limit
<	Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences
AO	Aesthetic objective
MAC	Maximum acceptable concentration (health-related guideline)
-	No Description
%	Percent W/W
°C	No Description
CFU/100mL	Colony Forming Units per 100 mL
CFU/mL	Colony Forming Units per millilitre
Color Unit	Colour referenced against a platinum cobalt standard
Days	No Description
mg/L	Milligrams per litre
millivolts	No Description
NTU	Nephelometric Turbidity Units
pH units	pH < 7 = acidic, pH > 7 = basic
uS/cm	Microsiemens per centimeter

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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Anions

Sample ID: TW13-01 (3080562-01) [Fresh Water] Sampled: Aug-08-13 05:15

Alkalinity, Total as CaCO ₃	49			1 mg/L	N/A	Aug-09-13	
Alkalinity, Phenolphthalein as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Alkalinity, Carbonate as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Alkalinity, Bicarbonate as CaCO ₃	49			1 mg/L	N/A	Aug-09-13	
Alkalinity, Hydroxide as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Chloride	0.12	AO ≤ 250		0.10 mg/L	N/A	Aug-10-13	
Fluoride	< 0.10	MAC = 1.5		0.10 mg/L	N/A	Aug-10-13	
Nitrogen, Nitrate as N	0.051	MAC = 10		0.010 mg/L	N/A	Aug-10-13	
Nitrogen, Nitrite as N	< 0.010	MAC = 1		0.010 mg/L	N/A	Aug-10-13	
Sulfate	2.5	AO ≤ 500		1.0 mg/L	N/A	Aug-10-13	

Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30

Alkalinity, Total as CaCO ₃	66			1 mg/L	N/A	Aug-09-13	
Alkalinity, Phenolphthalein as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Alkalinity, Carbonate as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Alkalinity, Bicarbonate as CaCO ₃	66			1 mg/L	N/A	Aug-09-13	
Alkalinity, Hydroxide as CaCO ₃	< 1			1 mg/L	N/A	Aug-09-13	
Chloride	0.15	AO ≤ 250		0.10 mg/L	N/A	Aug-10-13	
Fluoride	< 0.10	MAC = 1.5		0.10 mg/L	N/A	Aug-10-13	
Nitrogen, Nitrate as N	0.045	MAC = 10		0.010 mg/L	N/A	Aug-10-13	
Nitrogen, Nitrite as N	< 0.010	MAC = 1		0.010 mg/L	N/A	Aug-10-13	
Sulfate	2.8	AO ≤ 500		1.0 mg/L	N/A	Aug-10-13	

General Parameters

Sample ID: TW13-01 (3080562-01) [Fresh Water] Sampled: Aug-08-13 05:15

Carbon, Total Organic	< 0.5			0.5 mg/L	N/A	Aug-14-13	
Colour, True	< 5	AO ≤ 15		5 Color Unit	N/A	Aug-09-13	
Conductivity (EC)	104			2 uS/cm	N/A	Aug-09-13	
Cyanide, total	< 0.010	MAC = 0.2		0.010 mg/L	Aug-17-13	Aug-19-13	
Nitrogen, Ammonia as N, Total	< 0.020			0.020 mg/L	N/A	Aug-12-13	HT
Nitrogen, Total Kjeldahl	< 0.05			0.05 mg/L	Aug-09-13	Aug-13-13	
Solids, Total Dissolved	65	AO ≤ 500		5 mg/L	N/A	Aug-13-13	
Sulfide	< 0.05	AO ≤ 0.05		0.05 mg/L	N/A	Aug-15-13	
Turbidity	0.2	See Guidelines		0.1 NTU	N/A	Aug-11-13	
UV Transmittance @ 254nm - Unfiltered	99.8			0.1 %	N/A	Aug-13-13	

Sample ID: TW13-01 (THMFP) (3080562-02) [Fresh Water] Sampled: Aug-08-13 17:30 To Aug-21-13 17:30

pH	7.86	AO = 6.5 - 8.5		0.01 pH units	N/A	Aug-09-13	
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Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30

Carbon, Total Organic	< 0.5			0.5 mg/L	N/A	Aug-14-13	
Colour, True	< 5	AO ≤ 15		5 Color Unit	N/A	Aug-09-13	
Conductivity (EC)	136			2 uS/cm	N/A	Aug-09-13	
Cyanide, total	< 0.010	MAC = 0.2		0.010 mg/L	Aug-17-13	Aug-19-13	

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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General Parameters, Continued

Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30, Continued

Nitrogen, Ammonia as N, Total	< 0.020		0.020	mg/L	N/A	Aug-12-13	HT
Nitrogen, Total Kjeldahl	< 0.05		0.05	mg/L	Aug-09-13	Aug-13-13	
Solids, Total Dissolved	75	AO ≤ 500	5	mg/L	N/A	Aug-13-13	
Sulfide	< 0.05	AO ≤ 0.05	0.05	mg/L	N/A	Aug-15-13	
Turbidity	5.2	See Guidelines	0.1	NTU	N/A	Aug-11-13	
UV Transmittance @ 254nm - Unfiltered	96.4		0.1	%	N/A	Aug-13-13	

Sample ID: TW13-02 (THMFP) (3080562-04) [Fresh Water] Sampled: Aug-08-13 16:15 To Aug-21-13 16:15

pH	8.07	AO = 6.5 - 8.5	0.01	pH units	N/A	Aug-09-13	
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Calculated Parameters

Sample ID: TW13-01 (3080562-01) [Fresh Water] Sampled: Aug-08-13 05:15

Aggressiveness Index	12.1		-		N/A	Aug-28-13	
Hardness, Total (Total as CaCO ₃)	44.9		0.50	mg/L	N/A	N/A	
Hardness, Total (Diss. as CaCO ₃)	42.2		0.50	mg/L	N/A	N/A	
Langelier Index	0.04		-5.0	-	N/A	Aug-28-13	
Nitrogen, Organic	< 0.050		0.050	mg/L	N/A	N/A	

Sample ID: TW13-01 (THMFP) (3080562-02) [Fresh Water] Sampled: Aug-08-13 17:30 To Aug-21-13 17:30

Total Haloacetic Acids (HAA5)	0.012	0.08	0.002	mg/L	N/A	N/A	
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Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30

Aggressiveness Index	12.8		-		N/A	Aug-28-13	
Hardness, Total (Total as CaCO ₃)	65.9		0.50	mg/L	N/A	N/A	
Hardness, Total (Diss. as CaCO ₃)	58.6		0.50	mg/L	N/A	N/A	
Langelier Index	0.6		-5.0	-	N/A	Aug-28-13	
Nitrogen, Organic	< 0.050		0.050	mg/L	N/A	N/A	

Sample ID: TW13-02 (THMFP) (3080562-04) [Fresh Water] Sampled: Aug-08-13 16:15 To Aug-21-13 16:15

Total Haloacetic Acids (HAA5)	0.003	0.08	0.002	mg/L	N/A	N/A	
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Field Parameters

Sample ID: TW13-01 (3080562-01) [Fresh Water] Sampled: Aug-08-13 05:15

Conductivity (EC)	109		5	uS/cm	N/A	Aug-08-13	
pH	8.80	AO = 6.5 - 8.5	0.10	pH units	N/A	Aug-08-13	
Oxidation/Reduction Potential	272		-200	millivolts	N/A	Aug-08-13	
Temperature	5.1			°C	N/A	Aug-08-13	
Turbidity	0.6	See Guidelines	0.1	NTU	N/A	Aug-08-13	

Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30

Conductivity (EC)	143		5	uS/cm	N/A	Aug-08-13	
pH	9.15	AO = 6.5 - 8.5	0.10	pH units	N/A	Aug-08-13	

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WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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Field Parameters, Continued

Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30, Continued

Oxidation/Reduction Potential	202		-200	millivolts	N/A	Aug-08-13	
Temperature	4.5			°C	N/A	Aug-08-13	
Turbidity	2.3	See Guidelines	0.1	NTU	N/A	Aug-08-13	

Dissolved Metals

Sample ID: TW13-01 (3080562-01) [Fresh Water] Sampled: Aug-08-13 05:15

Aluminum, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Antimony, dissolved	0.0005		0.0001	mg/L	N/A	Aug-15-13	
Arsenic, dissolved	0.0023		0.0005	mg/L	N/A	Aug-15-13	
Barium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Beryllium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Bismuth, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Boron, dissolved	< 0.004		0.004	mg/L	N/A	Aug-15-13	
Cadmium, dissolved	< 0.00001		0.00001	mg/L	N/A	Aug-15-13	
Calcium, dissolved	12.0		0.2	mg/L	N/A	Aug-15-13	
Chromium, dissolved	0.0030		0.0005	mg/L	N/A	Aug-15-13	
Cobalt, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-15-13	
Copper, dissolved	0.0003		0.0002	mg/L	N/A	Aug-15-13	
Iron, dissolved	< 0.010		0.010	mg/L	N/A	Aug-15-13	
Lead, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Lithium, dissolved	0.0003		0.0001	mg/L	N/A	Aug-15-13	
Magnesium, dissolved	2.99		0.01	mg/L	N/A	Aug-15-13	
Manganese, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Mercury, dissolved	< 0.00002		0.00002	mg/L	N/A	Aug-15-13	
Molybdenum, dissolved	0.0017		0.0001	mg/L	N/A	Aug-15-13	
Nickel, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Phosphorus, dissolved	0.09		0.02	mg/L	N/A	Aug-15-13	
Potassium, dissolved	0.64		0.02	mg/L	N/A	Aug-15-13	
Selenium, dissolved	< 0.0005		0.0005	mg/L	N/A	Aug-15-13	
Silicon, dissolved	8.5		0.5	mg/L	N/A	Aug-15-13	
Silver, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-15-13	
Sodium, dissolved	4.33		0.02	mg/L	N/A	Aug-15-13	
Strontium, dissolved	0.085		0.001	mg/L	N/A	Aug-15-13	
Sulfur, dissolved	< 1		1	mg/L	N/A	Aug-15-13	
Tellurium, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Thallium, dissolved	< 0.00002		0.00002	mg/L	N/A	Aug-15-13	
Thorium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Tin, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Titanium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Uranium, dissolved	0.00019		0.00002	mg/L	N/A	Aug-15-13	
Vanadium, dissolved	0.004		0.001	mg/L	N/A	Aug-15-13	
Zinc, dissolved	< 0.004		0.004	mg/L	N/A	Aug-15-13	
Zirconium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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Dissolved Metals, Continued

Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30

Aluminum, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Antimony, dissolved	0.0004		0.0001	mg/L	N/A	Aug-15-13	
Arsenic, dissolved	0.0029		0.0005	mg/L	N/A	Aug-15-13	
Barium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Beryllium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Bismuth, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Boron, dissolved	< 0.004		0.004	mg/L	N/A	Aug-15-13	
Cadmium, dissolved	0.00001		0.00001	mg/L	N/A	Aug-15-13	
Calcium, dissolved	16.5		0.2	mg/L	N/A	Aug-15-13	
Chromium, dissolved	0.0028		0.0005	mg/L	N/A	Aug-15-13	
Cobalt, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-15-13	
Copper, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Iron, dissolved	< 0.010		0.010	mg/L	N/A	Aug-15-13	
Lead, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Lithium, dissolved	0.0004		0.0001	mg/L	N/A	Aug-15-13	
Magnesium, dissolved	4.24		0.01	mg/L	N/A	Aug-15-13	
Manganese, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Mercury, dissolved	< 0.00002		0.00002	mg/L	N/A	Aug-15-13	
Molybdenum, dissolved	0.0033		0.0001	mg/L	N/A	Aug-15-13	
Nickel, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Phosphorus, dissolved	0.08		0.02	mg/L	N/A	Aug-15-13	
Potassium, dissolved	0.75		0.02	mg/L	N/A	Aug-15-13	
Selenium, dissolved	< 0.0005		0.0005	mg/L	N/A	Aug-15-13	
Silicon, dissolved	10.2		0.5	mg/L	N/A	Aug-15-13	
Silver, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-15-13	
Sodium, dissolved	4.52		0.02	mg/L	N/A	Aug-15-13	
Strontium, dissolved	0.117		0.001	mg/L	N/A	Aug-15-13	
Sulfur, dissolved	< 1		1	mg/L	N/A	Aug-15-13	
Tellurium, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Thallium, dissolved	< 0.00002		0.00002	mg/L	N/A	Aug-15-13	
Thorium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	
Tin, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-15-13	
Titanium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-15-13	
Uranium, dissolved	0.00049		0.00002	mg/L	N/A	Aug-15-13	
Vanadium, dissolved	0.005		0.001	mg/L	N/A	Aug-15-13	
Zinc, dissolved	< 0.004		0.004	mg/L	N/A	Aug-15-13	
Zirconium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-15-13	

