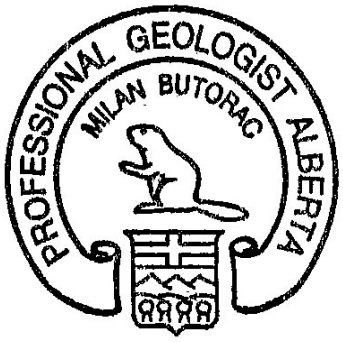
DESKTOP GROUNDWATER ASSESSMENT
GRIMSHAW SUBDIVISION - NE27-083-23 W5M
NEAR GRIMSHAW, ALBERTA
MUNICIPAL DISTRICT OF PEACE, ALBERTA

Report

to

Borderline Surveys Ltd.



M. Butorac, P.Geol.
Hydrogeologist

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.

Signature _____

Date _____

PERMIT NUMBER: P 5186
The Association of Professional
Engineers and Geoscientists of Alberta

Date: January 17, 2018
File: 21134

Neal Fernuik, M.Sc., P.Eng.
Review Principal

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1. INTRODUCTION

At the request of Borderline Surveys Ltd. (Borderline), Thurber Engineering Ltd. (Thurber) conducted a desktop groundwater assessment for a proposed residential subdivision within the quarter section of NE-27-083-23 W5M (the "Site") approximately 4.5 kilometers northeast of Grimshaw, Alberta. The residential subdivision may include up to thirteen lots. A Site map of the quarter section is shown on Drawing 21134-1 in Appendix A.

Authorization to proceed with the assessment was provided by Mr. Jason Coates of Borderline.

It is a condition of this report that Thurber's performance of its professional services is subject to the attached Statement of Limitations and Conditions.

2. OBJECTIVE AND SCOPE OF WORK

The objective of this hydrogeological desktop study was to assess the twenty-year safe yield (Q_{20}) of the aquifer(s) below the proposed Site. The project was conducted in general accordance to Alberta Environment (now Alberta Environment and Parks; AEP) March 2011 *Guide to Groundwater Authorization*. The scope of work as outlined in Thurber's October 10, 2017 proposal included the following;

- Perform a review of available reports, maps and databases of groundwater at the Site and surrounding area.
- Undertake a review of available AEP Water Well records for a radius of 1.6 km around the Site. Field verification was not included as part of this assessment.
- Prepare a hydrogeological desktop report for the Site.

3. HYDROGEOLOGICAL DESKTOP STUDY

3.1 Water Well Records

A review of AEP Water Well reports was compiled using the Abadata database. Table 3.1 in Appendix B summarizes well completion specifications from 71 AEP well records within a 1.6 km radius from the Site center. The wells within 1.6 km radius are also shown on Drawing 21134-1. The water wells were classed by recorded usage as follows:

- 53 domestic

- 2 domestic & stock
- 3 industrial
- 1 irrigation
- 6 municipal
- 2 observations
- 3 unknown.

There is also one abandoned oil and gas well within the 1.6 km radius of investigation. The Alberta Topographic Survey (ATS) system locations and drill dates for this abandoned oil and gas well are: 07-34-083-23 W5M (1982). The listed well is not within the Site and the well was reclaimed and decommissioned on 26 February 1988.

3.1.1 Site Topography

Only one quarter of the existing land use within the Site is agricultural. The rest of the Site is covered by vegetation.

Surface characteristics of the Site are relatively level with an approximately one percent regional gradient sloping southeast towards the Peace River, which is approximately 9 km southeast of the Site. The overall elevation difference across the Site is approximately 20 m from 625 m elevation in the northwest corner of the Site to 605 m elevation in the southeast corner of the Site (Drawing 21134-1, in Appendix A).

Surface water bodies near the Site include, Cardinal Lake which is approximately 7km west from the Site, Strong Creek which is 4km east from the Site and one small unnamed creek approximately one kilometre south of the Site.

3.1.2 Geology

Drawing 21134-2 and 21134-3 in Appendix A, shows geology maps of bedrock and surficial geology and cross-sections of the study area based on available published maps and AEP Water Well report logs. The water well logs used in producing the cross-section are in Appendix D.

The surficial deposits of the Site (Paulen, 2004) and satellite image interpretation indicate that the main surficial deposits units are:

- Moraine till comprised of non-sorted mixture of clay, silt and sand with pebbles and boulders and occasional layers of disturbed bedrock. The moraine deposits occupy northwest half of the Site.

- Glaciolacustrine deposits composed of bedded fine sand silt and clay. The glaciolacustrine deposits overlay the moraine deposits and occupy the southeast half of the Site.

- Organic deposits composed of undifferentiated peat layers are present a few hundred meters south of the Site.

- Some bodies of preglacial fluvial deposits are visible in the north corner of the study area. The preglacial deposits are located at the bottom of surficial deposits and they overlay the bedrock formations. The preglacial deposits are presented as the terrace deposits in the buried Peace River valley which was developed in preglacial period. The preglacial fluvial deposits are composed of sand and gravel.

According to bedrock topography map (Atkinson, 2010) total thickness of surficial deposits at the Site is between 10 m and 30 m. The bedrock topography elevation is between 580 m and 620 m.

Bedrock underling the Site (as per Bedrock Geology of Alberta, 2013) is Dunvegan Formation composed of deltaic sandstone, siltstone and shale. The Dunvegan Formation is underlain by the Shaftesbury Formation composed of offshore marine mudstone and siltstone.

3.1.3 Hydrogeology

Within the Site study area there are two aquifer types present: the sand deposits in the surficial deposits (glacial and preglacial sand and gravel) and the Dunvegan Formation deltaic sandstone. The aquifers in the surficial deposits are both unconfined and confined depending on the location within the Site while the Dunvegan sandstone aquifer is confined. Only the Dunvegan sandstone aquifer has been confirmed by water wells drilled in the northern portion of the Site. The surficial sand and gravel aquifer has not been confirmed by water wells drilled within the Site but because the sand and gravel aquifer is of unregular shape we expect that the sand and gravel aquifer may also be present at the Site.