Total Recoverable Metals

Sample ID: TW13-01 (3080562-01) [Fresh Water] Sampled: Aug-08-13 05:15

Aluminum, total	0.006	AO ≤ 0.1	0.005	mg/L	Aug-12-13	Aug-14-13	
Antimony, total	0.0002	MAC = 0.006	0.0001	mg/L	Aug-12-13	Aug-14-13	
Arsenic, total	0.0026	MAC = 0.01	0.0005	mg/L	Aug-12-13	Aug-14-13	
Barium, total	< 0.005	MAC = 1	0.005	mg/L	Aug-12-13	Aug-14-13	

REPORTED TO PROJECT Western Water Associates Ltd
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WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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Total Recoverable Metals, Continued

Sample ID: TW13-01 (3080562-01) [Fresh Water] Sampled: Aug-08-13 05:15, Continued

Beryllium, total	< 0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	
Bismuth, total	< 0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	
Boron, total	< 0.004	MAC = 5	0.004	mg/L	Aug-12-13	Aug-14-13	
Cadmium, total	< 0.00001	MAC = 0.005	0.00001	mg/L	Aug-12-13	Aug-14-13	
Calcium, total	12.7		0.2	mg/L	Aug-12-13	Aug-14-13	
Chromium, total	0.0029	MAC = 0.05	0.0005	mg/L	Aug-12-13	Aug-14-13	
Cobalt, total	< 0.00005		0.00005	mg/L	Aug-12-13	Aug-14-13	
Copper, total	0.0004	AO ≤ 1	0.0002	mg/L	Aug-12-13	Aug-14-13	
Iron, total	0.01	AO ≤ 0.3	0.01	mg/L	Aug-12-13	Aug-14-13	
Lead, total	< 0.0001	MAC = 0.01	0.0001	mg/L	Aug-12-13	Aug-14-13	
Lithium, total	0.0003		0.0001	mg/L	Aug-12-13	Aug-14-13	
Magnesium, total	3.17		0.01	mg/L	Aug-12-13	Aug-14-13	
Manganese, total	0.0002	AO ≤ 0.05	0.0002	mg/L	Aug-12-13	Aug-14-13	
Mercury, total	< 0.00002	MAC = 0.001	0.00002	mg/L	Aug-12-13	Aug-14-13	
Molybdenum, total	0.0018		0.0001	mg/L	Aug-12-13	Aug-14-13	
Nickel, total	< 0.0002		0.0002	mg/L	Aug-12-13	Aug-14-13	
Phosphorus, total	0.111		0.020	mg/L	Aug-12-13	Aug-14-13	
Potassium, total	0.67		0.02	mg/L	Aug-12-13	Aug-14-13	
Selenium, total	< 0.0005	MAC = 0.01	0.0005	mg/L	Aug-12-13	Aug-14-13	
Silicon, total	8.6		0.5	mg/L	Aug-12-13	Aug-14-13	
Silver, total	< 0.00005		0.00005	mg/L	Aug-12-13	Aug-14-13	
Sodium, total	4.55	AO ≤ 200	0.02	mg/L	Aug-12-13	Aug-14-13	
Strontium, total	0.091		0.001	mg/L	Aug-12-13	Aug-14-13	
Sulfur, total	< 1		1	mg/L	Aug-12-13	Aug-14-13	
Tellurium, total	< 0.0002		0.0002	mg/L	Aug-12-13	Aug-14-13	
Thallium, total	< 0.00002		0.00002	mg/L	Aug-12-13	Aug-14-13	
Thorium, total	< 0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	
Tin, total	< 0.0002		0.0002	mg/L	Aug-12-13	Aug-14-13	
Titanium, total	< 0.005		0.005	mg/L	Aug-12-13	Aug-14-13	
Uranium, total	0.00021	MAC = 0.02	0.00002	mg/L	Aug-12-13	Aug-14-13	
Vanadium, total	0.004		0.001	mg/L	Aug-12-13	Aug-14-13	
Zinc, total	< 0.004	AO ≤ 5	0.004	mg/L	Aug-12-13	Aug-14-13	
Zirconium, total	< 0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	

Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30

Aluminum, total	1.14	AO ≤ 0.1	0.005	mg/L	Aug-12-13	Aug-14-13	
Antimony, total	0.0003	MAC = 0.006	0.0001	mg/L	Aug-12-13	Aug-14-13	
Arsenic, total	0.0036	MAC = 0.01	0.0005	mg/L	Aug-12-13	Aug-14-13	
Barium, total	0.020	MAC = 1	0.005	mg/L	Aug-12-13	Aug-14-13	
Beryllium, total	0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	
Bismuth, total	< 0.0001		0.0001	mg/L	Aug-12-13	Aug-14-13	
Boron, total	< 0.004	MAC = 5	0.004	mg/L	Aug-12-13	Aug-14-13	
Cadmium, total	0.00002	MAC = 0.005	0.00001	mg/L	Aug-12-13	Aug-14-13	
Calcium, total	18.3		0.2	mg/L	Aug-12-13	Aug-14-13	
Chromium, total	0.0047	MAC = 0.05	0.0005	mg/L	Aug-12-13	Aug-14-13	
Cobalt, total	0.00084		0.00005	mg/L	Aug-12-13	Aug-14-13	

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WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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Total Recoverable Metals, Continued

Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30, Continued

Copper, total	0.0042	AO ≤ 1	0.0002	mg/L	Aug-12-13	Aug-14-13	
Iron, total	1.57	AO ≤ 0.3	0.01	mg/L	Aug-12-13	Aug-14-13	
Lead, total	0.0012	MAC = 0.01	0.0001	mg/L	Aug-12-13	Aug-14-13	
Lithium, total	0.0008		0.0001	mg/L	Aug-12-13	Aug-14-13	
Magnesium, total	4.89		0.01	mg/L	Aug-12-13	Aug-14-13	
Manganese, total	0.0158	AO ≤ 0.05	0.0002	mg/L	Aug-12-13	Aug-14-13	
Mercury, total	0.00002	MAC = 0.001	0.00002	mg/L	Aug-12-13	Aug-14-13	
Molybdenum, total	0.0033		0.0001	mg/L	Aug-12-13	Aug-14-13	
Nickel, total	0.0018		0.0002	mg/L	Aug-12-13	Aug-14-13	
Phosphorus, total	0.177		0.020	mg/L	Aug-12-13	Aug-14-13	
Potassium, total	1.05		0.02	mg/L	Aug-12-13	Aug-14-13	
Selenium, total	< 0.0005	MAC = 0.01	0.0005	mg/L	Aug-12-13	Aug-14-13	
Silicon, total	12.5		0.5	mg/L	Aug-12-13	Aug-14-13	
Silver, total	< 0.00005		0.00005	mg/L	Aug-12-13	Aug-14-13	
Sodium, total	4.82	AO ≤ 200	0.02	mg/L	Aug-12-13	Aug-14-13	
Strontium, total	0.133		0.001	mg/L	Aug-12-13	Aug-14-13	
Sulfur, total	< 1		1	mg/L	Aug-12-13	Aug-14-13	
Tellurium, total	< 0.0002		0.0002	mg/L	Aug-12-13	Aug-14-13	
Thallium, total	0.00002		0.00002	mg/L	Aug-12-13	Aug-14-13	
Thorium, total	0.0002		0.0001	mg/L	Aug-12-13	Aug-14-13	
Tin, total	< 0.0002		0.0002	mg/L	Aug-12-13	Aug-14-13	
Titanium, total	0.059		0.005	mg/L	Aug-12-13	Aug-14-13	
Uranium, total	0.00068	MAC = 0.02	0.00002	mg/L	Aug-12-13	Aug-14-13	
Vanadium, total	0.009		0.001	mg/L	Aug-12-13	Aug-14-13	
Zinc, total	0.008	AO ≤ 5	0.004	mg/L	Aug-12-13	Aug-14-13	
Zirconium, total	0.0002		0.0001	mg/L	Aug-12-13	Aug-14-13	

Microbiological Parameters

Sample ID: TW13-01 (3080562-01) [Fresh Water] Sampled: Aug-08-13 05:15

Coliforms, Total	< 1	MAC < 1	1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Coliforms, Fecal	< 1		1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Background Colonies	21		1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Heterotrophic Plate Count	1		1	CFU/mL	Aug-09-13	Aug-12-13	HT
E. coli	< 1	MAC < 1	1	CFU/100mL	Aug-09-13	Aug-10-13	HT

Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30

Coliforms, Total	< 1	MAC < 1	1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Coliforms, Fecal	< 1		1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Background Colonies	< 1		1	CFU/100mL	Aug-09-13	Aug-10-13	HT
Heterotrophic Plate Count	1		1	CFU/mL	Aug-09-13	Aug-12-13	HT
E. coli	< 1	MAC < 1	1	CFU/100mL	Aug-09-13	Aug-10-13	HT

Biological Activity Reaction Tests

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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Biological Activity Reaction Tests, Continued

Sample ID: TW13-01 (3080562-01) [Fresh Water] Sampled: Aug-08-13 05:15

Sulfate Reducing Bacteria	Not Detected				Aug-09-13	Aug-20-13	
Iron Related Bacteria	Detected				Aug-09-13	Aug-20-13	

Sample ID: TW13-02 (3080562-03) [Fresh Water] Sampled: Aug-08-13 05:30

Sulfate Reducing Bacteria	Not Detected				Aug-09-13	Aug-20-13	
Iron Related Bacteria	Not Detected				Aug-09-13	Aug-20-13	

Haloacetic Acids

Sample ID: TW13-01 (THMFP) (3080562-02) [Fresh Water] Sampled: Aug-08-13 17:30 To Aug-21-13

17:30							
Monochloroacetic Acid	< 0.002		0.002	mg/L	Aug-23-13	Aug-23-13	
Monobromoacetic Acid	< 0.002		0.002	mg/L	Aug-23-13	Aug-23-13	
Dichloroacetic Acid	0.006		0.002	mg/L	Aug-23-13	Aug-23-13	
Trichloroacetic Acid	0.005		0.002	mg/L	Aug-23-13	Aug-23-13	
Dibromoacetic Acid	< 0.002		0.002	mg/L	Aug-23-13	Aug-23-13	
Surrogate: 2-Bromopropionic Acid	144 %		101-166		Aug-23-13	Aug-23-13	

Sample ID: TW13-02 (THMFP) (3080562-04) [Fresh Water] Sampled: Aug-08-13 16:15 To Aug-21-13

16:15							
Monochloroacetic Acid	< 0.002		0.002	mg/L	Aug-23-13	Aug-26-13	
Monobromoacetic Acid	< 0.002		0.002	mg/L	Aug-23-13	Aug-26-13	
Dichloroacetic Acid	0.003		0.002	mg/L	Aug-23-13	Aug-26-13	
Trichloroacetic Acid	< 0.002		0.002	mg/L	Aug-23-13	Aug-26-13	
Dibromoacetic Acid	< 0.002		0.002	mg/L	Aug-23-13	Aug-26-13	
Surrogate: 2-Bromopropionic Acid	138 %		101-166		Aug-23-13	Aug-26-13	