The sand and gravel aquifer have expected yields in the rage of 2l/sec to 8l/sec (Borneuf, 1983), or from 63,000m^3/year to 25,2000m^3/year. For this Site, the lithologs indicated the sand and gravel aquifer is in use as one of the major aquifers for water supply in the Study area.

Wells completed in the Dunvegan Formation sandstone have expected yields in the range from 0.1l/sec to 0.4l/sec (Borneuf 1983) or from 3,150m^3/year to 12,600m^3/year.

3.2 Twenty Year Safe Yield (Q_{20})

The twenty-year safe yield (Q_{20}) was estimated using the Farvolden method (AEP 2011) for confined aquifers (wells 9516204 and 1665261).

$$Q_{20} = (0.68)\ T(H_a)\times 0.7 \qquad \text{(Farvolden method)}$$

and modified Moell method (Maathuias and van der Kamp) method for unconfined aquifer (wells 358281 and 358279).

$$Q_{20} = (0.7 x Q x H_a) / [S_{100min} + (S_{20yr} - S_{100min})] \qquad \text{(Modified Moell Method)}$$

Where T is transmissivity and H_a is available drawdown (distance between static water level and top of aquifer).

Calculated transmissivity, available drawdown and Q_{20} values from pumping tests for four water wells are shown in the Table 3 below, and pumping tests graphs are shown in the Appendix C. Water Well #9516204 is located at the Site while other wells are in surrounding area.

TABLE 3
PUMPING TESTS ANALYSES RESULTS
WELLS #9516204, 1665261, 358281, and 358279

AEP Well ID	Location	Static Water Level (mbgs)	Aquifer	Available Drawdown	Geometric mean of Hydraulic Conductivities (m/s)	Geometric mean of Transmissivity (m^2/s)	Q20	Q20	Aquifer
			(m)	(m)	(m/sec)	(m^2/sec)	(m^3/sec)	(m3/year)	
9516204	16-27-083-23 W5M	10.12	5.2	43.22	1.53E-06	7.96E-06	1.64E-04	5,162	Sandstone
1665261	SE33-083-23 W5M	18.9	7.72	29.87	1.12E-06	8.65E-06	1.23E-04	3,877	Sandstone
358281	NW27-083-23 W5M	3.96	2.44	1.83	7.65E-03	1.87E-02	3.42E-02	1,077,270	Gravel
358279	NW27-083-23 W5M	1.44	4.97	3.72	1.57E-03	7.80E-03	1.30E-01	4,105,987	Gravel

Transmissivities are estimated from curve-fitting to observed pumping test and recovery data.

The estimated Q_{20} values in sandstone are in range from 3,900 m^3/year to 5,200 m^3/year, and Q_{20} values for sand and gravel are in range of 1,000,000 m^3/year to 4,100,000 m^3/year. The estimated values are in general agreement with values for Q_{20} presented at hydrogeological map (Borneuf 1983). For comparison, the current AEP standard stipulates that 1,250 m^3/year is a minimum requirement for an individual residential lot.

3.3 Groundwater Quality

Table 2 in Appendix B shows the averaged groundwater chemistry does not meet February 2017 Guidelines for Canada Drinking Water Quality (CDWQ) Aesthetic Objectives (AO) for sulphate, iron, and total dissolved solids (TDS). Aesthetic Objectives are recommended for acceptance (through taste, odor, and color criteria) by consumers, but are not health-related guidelines.

A Piper Plot (Appendix C) for the Site shows that the groundwater quality is uniform and the water type is calcium-sulphate bicarbonate.

4. SUMMARY

Confirmed aquifer at the Site is Dunvegan sandstone aquifer and calculated Q_{20} using the Farvolden method, based on pumping test from well 9516204 is in the order of 5,200 m^3/year. The Q_{20} compares favorably with the range of 3,150 m^3/year to 12,600 m^3/year reported by hydrogeological map (Borneuf 1983). For comparison, the current AEP standard stipulates that 1,250 m^3/year is a minimum requirement for an individual residential lot. The surficial sand and gravel aquifer could have Q_{20} in the range of 1,000,000 m^3/year to 4,100,000 m^3/year but this aquifer while likely present has not been confirmed with wells within the Site.

Table 4 below shows an estimated drawdown at distances of 0m, 800m, 1200m and 2000m from pumping test data conducted within the sandstone aquifer from well 9516204. The drawdown would be considered negligible.

TABLE 4

IMPACT ASSESSMENT AFTER 20 YEARS

OF PUMPING WELL #9516204 AT Q=2.4 L/MIN

Distance from Well #9516204 (m)	0	400	800	1200	2000
Drawdown at Distance (m)	6	1	0.5	0.2	0

Based on the available chemistry records, groundwater sourced from the Dunvegan bedrock aquifer is expected to not meet the 2017 CDWQ Aesthetic Objectives for sulphate, iron, and TDS. Treatment would not be required from a potability perspective but recommended for aesthetics.

5. REFERENCES

Alberta Environment (now AEP), March 2011, “Alberta Environment Guide to Groundwater Authorization”.

Alberta Geological Survey, Map 600. Bedrock Geology of Alberta. Published 2013.

D. Borneuf. Hydrogeological Map Peace River, Alberta. NTS 84C. Alberta Research Council. Published 1983.

Health Canada, February 2017, “Guidelines for Canadian Drinking Water Quality—Summary Table”, Water, Air and Climate Change Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.

N. Atkinson and S. Lyster. Map 550. Bedrock Topography of Alberta, Canada. Alberta Geological Survey. Published 2010.

R.C. Paulen. Map 291. Surficial Geology of the Grimshaw Area (NTS 84C/SW). Alberta Geological Survey. 2004.

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STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

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5. INTERPRETATION OF THE REPORT

a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.

d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

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APPENDIX A

Drawings

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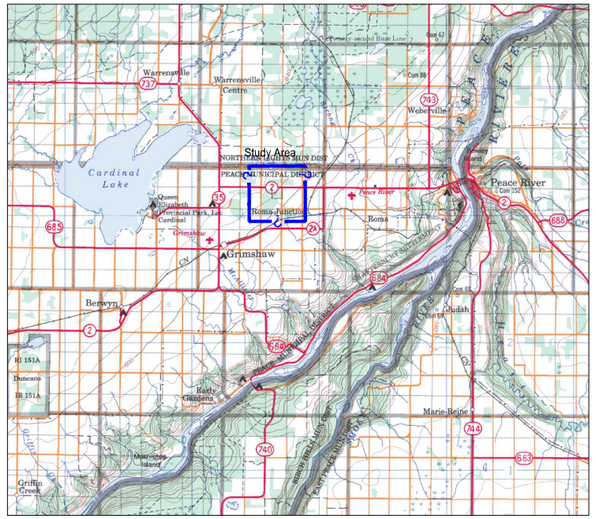

KEY MAP

LEGEND

- WATER WELL
- CROSS SECTION A - A'
- SITE
- RADIUS 1600M (FROM CENTER OF THE SITE)
- GROUND TOPOGRAPHY (CONTOURS 1m)

0 200 400 600 800 1000 1200m

SCALE 1:20000

BORDERLINE SURVEYS

GRIMSHAW SUBDIVISION, HYDROGEOLOGICAL STUDY

SITE MAP

DWG No. 21134-1

DRAWN BY	ML
DESIGNED BY	MJB
APPROVED BY	NHF
SCALE	1:20000
DATE	DECEMBER 2017
FILE No.	21134

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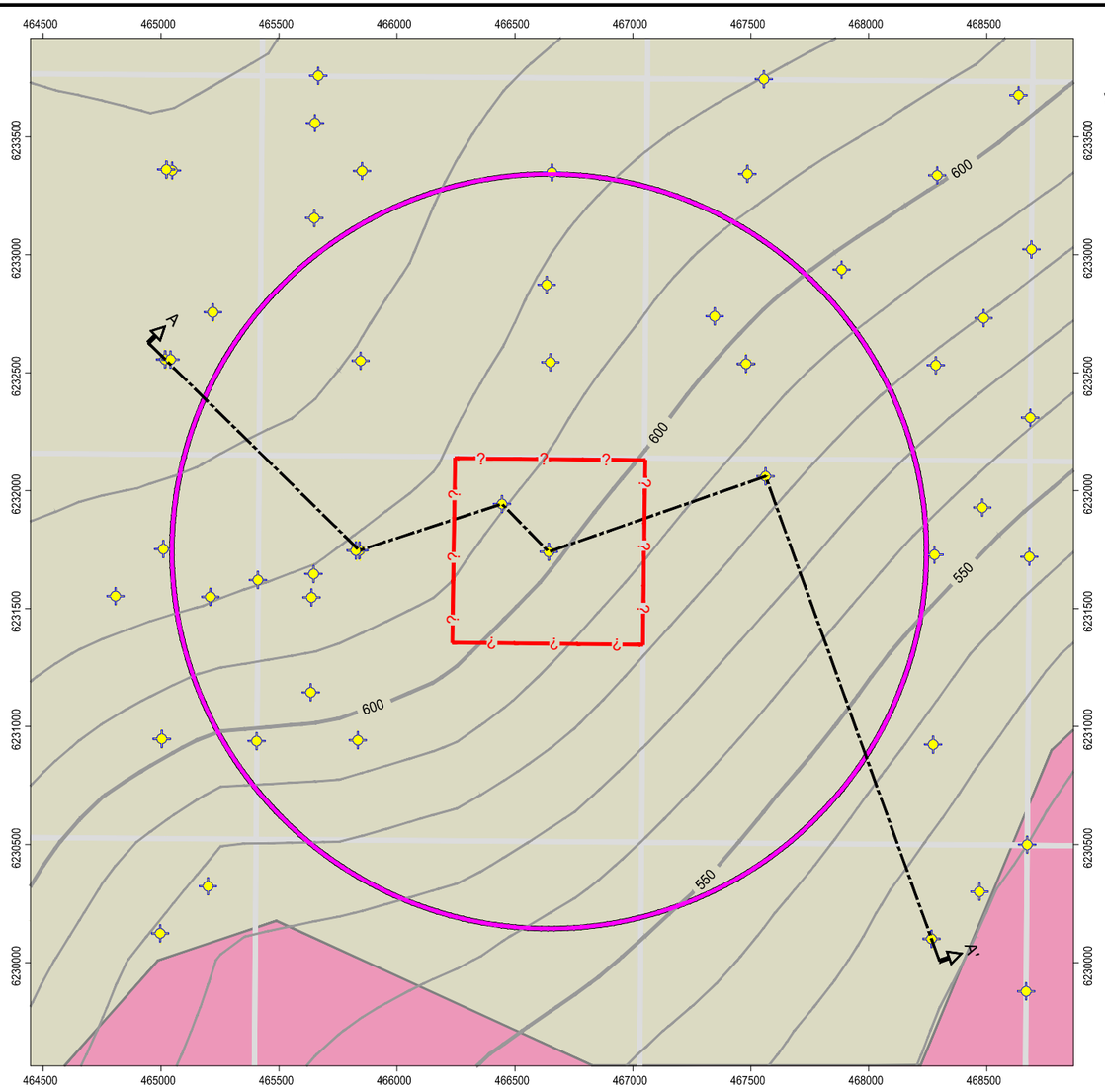

BEDROCK GEOLOGY MAP

LEGEND

- WATER WELL
- CROSS SECTION A - A'
- SITE
- RADIUS 1600M (FROM CENTER OF THE SITE)
- DUNVEGAN FORMATION DELTAIC SANDSTONE, SILTSTONE AND SHALE
- SHAFTESBURY FORMATION OFSHORE MARINE MUDSTONE, SILTDYONE
- BEDROCK TOPOGRAPHY (CONTOUR INTERVAL = 10m)

Reference for Bedrock Geology:
Surficial Geology of Alberta. Alberta Geological Survey Map 601. Published 2013.