THM Formation Potential / Chlorine Demand

Sample ID: TW13-01 (THMFP) (3080562-02) [Fresh Water] Sampled: Aug-08-13 17:30 To Aug-21-13

17:30							
Incubation Time	7.0			Days	N/A	Aug-21-13	
Incubation Temperature	20.0			1.0 °C	N/A	Aug-21-13	
Free Chlorine, Initial Dose	4.30			0.05 mg/L	N/A	Aug-21-13	
Free Chlorine, Final	3.90			0.05 mg/L	N/A	Aug-21-13	
Chlorine Demand, Free	0.40			0.05 mg/L	N/A	N/A	
Total Trihalomethanes	0.005	0.1		0.001 mg/L	N/A	N/A	
Total Trihalomethanes (as CHCl ₃)	0.005			0.001 mg/L	N/A	N/A	

Sample ID: TW13-02 (THMFP) (3080562-04) [Fresh Water] Sampled: Aug-08-13 16:15 To Aug-21-13

16:15							
Incubation Time	7.0			Days	N/A	Aug-21-13	
Incubation Temperature	20.0			1.0 °C	N/A	Aug-21-13	
Free Chlorine, Initial Dose	4.90			0.05 mg/L	N/A	Aug-21-13	
Free Chlorine, Final	4.50			0.05 mg/L	N/A	Aug-21-13	
Chlorine Demand, Free	0.40			0.05 mg/L	N/A	N/A	
Total Trihalomethanes	0.003	0.1		0.001 mg/L	N/A	N/A	

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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THM Formation Potential / Chlorine Demand, Continued

Sample ID: TW13-02 (THMFP) (3080562-04) [Fresh Water] Sampled: Aug-08-13 16:15 To Aug-21-13 16:15, Continued

Total Trihalomethanes (as CHCl ₃)	0.003		0.001	mg/L	N/A	N/A	
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Volatile Organic Compounds (VOC)

Sample ID: TW13-01 (THMFP) (3080562-02) [Fresh Water] Sampled: Aug-08-13 17:30 To Aug-21-13 17:30

Bromodichloromethane	< 0.001		0.001	mg/L	N/A	Aug-25-13	
Bromoform	< 0.001		0.001	mg/L	N/A	Aug-25-13	
Chloroform	0.005		0.001	mg/L	N/A	Aug-25-13	
Dibromochloromethane	< 0.001		0.001	mg/L	N/A	Aug-25-13	
Surrogate: Toluene-d ₈	109 %		80-120		N/A	Aug-25-13	
Surrogate: 4-Bromofluorobenzene	90 %		80-120		N/A	Aug-25-13	

Sample ID: TW13-02 (THMFP) (3080562-04) [Fresh Water] Sampled: Aug-08-13 16:15 To Aug-21-13 16:15

Bromodichloromethane	< 0.001		0.001	mg/L	N/A	Aug-25-13	
Bromoform	< 0.001		0.001	mg/L	N/A	Aug-25-13	
Chloroform	0.003		0.001	mg/L	N/A	Aug-25-13	
Dibromochloromethane	< 0.001		0.001	mg/L	N/A	Aug-25-13	
Surrogate: Toluene-d ₈	116 %		80-120		N/A	Aug-25-13	
Surrogate: 4-Bromofluorobenzene	93 %		80-120		N/A	Aug-25-13	

Sample / Analysis Qualifiers:

HT The sample was prepared / analyzed past the recommended holding time.

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

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):** Laboratory reagent water is carried through sample preparation and analysis steps. Method Blanks indicate that results are free from contamination, i.e. not biased high from sources such as the sample container or the laboratory environment
- **Duplicate (Dup):** Preparation and analysis of a replicate aliquot of a sample. Duplicates provide a measure of the analytical method's precision, i.e. how reproducible a result is. Duplicates are only reported if they are associated with your sample data.
- **Blank Spike (BS):** A known amount of standard is carried through sample preparation and analysis steps. Blank Spikes, also known as laboratory control samples (LCS), are prepared from a different source of standard than used for the calibration. They ensure that the calibration is acceptable (i.e. not biased high or low) and also provide a measure of the analytical method's accuracy (i.e. closeness of the result to a target value).
- **Standard Reference Material (SRM):** A material of similar matrix to the samples, externally certified for the parameter(s) listed. Standard Reference Materials ensure that the preparation steps in the method are 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 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	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
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Anions, Batch B3H0301

Blank (B3H0301-BLK1)

Prepared: Aug-09-13, Analyzed: Aug-09-13

Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrogen, Nitrate as N	< 0.010	0.010 mg/L							
Nitrogen, Nitrite as N	< 0.010	0.010 mg/L							
Sulfate	< 1.0	1.0 mg/L							

Blank (B3H0301-BLK2)

Prepared: Aug-09-13, Analyzed: Aug-09-13

Chloride	< 0.10	0.10 mg/L							
Fluoride	< 0.10	0.10 mg/L							
Nitrogen, Nitrate as N	< 0.010	0.010 mg/L							
Nitrogen, Nitrite as N	< 0.010	0.010 mg/L							
Sulfate	< 1.0	1.0 mg/L							

LCS (B3H0301-BS1)

Prepared: Aug-09-13, Analyzed: Aug-09-13

Chloride	15.7	0.10 mg/L	16.0		98	85-115			
Fluoride	3.69	0.10 mg/L	4.00		92	85-115			
Nitrogen, Nitrate as N	3.80	0.010 mg/L	4.00		95	85-115			
Nitrogen, Nitrite as N	1.82	0.010 mg/L	2.00		91	85-115			
Sulfate	15.5	1.0 mg/L	16.0		97	85-115			

LCS (B3H0301-BS2)

Prepared: Aug-09-13, Analyzed: Aug-09-13

Chloride	15.6	0.10 mg/L	16.0		98	85-115			
Fluoride	3.70	0.10 mg/L	4.00		92	85-115			
Nitrogen, Nitrate as N	3.80	0.010 mg/L	4.00		95	85-115			
Nitrogen, Nitrite as N	1.89	0.010 mg/L	2.00		95	85-115			
Sulfate	15.6	1.0 mg/L	16.0		97	85-115			

Anions, Batch B3H0312

Blank (B3H0312-BLK1)

Prepared: Aug-09-13, Analyzed: Aug-09-13

Alkalinity, Total as CaCO3	< 1	1 mg/L							
Alkalinity, Phenolphthalein as CaCO3	< 1	1 mg/L							
Alkalinity, Carbonate as CaCO3	< 1	1 mg/L							
Alkalinity, Bicarbonate as CaCO3	< 1	1 mg/L							

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
Anions, Batch B3H0312, Continued									
Blank (B3H0312-BLK1), Continued			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Alkalinity, Hydroxide as CaCO3	< 1	1 mg/L							
LCS (B3H0312-BS1)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Alkalinity, Total as CaCO3	101	1 mg/L	100		101	96-108			
Duplicate (B3H0312-DUP1)			Source: 3080562-01 Prepared: Aug-09-13, Analyzed: Aug-09-13						
Alkalinity, Total as CaCO3	49	1 mg/L		49			1	10	
Alkalinity, Phenolphthalein as CaCO3	< 1	1 mg/L		< 1				10	
Alkalinity, Carbonate as CaCO3	< 1	1 mg/L		< 1				10	
Alkalinity, Bicarbonate as CaCO3	49	1 mg/L		49			1	10	
Alkalinity, Hydroxide as CaCO3	< 1	1 mg/L		< 1				10	
Biological Activity Reaction Tests, Batch B3H0314									
Blank (B3H0314-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-20-13						
Sulfate Reducing Bacteria	Not Detected	-							
Duplicate (B3H0314-DUP1)			Source: 3080562-03 Prepared: Aug-09-13, Analyzed: Aug-20-13						
Sulfate Reducing Bacteria	Not Detected	-		Not Detected				40	
Biological Activity Reaction Tests, Batch B3H0315									
Blank (B3H0315-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-20-13						
Iron Related Bacteria	Not Detected	-							
Duplicate (B3H0315-DUP1)			Source: 3080562-01 Prepared: Aug-09-13, Analyzed: Aug-20-13						
Iron Related Bacteria	Detected	-		Detected				200	
Dissolved Metals, Batch B3H0378									
Blank (B3H0378-BLK1)			Prepared: Aug-15-13, Analyzed: Aug-15-13						
Aluminum, dissolved	< 0.005	0.005 mg/L							
Antimony, dissolved	< 0.0001	0.0001 mg/L							
Arsenic, dissolved	< 0.0005	0.0005 mg/L							
Barium, dissolved	< 0.005	0.005 mg/L							
Beryllium, dissolved	< 0.0001	0.0001 mg/L							
Bismuth, dissolved	< 0.0001	0.0001 mg/L							
Boron, dissolved	< 0.004	0.004 mg/L							
Cadmium, dissolved	< 0.00001	0.00001 mg/L							
Calcium, dissolved	< 0.2	0.2 mg/L							
Chromium, dissolved	< 0.0005	0.0005 mg/L							
Cobalt, dissolved	< 0.00005	0.00005 mg/L							
Copper, dissolved	< 0.0002	0.0002 mg/L							
Iron, dissolved	< 0.010	0.010 mg/L							
Lead, dissolved	< 0.0001	0.0001 mg/L							
Lithium, dissolved	< 0.0001	0.0001 mg/L							
Magnesium, dissolved	< 0.01	0.01 mg/L							
Manganese, dissolved	< 0.0002	0.0002 mg/L							
Mercury, dissolved	< 0.00002	0.00002 mg/L							
Molybdenum, dissolved	< 0.0001	0.0001 mg/L							
Nickel, dissolved	< 0.0002	0.0002 mg/L							
Phosphorus, dissolved	< 0.02	0.02 mg/L							
Potassium, dissolved	< 0.02	0.02 mg/L							
Selenium, dissolved	< 0.0005	0.0005 mg/L							
Silicon, dissolved	< 0.5	0.5 mg/L							

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Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
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Dissolved Metals, Batch B3H0378, Continued

Blank (B3H0378-BLK1), Continued

Prepared: Aug-15-13, Analyzed: Aug-15-13

Silver, dissolved	< 0.00005	0.00005 mg/L							
Sodium, dissolved	< 0.02	0.02 mg/L							
Strontium, dissolved	< 0.001	0.001 mg/L							
Sulfur, dissolved	< 1	1 mg/L							
Tellurium, dissolved	< 0.0002	0.0002 mg/L							
Thallium, dissolved	< 0.00002	0.00002 mg/L							
Thorium, dissolved	< 0.0001	0.0001 mg/L							
Tin, dissolved	< 0.0002	0.0002 mg/L							
Titanium, dissolved	< 0.005	0.005 mg/L							
Uranium, dissolved	< 0.00002	0.00002 mg/L							
Vanadium, dissolved	< 0.001	0.001 mg/L							
Zinc, dissolved	< 0.004	0.004 mg/L							
Zirconium, dissolved	< 0.0001	0.0001 mg/L							

Reference (B3H0378-SRM1)