Reference for bedrock topography and surficial deposits isopach:
N. Atkinson and S. Lyster. Map 550. Bedrock Topography of Alberta, Canada. Alberta Geological Survey. 2010.

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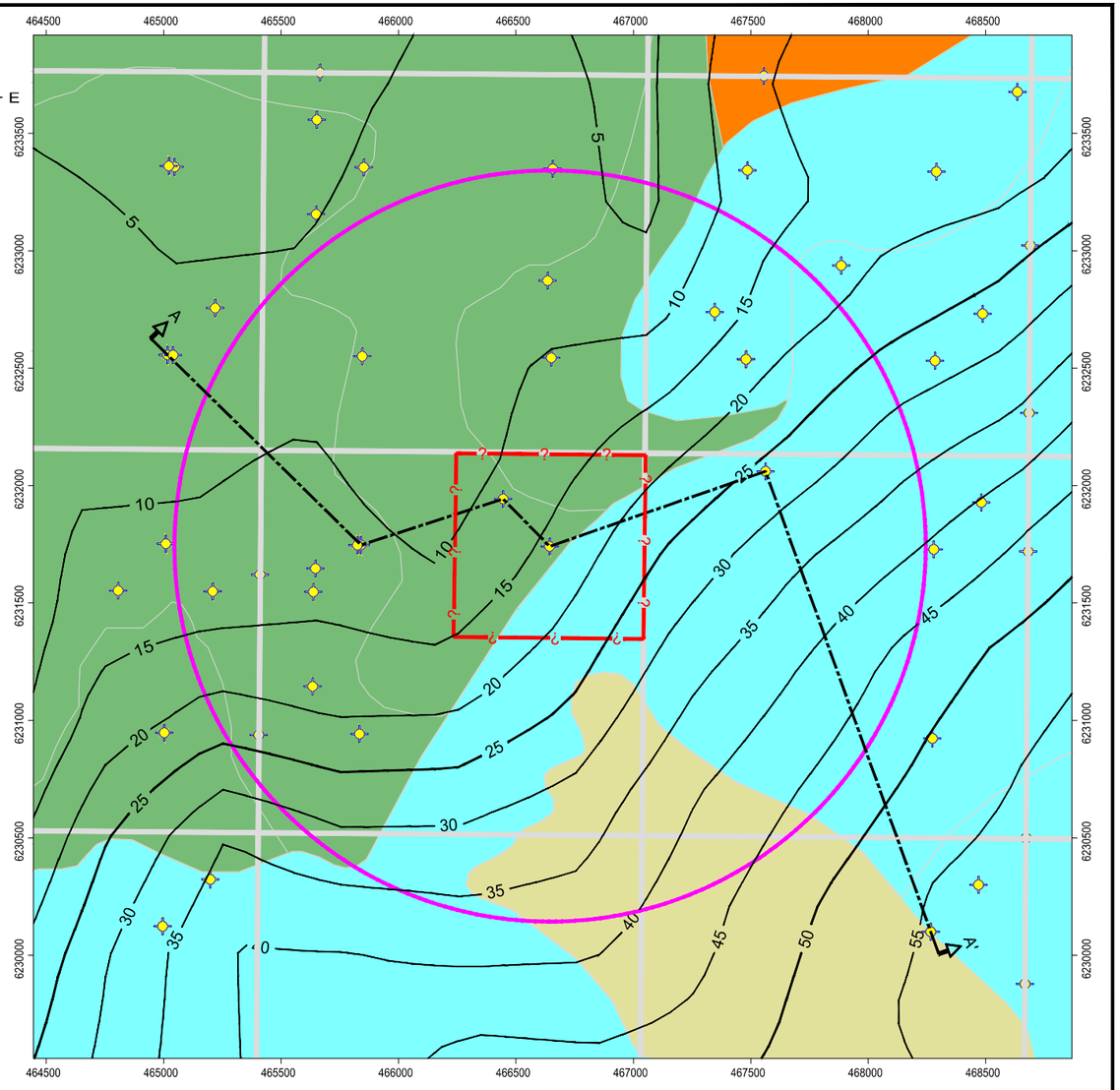

SURFICIAL DEPOSITS GEOLOGY MAP

- ORGANIC DEPOSITS: UNDIFFERENTIATED PEAT LAYERS, WOOD TO FIBROUS MUCK.
- GLACIOLACUSTRINE DEPOSITS BEDDED FINE SAND, SILT AND CLAY
- MORAINE DEPOSITS; TILL (NONSORTED MIXTURE OF CLAY, SILT AND SAND WITH PEBBLES AND BOULDERS)
- PREGLACIAL FLUVIAL DEPOSITS; SAND AND GRAVEL
- SURFICIAL DEPOSITS ISOPACH (CONTOUR INTERVAL= 5m)

Reference for the Surficial Geology Map:
R.C. Paulen. Map 291. Surficial Geology of the Grimshaw Area (NTS 84C/SW). Alberta Geological Survey. 2004.

0 250 500 750 1000 1250 1500m

SCALE 1:25000

BORDERLINE SURVEYS

GRIMSHAW SUBDIVISION, HYDROGEOLOGICAL STUDY

BEDROCK AND SURFICIAL DEPOSITS GEOLOGY MAPS

DWG No. 21134-2

DRAWN BY	ML
DESIGNED BY	MJB
APPROVED BY	NHF
SCALE	1:25000
DATE	DECEMBER 2017
FILE No.	21134

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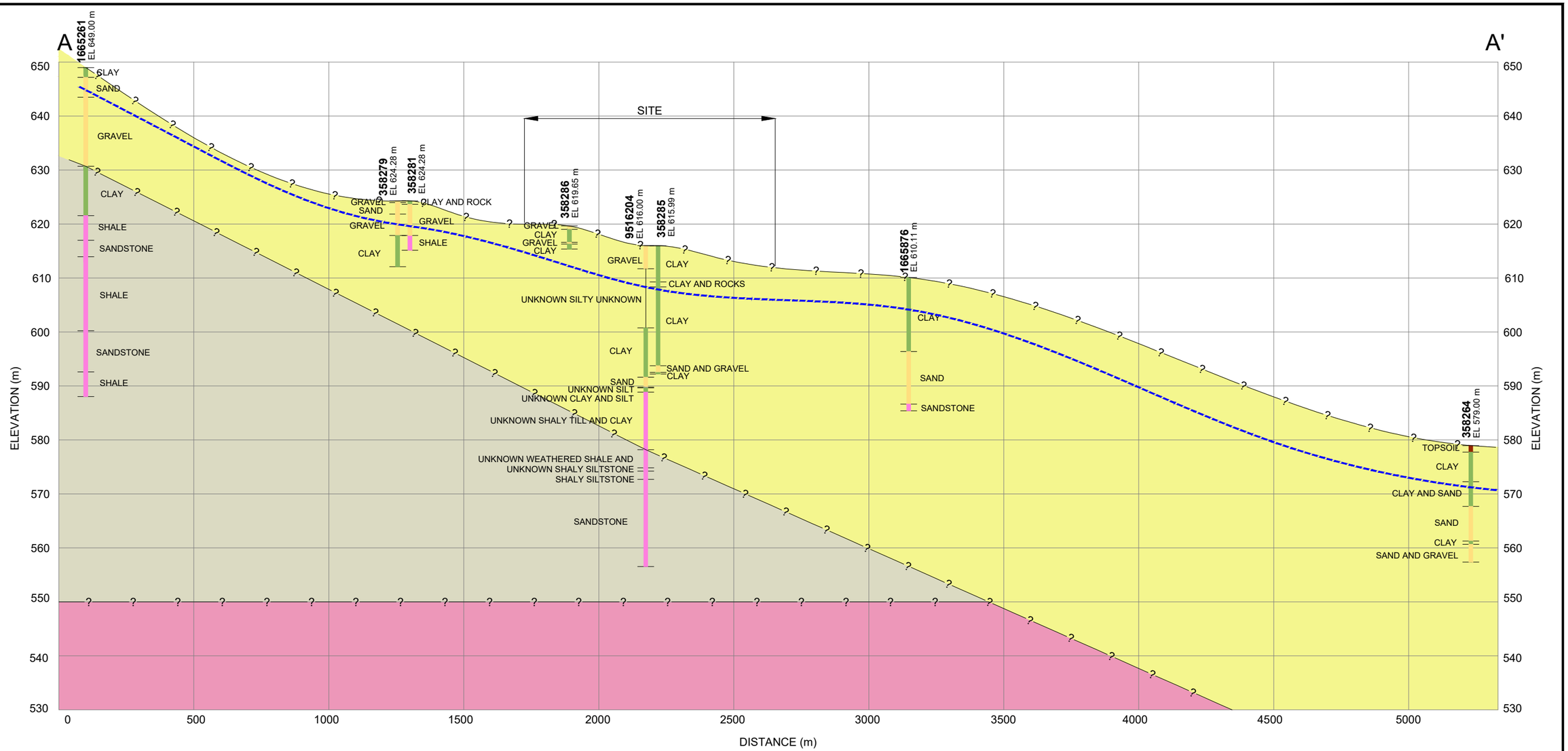

LEGEND

- SURFICIAL DEPOSITS
- DUNVEGAN FORMATION
- SHAFTESBURY FORMATION
- GROUNDWATER TABLE

NOTE

DATA CONCERNING THE VARIOUS STRATA HAVE BEEN OBTAINED AT THE TEST HOLE LOCATIONS ONLY. THE SOIL STRATIGRAPHY BETWEEN TEST HOLES HAS BEEN INFERRED FROM GEOLOGICAL EVIDENCE AND SO MAY VARY FROM THAT SHOWN.

BORDERLINE SURVEYS

GRIMSHAW SUBDIVISION, HYDROGEOLOGICAL STUDY

CROSS - SECTION A - A'