Prepared: Aug-15-13, Analyzed: Aug-15-13

Aluminum, dissolved	0.274	0.005 mg/L	0.233	117	58-142
Antimony, dissolved	0.0485	0.0001 mg/L	0.0430	113	75-125
Arsenic, dissolved	0.447	0.0005 mg/L	0.438	102	81-119
Barium, dissolved	3.37	0.005 mg/L	3.35	100	83-117
Beryllium, dissolved	0.209	0.0001 mg/L	0.213	98	80-120
Boron, dissolved	1.91	0.004 mg/L	1.74	110	74-117
Cadmium, dissolved	0.233	0.00001 mg/L	0.224	104	83-117
Calcium, dissolved	8.0	0.2 mg/L	7.69	104	76-124
Chromium, dissolved	0.478	0.0005 mg/L	0.437	109	81-119
Cobalt, dissolved	0.145	0.00005 mg/L	0.128	113	76-124
Copper, dissolved	0.902	0.0002 mg/L	0.844	107	84-116
Iron, dissolved	1.35	0.010 mg/L	1.29	105	74-126
Lead, dissolved	0.118	0.0001 mg/L	0.112	105	72-128
Lithium, dissolved	0.106	0.0001 mg/L	0.104	102	60-140
Magnesium, dissolved	7.48	0.01 mg/L	6.92	108	81-119
Manganese, dissolved	0.376	0.0002 mg/L	0.345	109	84-116
Molybdenum, dissolved	0.464	0.0001 mg/L	0.426	109	83-117
Nickel, dissolved	0.899	0.0002 mg/L	0.840	107	74-126
Phosphorus, dissolved	0.49	0.02 mg/L	0.495	99	68-132
Potassium, dissolved	3.39	0.02 mg/L	3.19	106	74-126
Selenium, dissolved	0.0332	0.0005 mg/L	0.0331	100	70-130
Sodium, dissolved	19.7	0.02 mg/L	19.1	103	72-128
Strontium, dissolved	0.936	0.001 mg/L	0.916	102	84-113
Thallium, dissolved	0.0424	0.00002 mg/L	0.0393	108	57-143
Uranium, dissolved	0.266	0.00002 mg/L	0.266	100	85-115
Vanadium, dissolved	0.889	0.001 mg/L	0.869	102	87-113
Zinc, dissolved	0.916	0.004 mg/L	0.881	104	72-128

General Parameters, Batch B3H0265

Blank (B3H0265-BLK1)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total	< 0.020	0.020 mg/L			
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Blank (B3H0265-BLK2)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total	< 0.020	0.020 mg/L			
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Blank (B3H0265-BLK3)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total	< 0.020	0.020 mg/L			
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Blank (B3H0265-BLK4)

Prepared: Aug-12-13, Analyzed: Aug-12-13

Nitrogen, Ammonia as N, Total	< 0.020	0.020 mg/L			
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REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
General Parameters, Batch B3H0265, Continued									
LCS (B3H0265-BS1)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	9.89	0.020 mg/L	10.0		99	86-111			
LCS (B3H0265-BS2)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	9.98	0.020 mg/L	10.0		100	86-111			
LCS (B3H0265-BS3)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	9.82	0.020 mg/L	10.0		98	86-111			
LCS (B3H0265-BS4)			Prepared: Aug-12-13, Analyzed: Aug-12-13						
Nitrogen, Ammonia as N, Total	9.93	0.020 mg/L	10.0		99	86-111			
General Parameters, Batch B3H0309									
Blank (B3H0309-BLK1)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
Blank (B3H0309-BLK2)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
Blank (B3H0309-BLK3)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
Blank (B3H0309-BLK4)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
Blank (B3H0309-BLK5)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	< 0.1	0.1 NTU							
LCS (B3H0309-BS1)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	40.8	0.1 NTU	40.0		102	85-115			
LCS (B3H0309-BS2)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	40.6	0.1 NTU	40.0		102	85-115			
LCS (B3H0309-BS3)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	40.8	0.1 NTU	40.0		102	85-115			
LCS (B3H0309-BS4)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	39.8	0.1 NTU	40.0		100	85-115			
LCS (B3H0309-BS5)			Prepared: Aug-11-13, Analyzed: Aug-11-13						
Turbidity	39.7	0.1 NTU	40.0		99	85-115			
General Parameters, Batch B3H0313									
Blank (B3H0313-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	< 2	2 uS/cm							
Blank (B3H0313-BLK2)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	< 2	2 uS/cm							
Blank (B3H0313-BLK3)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	< 2	2 uS/cm							
LCS (B3H0313-BS4)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	1410	2 uS/cm	1410		100	93-104			
LCS (B3H0313-BS5)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	1410	2 uS/cm	1410		100	93-104			

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
General Parameters, Batch B3H0313, Continued									
LCS (B3H0313-BS6)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	1410	2 uS/cm	1410		100	93-104			
Duplicate (B3H0313-DUP3)			Source: 3080562-01 Prepared: Aug-09-13, Analyzed: Aug-09-13						
Conductivity (EC)	104	2 uS/cm		104			< 1	5	
pH	7.93	0.01 pH units		7.88			< 1	5	
Reference (B3H0313-SRM1)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
pH	6.99	0.01 pH units	7.00		100	98-102			
Reference (B3H0313-SRM2)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
pH	6.99	0.01 pH units	7.00		100	98-102			
Reference (B3H0313-SRM3)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
pH	6.98	0.01 pH units	7.00		100	98-102			
General Parameters, Batch B3H0318									
Blank (B3H0318-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Colour, True	< 5	5 Color Unit							
Blank (B3H0318-BLK2)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Colour, True	< 5	5 Color Unit							
LCS (B3H0318-BS1)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Colour, True	11	5 Color Unit	10.0		105	81-118			
LCS (B3H0318-BS2)			Prepared: Aug-09-13, Analyzed: Aug-09-13						
Colour, True	10	5 Color Unit	10.0		104	81-118			
General Parameters, Batch B3H0354									
Blank (B3H0354-BLK1)			Prepared: Aug-12-13, Analyzed: Aug-13-13						
Nitrogen, Total Kjeldahl	< 0.05	0.05 mg/L							
Blank (B3H0354-BLK2)			Prepared: Aug-12-13, Analyzed: Aug-13-13						
Nitrogen, Total Kjeldahl	< 0.05	0.05 mg/L							
Blank (B3H0354-BLK3)			Prepared: Aug-12-13, Analyzed: Aug-13-13						
Nitrogen, Total Kjeldahl	< 0.05	0.05 mg/L							
LCS (B3H0354-BS1)			Prepared: Aug-12-13, Analyzed: Aug-13-13						
Nitrogen, Total Kjeldahl	10.4	0.05 mg/L	10.0		104	89-116			
LCS (B3H0354-BS2)			Prepared: Aug-12-13, Analyzed: Aug-13-13						
Nitrogen, Total Kjeldahl	10.3	0.05 mg/L	10.0		103	89-116			
LCS (B3H0354-BS3)			Prepared: Aug-12-13, Analyzed: Aug-13-13						
Nitrogen, Total Kjeldahl	10.7	0.05 mg/L	10.0		107	89-116			
General Parameters, Batch B3H0402									
Blank (B3H0402-BLK1)			Prepared: Aug-13-13, Analyzed: Aug-13-13						
UV Transmittance @ 254nm - Unfiltered	< 0.1	0.1 %							
Reference (B3H0402-SRM1)			Prepared: Aug-13-13, Analyzed: Aug-13-13						
UV Transmittance @ 254nm - Unfiltered	81.8	0.1 %	79.8		103	90-110			
General Parameters, Batch B3H0421									

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes	
General Parameters, Batch B3H0421, Continued										
Blank (B3H0421-BLK1)			Prepared: Aug-14-13, Analyzed: Aug-14-13							
Carbon, Total Organic	< 0.5	0.5 mg/L								
Blank (B3H0421-BLK2)			Prepared: Aug-14-13, Analyzed: Aug-14-13							
Carbon, Total Organic	< 0.5	0.5 mg/L								
LCS (B3H0421-BS1)			Prepared: Aug-14-13, Analyzed: Aug-14-13							
Carbon, Total Organic	10.3	0.5 mg/L	10.0		103	80-120				
LCS (B3H0421-BS2)			Prepared: Aug-14-13, Analyzed: Aug-14-13							
Carbon, Total Organic	8.7	0.5 mg/L	10.0		87	80-120				
Duplicate (B3H0421-DUP2)			Source: 3080562-01				Prepared: Aug-14-13, Analyzed: Aug-14-13			
Carbon, Total Organic	< 0.5	0.5 mg/L		< 0.5				15		
General Parameters, Batch B3H0429										
Blank (B3H0429-BLK1)			Prepared: Aug-15-13, Analyzed: Aug-15-13							
Solids, Total Dissolved	< 5	5 mg/L								
Blank (B3H0429-BLK2)			Prepared: Jan-01-00, Analyzed: Jan-01-00							
Solids, Total Dissolved	< 5	5 mg/L								
Reference (B3H0429-SRM1)			Prepared: Aug-15-13, Analyzed: Aug-15-13							
Solids, Total Dissolved	235	5 mg/L	240		98	85-115				
Reference (B3H0429-SRM2)			Prepared: Aug-15-13, Analyzed: Aug-15-13							
Solids, Total Dissolved	235	5 mg/L	240		98	85-115				
General Parameters, Batch B3H0518										
Blank (B3H0518-BLK1)			Prepared: Aug-15-13, Analyzed: Aug-15-13							
Sulfide	< 0.05	0.05 mg/L								
LCS (B3H0518-BS1)			Prepared: Aug-15-13, Analyzed: Aug-15-13							
Sulfide	0.10	0.05 mg/L	0.100		100	74-123				
General Parameters, Batch B3H0620										
Blank (B3H0620-BLK1)			Prepared: Aug-17-13, Analyzed: Aug-19-13							
Cyanide, total	< 0.010	0.010 mg/L								
Blank (B3H0620-BLK2)			Prepared: Aug-17-13, Analyzed: Aug-19-13							
Cyanide, total	< 0.010	0.010 mg/L								
LCS (B3H0620-BS1)			Prepared: Aug-17-13, Analyzed: Aug-19-13							
Cyanide, total	10.1	0.010 mg/L	10.0		101	85-110				
LCS (B3H0620-BS2)			Prepared: Aug-17-13, Analyzed: Aug-19-13							
Cyanide, total	10.2	0.010 mg/L	10.0		102	85-110				
Duplicate (B3H0620-DUP1)			Source: 3080562-01				Prepared: Aug-17-13, Analyzed: Aug-19-13			
Cyanide, total	< 0.010	0.010 mg/L		< 0.010				15		
Haloacetic Acids, Batch B3H0811										
Blank (B3H0811-BLK1)			Prepared: Aug-23-13, Analyzed: Aug-23-13							
Monochloroacetic Acid	< 0.002	0.002 mg/L								
Monobromoacetic Acid	< 0.002	0.002 mg/L								

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
Haloacetic Acids, Batch B3H0811, Continued									
Blank (B3H0811-BLK1), Continued			Prepared: Aug-23-13, Analyzed: Aug-23-13						
Dichloroacetic Acid	< 0.002	0.002 mg/L							
Trichloroacetic Acid	< 0.002	0.002 mg/L							
Dibromoacetic Acid	< 0.002	0.002 mg/L							
Surrogate: 2-Bromopropionic Acid	0.0138	mg/L	0.0116		119	101-166			
LCS (B3H0811-BS1)			Prepared: Aug-23-13, Analyzed: Aug-23-13						
Monochloroacetic Acid	0.037	0.002 mg/L	0.0558		66	48-74			
Monobromoacetic Acid	0.027	0.002 mg/L	0.0372		72	66-99			
Dichloroacetic Acid	0.064	0.002 mg/L	0.0558		115	110-158			
Trichloroacetic Acid	0.021	0.002 mg/L	0.0186		114	100-152			
Dibromoacetic Acid	0.030	0.002 mg/L	0.0186		161	108-164			
Surrogate: 2-Bromopropionic Acid	0.0117	mg/L	0.0116		101	101-166			
Duplicate (B3H0811-DUP1)			Source: 3080562-02		Prepared: Aug-23-13, Analyzed: Aug-23-13				
Monochloroacetic Acid	< 0.002	0.002 mg/L		< 0.002					23
Monobromoacetic Acid	< 0.002	0.002 mg/L		< 0.002					13
Dichloroacetic Acid	0.007	0.002 mg/L		0.006					19
Trichloroacetic Acid	0.005	0.002 mg/L		0.005					19
Dibromoacetic Acid	< 0.002	0.002 mg/L		< 0.002					20
Surrogate: 2-Bromopropionic Acid	0.0176	mg/L	0.0116		151	101-166			
Microbiological Parameters, Batch B3H0277									
Blank (B3H0277-BLK1)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK2)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK3)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK4)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK5)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK6)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK7)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK8)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0277-BLK9)			Prepared: Aug-09-13, Analyzed: Aug-10-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result	MRL	Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
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Microbiological Parameters, Batch B3H0282