DWG No. 21134-3

DRAWN BY	ML
DESIGNED BY	MJB
APPROVED BY	NHF
SCALE	H 1:15000 V 1:750
DATE	DECEMBER 2017
FILE No.	21134

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APPENDIX B

Tables

TABLE 1
ALBERTA WATER WELL RECONNAISANCE REPORT 1.6KM RADIUS FROM
NE27-083-23 W5M
GRIMSHAW SUBDIVISION

Well ID	LSD	SEC	TWP	RGE	M	DRILLING COMPANY	DATE COMPLETED	DEPTH (m)	TYPE OF WORK	USE	CHM	LT	PT	WELL OWNER	STATIC LEVEL (m)	TEST RATE (L/min)	SC_DIAM (cm)
341204	NW	27	83	23	5	MCALLISTER WATERWELLS LTD.	2001-06-11	6.71	New Well	Domestic		4	3	EAST GRIMSHAW WATER CO-OP #2	2.04	158.66	17.78
341205	NW	27	83	23	5	MCALLISTER WATERWELLS LTD.	2001-06-10	8.84	New Well	Domestic		2	2	EAST GRIMSHAW WATER CO-OP #1	4.21	158.66	17.78
341206	NW	27	83	23	5	MCALLISTER WATERWELLS LTD.	2001-06-09	7.92	Test Hole-Abandoned	Domestic		2		EAST GRIMSHAW WATER CO-OP			0.00
350935	SW	35	83	23	5	SAVILLE WATER WELL DRILLING LTD.	1990-05-10	42.67	New Well	Domestic		11	10	ELIVK, MARSHALL	10.97	136.38	14.12
350936	SW	35	83	23	5	SAVILLE WATER WELL DRILLING LTD.	1990-05-10	42.67	New Well	Domestic		12	10	ELIVK, MARSHALL	10.97	136.38	14.12
350937	SW	35	83	23	5	SAVILLE WATER WELL DRILLING LTD.	1990-05-10	30.48	New Well	Domestic		8	8	ELIVK, MARSHALL	10.97	68.19	14.12
351371	SW	35	83	23	5	HOPPER WATER WELL DRILLING LTD.	1989-12-12	30.48	New Well	Domestic		6		PARENTEAU, CAL	5.49	36.37	14.12
354720	SW	35	83	23	5	UNKNOWN DRILLER		48.77	Chemistry	Domestic				WARKENTEN, LOVINA			0.00
357136	9	28	83	23	5	UNKNOWN DRILLER	1963-01-01	7.92	New Well	Irrigation				JOHNSTON, W.J.			12.70
357189	SW	35	83	23	5	UNKNOWN DRILLER		28.96	Chemistry	Domestic				PETERSEN, TED			0.00
357190	SW	35	83	23	5	UNKNOWN DRILLER		30.48	Chemistry	Domestic				PETERSEN, TED			0.00
357953	9	28	83	23	5	UNKNOWN DRILLER	1963-01-01	19.20	Chemistry	Domestic	3			JOHNSON, W.J.	10.67	0.00	0.00
358271	SW	35	83	23	5	SANDERSON, LLOYD	1988-05-26	24.38	New Well	Domestic		3		ELIUK, MARSHALL	8.53	22.73	0.00
358271	SW	35	83	23	5	HOPPER WATER WELL DRILLING LTD.	1989-09-04	48.77	Deepened	Domestic		8		BLANEY, KEN	6.40	68.19	16.81
358274	SW	35	83	23	5	SANDERSON, LLOYD	1988-05-27	24.38	New Well	Domestic		3		ELIUK, MARSHALL	9.14	22.73	0.00
358274	SW	35	83	23	5	HOPPER WATER WELL DRILLING LTD.	1989-09-03	42.67	Deepened	Domestic		5		ELIUK, MARSHALL	6.40	68.19	16.81
358275	SW	27	83	23	5	LBR CONTRACTORS LTD.	1982-09-08	22.86	Test Hole	Unknown		1		WILDERNESS PARK			0.00
358276	5	27	83	23	5	UNKNOWN DRILLER	1954-09-23	24.38	Flowing Shot Hole	Industrial		3		SHELL OIL CO#SP 204/5/50			0.00
358278	NW	27	83	23	5	BUFFALO LAKE DRILLING	1971-05-01	12.19	New Well	Domestic	3	2		MCINNIS, ART	7.32	27.28	10.16
358279	NW	27	83	23	5	BUFFALO LAKE DRILLING	1974-12-17	12.19	New Well	Municipal	8	4		PEACE, MD OF	0.91	0.00	0.00
358279	NW	27	83	23	5	BUFFALO LAKE DRILLING	1974-12-17	12.19	New Well	Municipal	8	4		PEACE, MD OF	1.43	272.77	0.00
358279	NW	27	83	23	5	BUFFALO LAKE DRILLING	1974-12-17	12.19	New Well	Municipal	8	4	18	PEACE, MD OF	1.43	272.77	0.00
358280	NW	27	83	23	5	GRIMSHAW WATER WELL DRILLING LTD.	1984-09-11	7.01	New Well	Municipal		4		PEACE, MD OF	1.22	350.05	0.00
358281	NW	27	83	23	5	HI-RATE DRILLING 1985 LTD.	1989-08-02	9.14	New Well	Domestic & Stock		3		GRIMSHAW WATER CO-OP#PW 89-1	3.05	0.00	17.78
358281	NW	27	83	23	5	HI-RATE DRILLING 1985 LTD.	1989-08-02	9.14	New Well	Domestic & Stock		3	52	GRIMSHAW WATER CO-OP#PW 89-1	3.96	677.37	17.78
358282	NW	27	83	23	5	HI-RATE DRILLING 1985 LTD.	1989-08-02	7.01	Piezometer	Observation		3		GRIMSHAW WATER CO-OP #OBS 1	3.66	0.00	0.00
358283	NW	27	83	23	5	HI-RATE DRILLING 1985 LTD.	1989-08-02	9.75	Piezometer	Observation		3		GRIMSHAW WATER CO-OP #OBS 2	5.49	0.00	0.00
358284	12	27	83	23	5	UNKNOWN DRILLER		0.00	Spring	Unknown	2						0.00
358285	NE	27	83	23	5	SANDERSON, LLOYD	1979-08-10	23.77	New Well	Domestic	2	5		COOPER, BASIL	10.67	13.64	0.00
358286	15	27	83	23	5	UNKNOWN DRILLER		4.57	Chemistry	Domestic	3	4		COOPER, B.			0.00
358359	SW	34	83	23	5	BUFFALO LAKE DRILLING	1972-05-01	9.75	New Well	Domestic	2	2		TERRIFF, HAROLD	7.01	22.73	0.00
358360	SE	34	83	23	5	UNKNOWN DRILLER		13.11	Chemistry	Domestic	5			TERRIFF, HAROLD			0.00
358368	SW	35	83	23	5	UNKNOWN DRILLER		7.01	Chemistry	Domestic	2			ELIUK, MARSHA	3.05	0.00	0.00
358369	SW	35	83	23	5	UNKNOWN DRILLER		47.55	Chemistry	Domestic	2			ELUIK, MARSHALL			0.00