Blank (B3H0282-BLK1)

Prepared: Aug-09-13, Analyzed: Aug-10-13

Coliforms, Fecal < 1 1 CFU/100mL

Blank (B3H0282-BLK2)

Prepared: Aug-09-13, Analyzed: Aug-10-13

Coliforms, Fecal < 1 1 CFU/100mL

Microbiological Parameters, Batch B3H0283

Blank (B3H0283-BLK1)

Prepared: Aug-09-13, Analyzed: Aug-12-13

Heterotrophic Plate Count < 1 1 CFU/mL

Blank (B3H0283-BLK2)

Prepared: Aug-09-13, Analyzed: Aug-12-13

Heterotrophic Plate Count 1 1 CFU/mL MIC27

Blank (B3H0283-BLK3)

Prepared: Aug-09-13, Analyzed: Aug-12-13

Heterotrophic Plate Count < 1 1 CFU/mL

Duplicate (B3H0283-DUP8)

Source: 3080562-01

Prepared: Aug-09-13, Analyzed: Aug-12-13

Heterotrophic Plate Count 4 1 CFU/mL 1 63

Duplicate (B3H0283-DUP9)

Source: 3080562-03

Prepared: Aug-09-13, Analyzed: Aug-12-13

Heterotrophic Plate Count < 1 1 CFU/mL 1 63

Total Recoverable Metals, Batch B3H0380

Blank (B3H0380-BLK1)

Prepared: Aug-12-13, Analyzed: Aug-14-13

Aluminum, total	< 0.005	0.005	mg/L
Antimony, total	< 0.0001	0.0001	mg/L
Arsenic, total	< 0.0005	0.0005	mg/L
Barium, total	< 0.005	0.005	mg/L
Beryllium, total	< 0.0001	0.0001	mg/L
Bismuth, total	< 0.0001	0.0001	mg/L
Boron, total	< 0.004	0.004	mg/L
Cadmium, total	< 0.00001	0.00001	mg/L
Calcium, total	< 0.2	0.2	mg/L
Chromium, total	< 0.0005	0.0005	mg/L
Cobalt, total	< 0.00005	0.00005	mg/L
Copper, total	< 0.0002	0.0002	mg/L
Iron, total	< 0.01	0.01	mg/L
Lead, total	< 0.0001	0.0001	mg/L
Lithium, total	< 0.0001	0.0001	mg/L
Magnesium, total	< 0.01	0.01	mg/L
Manganese, total	< 0.0002	0.0002	mg/L
Mercury, total	< 0.00002	0.00002	mg/L
Molybdenum, total	< 0.0001	0.0001	mg/L
Nickel, total	< 0.0002	0.0002	mg/L
Phosphorus, total	< 0.020	0.020	mg/L
Potassium, total	< 0.02	0.02	mg/L
Selenium, total	< 0.0005	0.0005	mg/L
Silicon, total	< 0.5	0.5	mg/L
Silver, total	< 0.00005	0.00005	mg/L
Sodium, total	< 0.02	0.02	mg/L
Strontium, total	< 0.001	0.001	mg/L
Sulfur, total	< 1	1	mg/L
Tellurium, total	< 0.0002	0.0002	mg/L
Thallium, total	< 0.00002	0.00002	mg/L
Thorium, total	< 0.0001	0.0001	mg/L
Tin, total	< 0.0002	0.0002	mg/L

REPORTED TO PROJECT Western Water Associates Ltd
Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER REPORTED 3080562
Aug-28-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
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Total Recoverable Metals, Batch B3H0380, Continued

Blank (B3H0380-BLK1), Continued

Prepared: Aug-12-13, Analyzed: Aug-14-13

Titanium, total	< 0.005	0.005 mg/L							
Uranium, total	< 0.00002	0.00002 mg/L							
Vanadium, total	< 0.001	0.001 mg/L							
Zinc, total	< 0.004	0.004 mg/L							
Zirconium, total	< 0.0001	0.0001 mg/L							

Reference (B3H0380-SRM1)

Prepared: Aug-12-13, Analyzed: Aug-14-13

Aluminum, total	0.283	0.005 mg/L	0.296		96	81-129			
Antimony, total	0.0531	0.0001 mg/L	0.0505		105	88-114			
Arsenic, total	0.119	0.0005 mg/L	0.122		97	88-114			
Barium, total	0.729	0.005 mg/L	0.777		94	72-104			
Beryllium, total	0.0454	0.0001 mg/L	0.0488		93	76-131			
Boron, total	3.38	0.004 mg/L	3.40		100	75-121			
Cadmium, total	0.0480	0.00001 mg/L	0.0490		98	89-111			
Calcium, total	9.8	0.2 mg/L	10.2		96	86-121			
Chromium, total	0.248	0.0005 mg/L	0.242		103	89-114			
Cobalt, total	0.0397	0.00005 mg/L	0.0366		108	91-113			
Copper, total	0.495	0.0002 mg/L	0.487		102	91-115			
Iron, total	0.50	0.01 mg/L	0.469		107	77-124			
Lead, total	0.196	0.0001 mg/L	0.193		102	92-113			
Lithium, total	0.365	0.0001 mg/L	0.390		94	85-115			
Magnesium, total	3.46	0.01 mg/L	3.31		104	78-120			
Manganese, total	0.111	0.0002 mg/L	0.109		102	90-114			
Mercury, total	0.00482	0.00002 mg/L	0.00456		106	50-150			
Molybdenum, total	0.200	0.0001 mg/L	0.197		101	90-111			
Nickel, total	0.243	0.0002 mg/L	0.242		101	90-111			
Phosphorus, total	0.204	0.020 mg/L	0.233		87	85-115			
Potassium, total	6.22	0.02 mg/L	5.93		105	84-113			
Selenium, total	0.114	0.0005 mg/L	0.115		99	85-115			
Sodium, total	7.54	0.02 mg/L	7.64		99	82-123			
Strontium, total	0.378	0.001 mg/L	0.363		104	88-112			
Thallium, total	0.0801	0.00002 mg/L	0.0794		101	91-114			
Uranium, total	0.0199	0.00002 mg/L	0.0192		104	85-120			
Vanadium, total	0.377	0.001 mg/L	0.376		100	86-111			
Zinc, total	2.36	0.004 mg/L	2.42		98	85-111			

Volatile Organic Compounds (VOC), Batch B3H0803

Blank (B3H0803-BLK1)

Prepared: Aug-25-13, Analyzed: Aug-25-13

Bromodichloromethane	< 0.001	0.001 mg/L							
Bromoform	< 0.001	0.001 mg/L							
Chloroform	< 0.001	0.001 mg/L							
Dibromochloromethane	< 0.001	0.001 mg/L							
Surrogate: Toluene-d8	0.0304	mg/L	0.0250		122	80-120			S02
Surrogate: 4-Bromofluorobenzene	0.0252	mg/L	0.0250		101	80-120			

LCS (B3H0803-BS1)

Prepared: Aug-25-13, Analyzed: Aug-25-13

Bromodichloromethane	0.022	0.001 mg/L	0.0200		112	80-120			
Bromoform	0.020	0.001 mg/L	0.0200		98	80-120			
Chloroform	0.023	0.001 mg/L	0.0200		117	80-120			
Dibromochloromethane	0.023	0.001 mg/L	0.0200		116	80-120			
Surrogate: Toluene-d8	0.0269	mg/L	0.0250		108	80-120			
Surrogate: 4-Bromofluorobenzene	0.0241	mg/L	0.0250		96	80-120			

REPORTED TO Western Water Associates Ltd
PROJECT Approval of New Sources-IHA (Bryer Manwell)

WORK ORDER 3080562
REPORTED Aug-28-13

QC Qualifiers:

MIC27 Method blank exceeds the RDL but results are considered valid based upon additional method QC.
S02 Surrogate recovery outside of control limits. Data accepted based on acceptable recovery of other surrogates.

REPORTED TO Western Water Associates Ltd
106 - 5145 26th Street
Vernon, BC V1T 8G4

TEL (250) 541-1030
FAX (250) 575-4764

ATTENTION Bryer Manwell

WORK ORDER 3080691

PO NUMBER

RECEIVED / TEMP Aug-13-13 13:50 / 3.0 °C

PROJECT Comprehensive - Bryer Manwell

REPORTED Aug-19-13

PROJECT INFO

COC NUMBER B14571

General Comments:

CARO Analytical Services employs methods which are conducted according to procedures accepted by appropriate regulatory agencies, and/or are conducted in accordance with recognized professional standards using accepted testing methodologies and quality control efforts, except where otherwise agreed to by the client.

The results in this report apply to the samples analyzed in accordance with the Chain of Custody or Sample Requisition 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.

Issued By:

DRAFT REPORT
DATA SUBJECT TO CHANGE

Please contact CARO if more information is needed or to provide feedback on our services.

Locations:

#110 4011 Viking Way
Richmond, BC V6V 2K9
Tel: 604-279-1499 Fax: 604-279-1599

#102 3677 Highway 97N
Kelowna, BC V1X 5C3
Tel: 250-765-9646 Fax: 250-765-3893

17225 109 Avenue
Edmonton, AB T5S 1H7
Tel: 780-489-9100 Fax: 780-489-9700

www.caro.ca

REPORTED TO PROJECT Western Water Associates Ltd
Comprehensive - Bryer Manwell

WORK ORDER REPORTED 3080691
Aug-19-13

Analysis Description	Method Reference (* = modified from)		Location
	Preparation	Analysis	
Alkalinity, total	N/A	APHA 2320 B	Kelowna
Chloride in Water by IC	N/A	APHA 4110 B	Kelowna
Colour, True at 410 nm	N/A	APHA 2120 C *	Kelowna
Conductivity in Water	N/A	APHA 2510 B	Kelowna
Cyanide, Total in Liquids	APHA 4500-CN C	APHA 4500-CN E	Kelowna
Dissolved Metals	APHA 3030 B	APHA 3125 B	Richmond
E. coli (by CCA)	N/A	APHA 9222 *	Kelowna
Fluoride in Water by IC	N/A	APHA 4110 B	Kelowna
Hardness as CaCO ₃ (CALC)	N/A	APHA 2340 B	Richmond
Nitrate-N in Water by IC	N/A	APHA 4110 B	Kelowna
Nitrite-N in Water by IC	N/A	APHA 4110 B	Kelowna
pH in Water	N/A	APHA 4500-H+ B	Kelowna
Potability, IH Comprehensive Pkg	N/A	APHA 1030 E	Kelowna
Sulfate in Water by IC	N/A	APHA 4110 B	Kelowna
Total Coliforms (by CCA)	N/A	APHA 9222 *	Kelowna
Total Recoverable Metals	APHA 3030E *	APHA 3125 B	Richmond
Transmissivity at 254nm	N/A	APHA 5910 B	Kelowna
Turbidity	N/A	APHA 2130 B	Kelowna

Note: The numbers in brackets represent the year that the method was published/approved

Method Reference Descriptions:

APHA Standard Methods for the Examination of Water and Wastewater, American Public Health Association

Glossary of Terms:

MRL Method Reporting Limit
 < Less than the Reported Detection Limit (RDL) - the RDL may be higher than the MRL due to various factors such as dilutions, limited sample volume, high moisture, or interferences
 AO Aesthetic objective
 MAC Maximum acceptable concentration (health-related guideline)
 % Percent W/W
 CFU/100mL Colony Forming Units per 100 mL
 Color Unit Colour referenced against a platinum cobalt standard
 mg/L Milligrams per litre
 NTU Nephelometric Turbidity Units
 pH units pH < 7 = acidic, pH > 7 = basic
 uS/cm Microsiemens per centimeter

REPORTED TO PROJECT Western Water Associates Ltd
Comprehensive - Bryer Manwell

WORK ORDER REPORTED 3080691
Aug-19-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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DRAFT: Anions

Sample ID: TW13-03 (3080691-01) [Water] Sampled: Aug-12-13 08:15

Alkalinity, Total as CaCO ₃	62			1 mg/L	N/A	Aug-13-13	
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Sample ID: TW13-04 (3080691-02) [Water] Sampled: Aug-12-13 06:50

Alkalinity, Total as CaCO ₃	88			1 mg/L	N/A	Aug-13-13	
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DRAFT: General Parameters

Sample ID: TW13-03 (3080691-01) [Water] Sampled: Aug-12-13 08:15

Colour, True	< 5	AO ≤ 15		5 Color Unit	N/A	Aug-14-13	
Conductivity (EC)	123			2 uS/cm	N/A	Aug-13-13	
pH	7.64	AO = 6.5 - 8.5	0.01	pH units	N/A	Aug-13-13	
Turbidity	< 0.1	See Guidelines	0.1	NTU	N/A	Aug-14-13	
UV Transmittance @ 254nm	97.2		0.1	%	N/A	Aug-16-13	

Sample ID: TW13-04 (3080691-02) [Water] Sampled: Aug-12-13 06:50

Colour, True	< 5	AO ≤ 15		5 Color Unit	N/A	Aug-14-13	
Conductivity (EC)	169			2 uS/cm	N/A	Aug-13-13	
pH	8.05	AO = 6.5 - 8.5	0.01	pH units	N/A	Aug-13-13	
Turbidity	0.2	See Guidelines	0.1	NTU	N/A	Aug-14-13	
UV Transmittance @ 254nm	99.7		0.1	%	N/A	Aug-16-13	

DRAFT: Calculated Parameters

Sample ID: TW13-03 (3080691-01) [Water] Sampled: Aug-12-13 08:15

Hardness, Total (Diss. as CaCO ₃)	54.9		0.50	mg/L	N/A	N/A	
Solids, Total Dissolved	38		0.6	mg/L	N/A	N/A	

Sample ID: TW13-04 (3080691-02) [Water] Sampled: Aug-12-13 06:50

Hardness, Total (Diss. as CaCO ₃)	75.3		0.50	mg/L	N/A	N/A	
Solids, Total Dissolved	54		0.6	mg/L	N/A	N/A	

DRAFT: Dissolved Metals

Sample ID: TW13-03 (3080691-01) [Water] Sampled: Aug-12-13 08:15

Aluminum, dissolved	< 0.005		0.005	mg/L	N/A	Aug-16-13	
Antimony, dissolved	0.0004		0.0001	mg/L	N/A	Aug-16-13	
Arsenic, dissolved	0.0006		0.0005	mg/L	N/A	Aug-16-13	
Barium, dissolved	0.008		0.005	mg/L	N/A	Aug-16-13	
Beryllium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-16-13	
Bismuth, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-16-13	
Boron, dissolved	< 0.004		0.004	mg/L	N/A	Aug-16-13	
Cadmium, dissolved	< 0.00001		0.00001	mg/L	N/A	Aug-16-13	
Calcium, dissolved	17.2		0.2	mg/L	N/A	Aug-16-13	
Chromium, dissolved	0.0007		0.0005	mg/L	N/A	Aug-16-13	
Cobalt, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-16-13	
Copper, dissolved	0.0003		0.0002	mg/L	N/A	Aug-16-13	

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WORK ORDER REPORTED 3080691
Aug-19-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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DRAFT: Dissolved Metals, Continued

Sample ID: TW13-03 (3080691-01) [Water] Sampled: Aug-12-13 08:15, Continued

Iron, dissolved	< 0.010		0.010	mg/L	N/A	Aug-16-13	
Lead, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-16-13	
Lithium, dissolved	0.0003		0.0001	mg/L	N/A	Aug-16-13	
Magnesium, dissolved	2.92		0.01	mg/L	N/A	Aug-16-13	
Manganese, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-16-13	
Mercury, dissolved	0.00003		0.00002	mg/L	N/A	Aug-16-13	
Molybdenum, dissolved	0.0011		0.0001	mg/L	N/A	Aug-16-13	
Nickel, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-16-13	
Phosphorus, dissolved	< 0.02		0.02	mg/L	N/A	Aug-16-13	
Potassium, dissolved	0.66		0.02	mg/L	N/A	Aug-16-13	
Selenium, dissolved	< 0.0005		0.0005	mg/L	N/A	Aug-16-13	
Silicon, dissolved	6.6		0.5	mg/L	N/A	Aug-16-13	
Silver, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-16-13	
Sodium, dissolved	3.17		0.02	mg/L	N/A	Aug-16-13	
Strontium, dissolved	0.091		0.001	mg/L	N/A	Aug-16-13	
Sulfur, dissolved	< 1		1	mg/L	N/A	Aug-16-13	
Tellurium, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-16-13	
Thallium, dissolved	< 0.00002		0.00002	mg/L	N/A	Aug-16-13	
Thorium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-16-13	
Tin, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-16-13	
Titanium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-16-13	
Uranium, dissolved	0.00015		0.00002	mg/L	N/A	Aug-16-13	
Vanadium, dissolved	< 0.001		0.001	mg/L	N/A	Aug-16-13	
Zinc, dissolved	< 0.004		0.004	mg/L	N/A	Aug-16-13	
Zirconium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-16-13	

Sample ID: TW13-04 (3080691-02) [Water] Sampled: Aug-12-13 06:50

Aluminum, dissolved	0.005		0.005	mg/L	N/A	Aug-16-13	
Antimony, dissolved	0.0004		0.0001	mg/L	N/A	Aug-16-13	
Arsenic, dissolved	< 0.0005		0.0005	mg/L	N/A	Aug-16-13	
Barium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-16-13	
Beryllium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-16-13	
Bismuth, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-16-13	
Boron, dissolved	< 0.004		0.004	mg/L	N/A	Aug-16-13	
Cadmium, dissolved	< 0.00001		0.00001	mg/L	N/A	Aug-16-13	
Calcium, dissolved	19.6		0.2	mg/L	N/A	Aug-16-13	
Chromium, dissolved	0.0014		0.0005	mg/L	N/A	Aug-16-13	
Cobalt, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-16-13	
Copper, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-16-13	
Iron, dissolved	< 0.010		0.010	mg/L	N/A	Aug-16-13	
Lead, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-16-13	
Lithium, dissolved	0.0010		0.0001	mg/L	N/A	Aug-16-13	
Magnesium, dissolved	6.36		0.01	mg/L	N/A	Aug-16-13	
Manganese, dissolved	0.0004		0.0002	mg/L	N/A	Aug-16-13	
Mercury, dissolved	0.00003		0.00002	mg/L	N/A	Aug-16-13	
Molybdenum, dissolved	0.0010		0.0001	mg/L	N/A	Aug-16-13	

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WORK ORDER REPORTED 3080691
Aug-19-13

Analyte	Result / Recovery	Canadian DW Guideline	MRL / Limit	Units	Prepared	Analyzed	Notes
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DRAFT: Dissolved Metals, Continued

Sample ID: TW13-04 (3080691-02) [Water] Sampled: Aug-12-13 06:50, Continued

Nickel, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-16-13	
Phosphorus, dissolved	< 0.02		0.02	mg/L	N/A	Aug-16-13	
Potassium, dissolved	0.64		0.02	mg/L	N/A	Aug-16-13	
Selenium, dissolved	< 0.0005		0.0005	mg/L	N/A	Aug-16-13	
Silicon, dissolved	8.8		0.5	mg/L	N/A	Aug-16-13	
Silver, dissolved	< 0.00005		0.00005	mg/L	N/A	Aug-16-13	
Sodium, dissolved	6.17		0.02	mg/L	N/A	Aug-16-13	
Strontium, dissolved	0.231		0.001	mg/L	N/A	Aug-16-13	
Sulfur, dissolved	< 1		1	mg/L	N/A	Aug-16-13	
Tellurium, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-16-13	
Thallium, dissolved	< 0.00002		0.00002	mg/L	N/A	Aug-16-13	
Thorium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-16-13	
Tin, dissolved	< 0.0002		0.0002	mg/L	N/A	Aug-16-13	
Titanium, dissolved	< 0.005		0.005	mg/L	N/A	Aug-16-13	
Uranium, dissolved	0.00074		0.00002	mg/L	N/A	Aug-16-13	
Vanadium, dissolved	0.002		0.001	mg/L	N/A	Aug-16-13	
Zinc, dissolved	< 0.004		0.004	mg/L	N/A	Aug-16-13	
Zirconium, dissolved	< 0.0001		0.0001	mg/L	N/A	Aug-16-13	

DRAFT: Microbiological Parameters

Sample ID: TW13-03 (3080691-01) [Water] Sampled: Aug-12-13 08:15

Coliforms, Total	< 1	MAC < 1	1	CFU/100mL	Aug-13-13	Aug-14-13	HT
E. coli	< 1	MAC < 1	1	CFU/100mL	Aug-13-13	Aug-14-13	HT

Sample ID: TW13-04 (3080691-02) [Water] Sampled: Aug-12-13 06:50

Coliforms, Total	< 1	MAC < 1	1	CFU/100mL	Aug-13-13	Aug-14-13	HT
Background Colonies	> 200		200	CFU/100mL	Aug-13-13	Aug-14-13	HT
E. coli	< 1	MAC < 1	1	CFU/100mL	Aug-13-13	Aug-14-13	HT

Sample / Analysis Qualifiers:

HT The sample was prepared / analyzed past the recommended holding time.

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WORK ORDER REPORTED 3080691
Aug-19-13

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):** Laboratory reagent water is carried through sample preparation and analysis steps. Method Blanks indicate that results are free from contamination, i.e. not biased high from sources such as the sample container or the laboratory environment
- **Duplicate (Dup):** Preparation and analysis of a replicate aliquot of a sample. Duplicates provide a measure of the analytical method's precision, i.e. how reproducible a result is. Duplicates are only reported if they are associated with your sample data.
- **Blank Spike (BS):** A known amount of standard is carried through sample preparation and analysis steps. Blank Spikes, also known as laboratory control samples (LCS), are prepared from a different source of standard than used for the calibration. They ensure that the calibration is acceptable (i.e. not biased high or low) and also provide a measure of the analytical method's accuracy (i.e. closeness of the result to a target value).
- **Standard Reference Material (SRM):** A material of similar matrix to the samples, externally certified for the parameter(s) listed. Standard Reference Materials ensure that the preparation steps in the method are 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 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	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
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DRAFT: Anions, Batch B3H0441

Blank (B3H0441-BLK1)		Prepared: Aug-13-13, Analyzed: Aug-13-13							
Alkalinity, Total as CaCO3	< 1	1 mg/L							
LCS (B3H0441-BS1)		Prepared: Aug-13-13, Analyzed: Aug-13-13							
Alkalinity, Total as CaCO3	101	1 mg/L	100		101	96-108			

DRAFT: Dissolved Metals, Batch B3H0536

Blank (B3H0536-BLK1)		Prepared: Aug-15-13, Analyzed: Aug-15-13							
Aluminum, dissolved	< 0.005	0.005 mg/L							
Antimony, dissolved	< 0.0001	0.0001 mg/L							
Arsenic, dissolved	< 0.0005	0.0005 mg/L							
Barium, dissolved	< 0.005	0.005 mg/L							
Beryllium, dissolved	< 0.0001	0.0001 mg/L							
Bismuth, dissolved	< 0.0001	0.0001 mg/L							
Boron, dissolved	< 0.004	0.004 mg/L							
Cadmium, dissolved	< 0.00001	0.00001 mg/L							
Calcium, dissolved	< 0.2	0.2 mg/L							
Chromium, dissolved	< 0.0005	0.0005 mg/L							
Cobalt, dissolved	< 0.00005	0.00005 mg/L							
Copper, dissolved	< 0.0002	0.0002 mg/L							
Iron, dissolved	< 0.010	0.010 mg/L							
Lead, dissolved	< 0.0001	0.0001 mg/L							
Lithium, dissolved	< 0.0001	0.0001 mg/L							
Magnesium, dissolved	< 0.01	0.01 mg/L							
Manganese, dissolved	< 0.0002	0.0002 mg/L							
Mercury, dissolved	< 0.00002	0.00002 mg/L							
Molybdenum, dissolved	< 0.0001	0.0001 mg/L							
Nickel, dissolved	< 0.0002	0.0002 mg/L							
Phosphorus, dissolved	< 0.02	0.02 mg/L							
Potassium, dissolved	< 0.02	0.02 mg/L							
Selenium, dissolved	< 0.0005	0.0005 mg/L							
Silicon, dissolved	< 0.5	0.5 mg/L							
Silver, dissolved	< 0.00005	0.00005 mg/L							
Sodium, dissolved	< 0.02	0.02 mg/L							

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WORK ORDER REPORTED 3080691
Aug-19-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
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DRAFT: Dissolved Metals, Batch B3H0536, Continued

Blank (B3H0536-BLK1), Continued

Prepared: Aug-15-13, Analyzed: Aug-15-13

Strontium, dissolved	< 0.001	0.001 mg/L							
Sulfur, dissolved	< 1	1 mg/L							
Tellurium, dissolved	< 0.0002	0.0002 mg/L							
Thallium, dissolved	< 0.00002	0.00002 mg/L							
Thorium, dissolved	< 0.0001	0.0001 mg/L							
Tin, dissolved	< 0.0002	0.0002 mg/L							
Titanium, dissolved	< 0.005	0.005 mg/L							
Uranium, dissolved	< 0.00002	0.00002 mg/L							
Vanadium, dissolved	< 0.001	0.001 mg/L							
Zinc, dissolved	< 0.004	0.004 mg/L							
Zirconium, dissolved	< 0.0001	0.0001 mg/L							

Reference (B3H0536-SRM1)

Prepared: Aug-15-13, Analyzed: Aug-15-13

Aluminum, dissolved	0.212	0.005 mg/L	0.233		91	58-142			
Antimony, dissolved	0.0520	0.0001 mg/L	0.0430		121	75-125			
Arsenic, dissolved	0.412	0.0005 mg/L	0.438		94	81-119			
Barium, dissolved	3.20	0.005 mg/L	3.35		95	83-117			
Beryllium, dissolved	0.199	0.0001 mg/L	0.213		93	80-120			
Boron, dissolved	1.70	0.004 mg/L	1.74		98	74-117			
Cadmium, dissolved	0.216	0.00001 mg/L	0.224		97	83-117			
Calcium, dissolved	7.7	0.2 mg/L	7.69		100	76-124			
Chromium, dissolved	0.443	0.0005 mg/L	0.437		101	81-119			
Cobalt, dissolved	0.134	0.00005 mg/L	0.128		104	76-124			
Copper, dissolved	0.853	0.0002 mg/L	0.844		101	84-116			
Iron, dissolved	1.25	0.010 mg/L	1.29		97	74-126			
Lead, dissolved	0.118	0.0001 mg/L	0.112		105	72-128			
Lithium, dissolved	0.105	0.0001 mg/L	0.104		101	60-140			
Magnesium, dissolved	6.88	0.01 mg/L	6.92		99	81-119			
Manganese, dissolved	0.348	0.0002 mg/L	0.345		101	84-116			
Molybdenum, dissolved	0.432	0.0001 mg/L	0.426		101	83-117			
Nickel, dissolved	0.830	0.0002 mg/L	0.840		99	74-126			
Phosphorus, dissolved	0.42	0.02 mg/L	0.495		84	68-132			
Potassium, dissolved	3.08	0.02 mg/L	3.19		96	74-126			
Selenium, dissolved	0.0309	0.0005 mg/L	0.0331		93	70-130			
Sodium, dissolved	18.2	0.02 mg/L	19.1		95	72-128			
Strontium, dissolved	0.899	0.001 mg/L	0.916		98	84-113			
Thallium, dissolved	0.0421	0.00002 mg/L	0.0393		107	57-143			
Uranium, dissolved	0.266	0.00002 mg/L	0.266		100	85-115			
Vanadium, dissolved	0.832	0.001 mg/L	0.869		96	87-113			
Zinc, dissolved	0.863	0.004 mg/L	0.881		98	72-128			

DRAFT: General Parameters, Batch B3H0441

Blank (B3H0441-BLK1)

Prepared: Aug-13-13, Analyzed: Aug-13-13

Conductivity (EC)	< 2	2 uS/cm							
pH	< 0.01	0.01 pH units							

LCS (B3H0441-BS2)

Prepared: Aug-13-13, Analyzed: Aug-13-13

Conductivity (EC)	1410	2 uS/cm	1410		100	93-104			
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Reference (B3H0441-SRM1)

Prepared: Aug-13-13, Analyzed: Aug-13-13

pH	7.00	0.01 pH units	7.00		100	98-102			
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DRAFT: General Parameters, Batch B3H0465

Blank (B3H0465-BLK1)

Prepared: Aug-14-13, Analyzed: Aug-14-13

Turbidity	< 0.1	0.1 NTU							
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WORK ORDER REPORTED 3080691
Aug-19-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
DRAFT: General Parameters, Batch B3H0465, Continued									
Blank (B3H0465-BLK1), Continued			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Blank (B3H0465-BLK2)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Turbidity	< 0.1	0.1 NTU							
Blank (B3H0465-BLK3)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Turbidity	< 0.1	0.1 NTU							
LCS (B3H0465-BS1)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Turbidity	40.2	0.1 NTU	40.0		100	85-115			
LCS (B3H0465-BS2)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Turbidity	40.6	0.1 NTU	40.0		102	85-115			
LCS (B3H0465-BS3)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Turbidity	40.5	0.1 NTU	40.0		101	85-115			
DRAFT: General Parameters, Batch B3H0485									
Blank (B3H0485-BLK1)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Colour, True	< 5	5 Color Unit							
Blank (B3H0485-BLK2)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Colour, True	< 5	5 Color Unit							
LCS (B3H0485-BS1)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Colour, True	10	5 Color Unit	10.0		101	81-118			
LCS (B3H0485-BS2)			Prepared: Aug-14-13, Analyzed: Aug-14-13						
Colour, True	10	5 Color Unit	10.0		103	81-118			
DRAFT: General Parameters, Batch B3H0599									
Blank (B3H0599-BLK1)			Prepared: Aug-16-13, Analyzed: Aug-16-13						
UV Transmittance @ 254nm	< 0.1	0.1 %							
Blank (B3H0599-BLK2)			Prepared: Aug-16-13, Analyzed: Aug-16-13						
UV Transmittance @ 254nm	< 0.1	0.1 %							
Blank (B3H0599-BLK3)			Prepared: Aug-16-13, Analyzed: Aug-16-13						
UV Transmittance @ 254nm	< 0.1	0.1 %							
Reference (B3H0599-SRM1)			Prepared: Aug-16-13, Analyzed: Aug-16-13						
UV Transmittance @ 254nm	86.4	0.1 %	79.8		108	90-110			
Reference (B3H0599-SRM2)			Prepared: Aug-16-13, Analyzed: Aug-16-13						
UV Transmittance @ 254nm	86.5	0.1 %	79.8		108	90-110			
Reference (B3H0599-SRM3)			Prepared: Aug-16-13, Analyzed: Aug-16-13						
UV Transmittance @ 254nm	86.4	0.1 %	79.8		108	90-110			
DRAFT: Microbiological Parameters, Batch B3H0403									
Blank (B3H0403-BLK1)			Prepared: Aug-13-13, Analyzed: Aug-14-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0403-BLK2)			Prepared: Aug-13-13, Analyzed: Aug-14-13						
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							

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WORK ORDER REPORTED 3080691
Aug-19-13

Analyte	Result	MRL Units	Spike Level	Source Result	% REC	REC Limit	RPD	RPD Limit	Notes
DRAFT: Microbiological Parameters, Batch B3H0403, Continued									
Blank (B3H0403-BLK3)					Prepared: Aug-13-13, Analyzed: Aug-14-13				
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0403-BLK4)					Prepared: Aug-13-13, Analyzed: Aug-14-13				
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0403-BLK5)					Prepared: Aug-13-13, Analyzed: Aug-14-13				
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0403-BLK6)					Prepared: Aug-13-13, Analyzed: Aug-14-13				
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0403-BLK7)					Prepared: Aug-13-13, Analyzed: Aug-14-13				
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0403-BLK8)					Prepared: Aug-13-13, Analyzed: Aug-14-13				
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0403-BLK9)					Prepared: Aug-13-13, Analyzed: Aug-14-13				
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							
Blank (B3H0403-BLKA)					Prepared: Aug-13-13, Analyzed: Aug-14-13				
Coliforms, Total	< 1	1 CFU/100mL							
E. coli	< 1	1 CFU/100mL							

Appendix E

GWUDI Checklists for
TWI3-01 and TWI3-02



**Screening Tool Checklist for
GROUND WATER AT RISK OF CONTAINING PATHOGENS**

New Gold Inc. - Blackwater Construction Camp TW13-01 (WPN 28413)

From: MoE. 2013. Guidance Document for Determining Ground Water at Risk of Containing Pathogens including Ground Water Under Direct Influence of Surface Water, Version 2 (DRAFT July 2013).

WATER SYSTEM NAME: _NewGold Blackwater Construction Camp – planned to be commissioned in July 2015.

BCMOE Well Identification Plate Number (number of plate on well): TW13-01, WPN 28413,
New Water Source for the Blackwater Construction Camp

FACTORS and CRITERIA	YES: At Risk	NO: Low Risk	Unable to determine risk status	Comments
WATER QUALITY RESULTS				
Water system or well sampling shows presence of total or fecal coliform or <i>E.coli</i> .		√		
Water system has a reported or a history of turbidity problems associated with the source water.		√		
Water system has a history of known or suspected disease outbreaks that could be associated with surface water or other source(s) or pathogens.		√		
SOURCE TYPE and LOCATION				
Well situated inside setback distances of the Public Health Act Transitional Regulation, from a possible source of contamination.		√		
Well with intake depth < 15 m below ground and located in floodplain or with intake depth < 15 m below ground and < 100 m outside from high water mark or natural boundary of surface water feature.		√		
Well located < 100 m outside from high water mark of surface water feature and with intake depth that is <15 m below the elevation of the high water mark.		√		
WELL CONSTRUCTION				
Well fails to meet section 7 of Ground Water Protection Regulation (GWPR) for surface sealing.		√		
Well fails to meet section 10 of GWPR for well caps and covers.		√		
Well fails to meet section 11 of GWPR for floodproofing.		√		
Well fails to meet section 12 of GWPR for wellhead protection.		√		
AQUIFER TYPE and SETTING				
Well with intake depth < 15 m below ground and situated in; a highly vulnerable, unconfined, unconsolidated aquifer or in any bedrock aquifer.		√		
Well completed in a karst bedrock aquifer.		√		

**Screening Tool Checklist for
GROUND WATER AT RISK OF CONTAINING PATHOGENS**

Well Log Examined: **Yes** / No

Site Survey Conducted: **Yes** / No

Risk Assessment:

Did any factor suggest that the system is "At Risk" (as opposed to "Low Risk")?