358370	SW	35	83	23	5	LBR CONTRACTORS LTD.	1982-08-31	43.59	New Well	Domestic		7		ELIUK, MARSHALL	7.62	27.28	12.07
358371	SW	35	83	23	5	HILL'S DRILLING	1984-04-07	94.49	Dry Hole	Domestic		8		MOCYK, Q.#WELL 1			0.00
358372	SW	35	83	23	5	HILL'S DRILLING	1984-04-12	37.80	New Well	Domestic	2	11		MOCYK, Q.#WELL 2	32.92	20.46	16.81
358373	SW	35	83	23	5	HILL'S DRILLING	1984-09-15	48.77	Dry Hole	Domestic		10		MOCYK, O.			16.81
358374	SW	35	83	23	5	HILL'S DRILLING	1984-09-17	48.77	Test Hole-Abandoned	Domestic		3		MOCYK, O.			0.00
358375	SW	35	83	23	5	LBR CONTRACTORS LTD.	1985-09-02	27.43	New Well	Domestic		5		ELIUK, MARSHALL	6.10	31.82	0.00
358376	SW	35	83	23	5	LBR CONTRACTORS LTD.	1985-08-31	54.86	New Well	Domestic		6		ELIUK, MARSHALL	1.52	22.73	0.00
358377	SW	35	83	23	5	UNKNOWN DRILLER		27.43	Chemistry	Domestic	2			LAFFERTY, KEN/ROCKY REACH EST			0.00
358378	SW	35	83	23	5	LBR CONTRACTORS LTD.	1986-09-27	27.43	New Well	Domestic		6	3	ELIUK, MARSHALL	3.05	31.82	0.00
358379	SW	35	83	23	5	SANDERSON, LLOYD	1988-05-19	26.82	New Well	Domestic		3		ELIUK, MARSHALL	10.06	45.46	0.00
358379	SW	35	83	23	5	HOPPER WATER WELL DRILLING LTD.	1989-07-08	42.67	Deepened	Domestic		7		ELIUK, MARSHALL	9.75	90.92	14.12
358380	SW	35	83	23	5	SANDERSON, LLOYD	1988-05-24	31.39	New Well	Domestic		3		ELIUK, MARSHALL	14.94	18.18	0.00
358380	SW	35	83	23	5	HOPPER WATER WELL DRILLING LTD.	1989-07-07	48.77	Deepened	Domestic		5		ELIUK, MARSHALL	11.28	68.19	14.12
358383	SW	35	83	23	5	SANDERSON, LLOYD	1988-06-24	19.51	New Well	Domestic		5		ELIUK, MARSHALL	5.79	45.46	0.00
358383	SW	35	83	23	5	HOPPER WATER WELL DRILLING LTD.	1989-08-31	36.58	Deepened	Domestic		8		SMITH, WAYNE	5.49	68.19	16.81
358384	SW	35	83	23	5	UNKNOWN DRILLER		27.74	Chemistry	Domestic	1			BLANEY, KEN			0.00
358385	SW	35	83	23	5	HOPPER WATER WELL DRILLING LTD.	1989-08-31	36.58	New Well	Domestic		10		ELIUK, MARSHALL	6.10	90.92	14.12
358386	SW	35	83	23	5	HOPPER WATER WELL DRILLING LTD.	1989-09-02	42.67	New Well	Domestic		11		ELIUK, MARSHALL	6.10	136.38	14.12
359509	9	28	83	23	5	UNKNOWN DRILLER		19.20	Well Inventory	Domestic				JOHNSON, W.J.	10.67		0.00
361888	SW	35	83	23	5	UNKNOWN DRILLER		32.00	Chemistry	Domestic				JOHNSON, SANDRA			0.00
365141	SW	35	83	23	5	SAVILLE WATER WELL DRILLING LTD.	1992-05-14	46.33	New Well	Domestic		6	5	NORTH PEACE INVESTMENTS	10.97	136.38	14.12
365142	SW	35	83	23	5	SAVILLE WATER WELL DRILLING LTD.	1992-05-14	45.72	New Well	Domestic		6	5	NORTH PEACE INVESTMENTS	10.97	159.11	14.12
365143	5	35	83	23	5	SAVILLE WATER WELL DRILLING LTD.	1992-05-13	48.16	New Well	Domestic		6	4	NORTH PEACE INVESTMENTS	15.85	136.38	14.12
371795	1	28	83	23	5	UNKNOWN DRILLER		24.38	Seismic Shot Hole	Industrial		1					0.00
371796	9	28	83	23	5	UNKNOWN DRILLER		13.72	Seismic Shot Hole	Industrial		1					0.00
394445	SW	35	83	23	5	SAVILLE WATER WELL DRILLING LTD.	1995-10-21	30.48	New Well	Domestic		6	11	DJP CONTRACTING	14.33	90.92	14.12
394445	SW	35	83	23	5	SAVILLE WATER WELL DRILLING LTD.	1995-10-21	30.48	New Well	Domestic		6	13	DJP CONTRACTING	10.39	18.18	14.12
394445	SW	35	83	23	5	SAVILLE WATER WELL DRILLING LTD.	1995-10-21	30.48	New Well	Domestic		6		DJP CONTRACTING			14.12
394445	SW	35	83	23	5	KLYMIUK WATER WELL DRILLING			Old Well-Test	Domestic			13	EPP, KIM	10.39	18.18	
492642	SW	35	83	23	5	KLYMIUK WATER WELL DRILLING	1998-06-12	30.48	New Well	Domestic		5	15	MURPHY, GORDON/GERIANN	6.71	15.91	15.24
496776	NW	27	83	23	5	MCALLISTER WATERWELLS LTD.	1998-09-30	7.92	New Well	Municipal		4	3	PEACE RIVER, MD OF	1.71	453.70	17.78
1375240	NW	27	83	23	5	HOPPER WATER WELL DRILLING LTD.		4.57	Old Well - Abandoned	Unknown		1		PEACE RIVER , MUNICIPAL DISTRICT OF			15.24
1375241	NW	27	83	23	5	HOPPER WATER WELL DRILLING LTD.	2010-06-04	12.19	New Well	Municipal		2	12	PEACE RIVER, MD OF / NO 135	2.16	272.77	14.12
1665251	12	27	83	23	5	SAVILLE DRILLING LTD.	2003-10-01	12.19	New Well	Domestic		5	25	GARDNER, DOUG	1.83	90.92	14.12
1665876	14	26	83	23	5	SAVILLE DRILLING LTD.	2008-08-26	24.69	New Well	Domestic		4	25	PARKER, BRYAN	5.94	227.30	14.12
9486006	8	34	83	23	5	BRAD SAVILLE ENTERPRISES LTD.	2010-05-14	91.44	New Well	Domestic		6	8	TERRIFF, WADE	10.67	9.09	14.12
9516204	16	27	83	23	5	ANDERSON WATER SERVICES LTD.	2016-07-19	59.44	New Well	Domestic		14	26	CONNOLLEY, DAVE	10.12	31.82	16.83