Yes/No/Unable to Determine

- If "**Yes**" and the water supplier does not wish to undertake remediation (see below for remediation options), move to Stage 2 Preliminary Hydrogeological Investigation.
- If "**No**", move to Stage 4 Long-term Water Quality Monitoring.
- If "**Unable to determine risk status**" because information is unavailable for any factor(s) or criteria of the assessment, then move to Stage 2 Preliminary Hydrogeological Investigation.

Remediation Options:

U Treatment to meet Health Authority drinking water requirements

U Provide alternate source of water

U Well Alteration / correct significant deficiencies in well construction

U Relocate the well

U Eliminate source(s) of contamination

U Stage 2 Preliminary Hydrogeological Investigation

U Stage 4 Long-term Water Quality Monitoring (see Water Quality Monitoring Section of main report)

U Other

Completed by: Bryer Manwell, M.Sc. P.Eng.

DATE: September 3, 2013

¹ Deficiencies in well construction related to the Ground Water Protection Regulation must be addressed.

**Screening Tool Checklist for
GROUND WATER AT RISK OF CONTAINING PATHOGENS**

New Gold Inc. - Blackwater Construction Camp TW13-02 (WPN 28414)

From: MoE. 2013. Guidance Document for Determining Ground Water at Risk of Containing Pathogens including Ground Water Under Direct Influence of Surface Water, Version 2 (DRAFT July 2013).

WATER SYSTEM NAME: _NewGold Blackwater Construction Camp – planned to be commissioned in July 2015.

BCMOE Well Identification Plate Number (number of plate on well): TW13-01, WPN 28413, New Water Source for the Blackwater Construction Camp

FACTORS and CRITERIA	YES: At Risk	NO: Low Risk	Unable to determine risk status	Comments
WATER QUALITY RESULTS				
Water system or well sampling shows presence of total or fecal coliform or <i>E.coli</i> .		√		
Water system has a reported or a history of turbidity problems associated with the source water.		√		
Water system has a history of known or suspected disease outbreaks that could be associated with surface water or other source(s) or pathogens.		√		
SOURCE TYPE and LOCATION				
Well situated inside setback distances of the Public Health Act Transitional Regulation, from a possible source of contamination.		√		
Well with intake depth < 15 m below ground and located in floodplain or with intake depth < 15 m below ground and < 100 m outside from high water mark or natural boundary of surface water feature.		√		
Well located < 100 m outside from high water mark of surface water feature and with intake depth that is <15 m below the elevation of the high water mark.		√		
WELL CONSTRUCTION				
Well fails to meet section 7 of Ground Water Protection Regulation (GWPR) for surface sealing.		√		
Well fails to meet section 10 of GWPR for well caps and covers.		√		
Well fails to meet section 11 of GWPR for floodproofing.		√		
Well fails to meet section 12 of GWPR for wellhead protection.		√		
AQUIFER TYPE and SETTING				
Well with intake depth < 15 m below ground and situated in; a highly vulnerable, unconfined, unconsolidated aquifer or in any bedrock aquifer.		√		
Well completed in a karst bedrock aquifer.		√		

**Screening Tool Checklist for
GROUND WATER AT RISK OF CONTAINING PATHOGENS**

Well Log Examined: **Yes** / No

Site Survey Conducted: **Yes** / No

Risk Assessment:

Did any factor suggest that the system is "At Risk" (as opposed to "Low Risk")? **NO**

Yes/No/Unable to Determine

- If "**Yes**" and the water supplier does not wish to undertake remediation (see below for remediation options), move to Stage 2 Preliminary Hydrogeological Investigation.
- If "**No**", move to Stage 4 Long-term Water Quality Monitoring.
- If "**Unable to determine risk status**" because information is unavailable for any factor(s) or criteria of the assessment, then move to Stage 2 Preliminary Hydrogeological Investigation.

Remediation Options:

U Treatment to meet Health Authority drinking water requirements

U Provide alternate source of water

U Well Alteration / correct significant deficiencies in well construction

U Relocate the well

U Eliminate source(s) of contamination

U Stage 2 Preliminary Hydrogeological Investigation

U Stage 4 Long-term Water Quality Monitoring (see Water Quality Monitoring Section of main report)

U Other

Completed by: Bryer Manwell, M.Sc. P.Eng.

DATE: September 3, 2013

¹ Deficiencies in well construction related to the Ground Water Protection Regulation must be addressed.

Appendix F

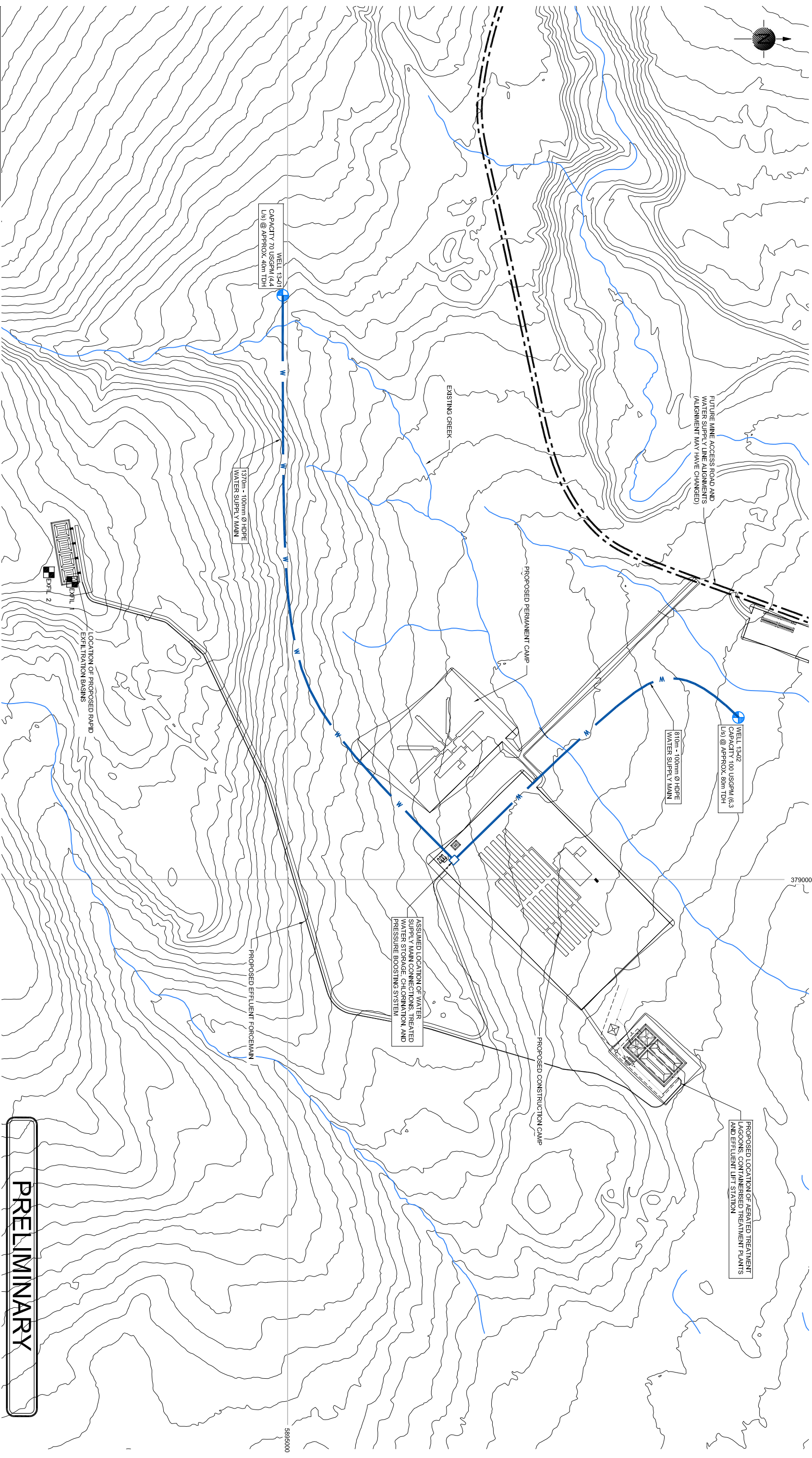
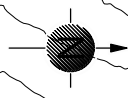
ODK – Cost Estimate to Pipe from
TW13-01 and TW13-02 to
Construction Camp





New Gold Inc.
Blackwater 500 and 1000 Person Camps
Potable Water Supply
Preliminary Class D Estimate of Construction Costs (2013 Dollars)

SUPPLY FROM WELL 13-01				
Description	Unit	Quantity	Unit Price (\$)	Amount
Clearing and Grubbing	Ha	2.1	\$ 16,000.00	\$ 33,600
Stripping	Ha	2.1	\$ 15,000.00	\$ 31,500
Well Improvements - Pitless Adapter, Piping, Controls	LS	1	\$ 50,000.00	\$ 50,000
Pump Electrical Supply	LS	1	\$ 30,000.00	\$ 30,000
Well Pump (40m TDH @ 4.4L/s)	ea	1	\$ 7,500.00	\$ 7,500
100mm Diameter HDPE Forcemain	lm	1370	\$ 150.00	\$ 205,500
Air Release Valve and Chamber	LS	1	\$ 15,000.00	\$ 15,000
Control Valves and Appurtenances	LS	1	\$ 40,000.00	\$ 40,000
Subtotal Well 13-01 Supply				\$ 413,100
SUPPLY FROM WELL 13-02				
Description	Unit	Quantity	Unit Price (\$)	Amount
Clearing and Grubbing	Ha	1.2	\$ 16,000.00	\$ 19,200
Stripping	Ha	1.2	\$ 15,000.00	\$ 18,000
Well Improvements - Pitless Adapter, Piping, Controls	LS	1	\$ 50,000.00	\$ 50,000
Pump Electrical Supply	LS	1	\$ 30,000.00	\$ 30,000
Well Pump (80m TDH @ 6.3L/s)	ea	1	\$ 12,500.00	\$ 12,500
100mm Diameter HDPE Forcemain	lm	810	\$ 140.00	\$ 113,400
Control Valves and Appurtenances	LS	1	\$ 40,000.00	\$ 40,000
Subtotal Well 13-02 Supply				\$ 283,100
TOTAL ESTIMATED PROJECT COST (excluding engineering, contingency, and taxes)				\$ 696,200



- NOTES:**
- ALL LOCATIONS OF WELLS, CONNECTIONS, AND WATER SUPPLY MAIN ROUTING IS AS PER INSTRUCTION FROM WESTERN WATER ASSOCIATES AND NEW GOLD PERSONNEL, WITH ASSUMPTIONS MADE WHERE NECESSARY.
 - PLAN IS PRELIMINARY IN NATURE AND ONLY FOR THE PURPOSES OF FORMULATING CLASS D (ORDER OF MAGNITUDE) COST ESTIMATES. PLAN SHOULD NOT BE USED FOR ANY OTHER PURPOSE.



Revision	Author/Date	Approved	Revision Date
1	PRELIMINARY COST ESTIMATE	SRB	OCT 2013

OPUS DAYTONKNIGHT
 Phone George Office
 201 - 1110 8TH AVENUE
 Prince George, BC
 V2L 3M6 CANADA
 +1 250 5620038

System: LDHB
 Designed: LDHB
 Approved: SRB

Project No.: D-75002.00

PRELIMINARY

Project:
 NEW GOLD INC.
 BLACKWATER PROJECT
 CAMP WATER SUPPLY

Sheet:
 SCHEMATIC SITE PLAN

Drawn No.: PG D-95002.00

Scale: 1:4000

Sheet No.: 01

Revision: 1

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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

Applied Research

Rural Subdivision Services

Environmental Assessment & Permitting