TABLE 2
ALBERTA WATER WELL RECORDS CHEMISTRY RESULTS
FOR 1.6 KM RADIUS FROM NE27-083-23 W5M
GRIMSHAW SUBDIVISION

Well ID	Location	SampleDate	Fluoride	Chloride	Bicarbonate	Carbonate	Nitrite	Nitrate	Nitrite+Nitrate as Nitrogen	Sulphate	Iron	Calcium	Potassium	Sodium	Magnesium	Silicon dioxide	PH	Ion Balance	Electrical Conductivity	Total Alkalinity	Total Hardness	Total Dissolved Solids
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		%	dS/m	mg/L	mg/L	mg/L
CDWQ[1] Guideline			1.5[2]	250[3]	--	--	1[2]	10[2]	--	500[3]	0.3[3]	--	--	200[3]	--	--	7-10.5[3]	--	--	--	--	500[3]
357953	9-28-83-23 W5M		0	0	305.03	6	0	0	0	229.34	0.2	136.10	6.344	37.10	40.13	0	7.5	0	0	260	505	714
357953	9-28-83-23 W5M		0	0	305.03	6	0	0	0	229.34	0.2	136.10	6.344	37.10	40.13	0	7.5	0	0	260	505	714
357953	9-28-83-23 W5M		0	0	305.03	6	0	0	0	229.34	0.2	136.10	6.344	37.10	40.13	0	7.5	0	0	260	505	714
358278	NW-27-83-23 W5M	OCT 10 1978	0.39	88.13	3.00	0	-0.0504	0.7994	0	156.23	0.2	88.00	4.4	18.00	35.03	17.6	8.3	0	745	277	383	474
358278	NW-27-83-23 W5M	OCT 10 1978	0.39	3.00	338.04	0	-0.0504	0	0.7994	156.23	0.2	88.00	4.4	18.00	35.03	17.6	8.3	0.91	745	277	363	474
358278	NW-27-83-23 W5M	OCT 10 1978	0.39	88.13	3.00	0	-0.0504	0.7994	0	156.23	0.2	88.00	4.4	18.00	35.03	17.6	8.3	0	745	277	383	474
358279	NW-27-83-23 W5M		0.36	2.00	288.03	0	-0.0504	0.9996	0	162.24	0.11	95.00	4.296	17.00	33.03	-0.5	8.2	0	732	237	372	460
358279	NW-27-83-23 W5M		0.36	2.00	288.03	0	-0.0504	0.9996	0	162.24	0.11	95.00	4.296	17.00	33.03	-0.5	8.2	0	732	237	372	460
358279	NW-27-83-23 W5M	JAN 15 1975	0.4	4.00	303.03	0	-0.0994	-0.0994	0	144.21	0.3	107.00	5.524	14.00	28.02	0	7.4	0	650	248	383	456
358279	NW-27-83-23 W5M	JAN 15 1975	0.4	4.00	303.03	0	-0.0994	-0.0994	0	144.21	0.3	107.00	5.524	14.00	28.02	0	7.4	1.04	650	248	383	456
358279	NW-27-83-23 W5M		0.36	2.00	288.03	0	-0.0504	0	0.9996	162.24	0.11	95.00	4.296	17.00	33.03	-0.05	8.2	1	732	237	372	460
358279	NW-27-83-23 W5M	MAY 5 1976	0.65	4.00	331.04	0	-0.0994	0	0.4004	133.19	-0.1	67.00	4.808	16.00	30.02	0	8.3	0.79	720	272	290	420
358279	NW-27-83-23 W5M	NOV 22 1978	0.44	4.00	314.03	0	-0.0504	0	0.6902	152.22	0.07	87.00	4.4	18.00	29.02	14.5	8.2	0.9	697	258	338	453
358279	NW-27-83-23 W5M	NOV 22 1978	0.44	4.00	314.03	0	-0.0504	0.6902	0	152.22	0.07	87.00	4.4	18.00	29.02	14.5	8.2	0	697	258	338	453
358284	12-27-83-23 W5M		0	0	317.23	0	0	0	0	211.31	0.05	100.10	5.832	57.80	34.03	0	7.65	0	0	260	390	648
358284	12-27-83-23 W5M		0	0	317.23	0	0	0	0	211.31	0.05	100.10	5.832	57.80	34.03	0	7.65	0	0	260	390	648
358285	NE-27-83-23 W5M	JUN 1 1980	0.24	2.00	987.10	0	-0.0504	0	-0.0504	84.12	2.37	123.00	4.4	94.00	82.07	14.4	8.2	0.95	1557	810	646	876
358285	NE-27-83-23 W5M	JUN 1 1980	0.24	2.00	987.10	0	-0.0504	-0.0504	0	84.12	2.37	123.00	4.4	94.00	82.07	14.4	8.2	0	1557	810	646	876
358286	15-27-83-23 W5M		0	5.01	317.23	0	0	0.9996	0	142.21	1.28	95.30	19.436	48.70	24.82	0	7.3	0	0	260	340	446
358286	15-27-83-23 W5M		0	5.01	317.23	0	0	0.9996	0	142.21	1.28	95.30	19.436	48.70	24.82	0	7.3	0	0	260	340	446
358286	15-27-83-23 W5M		0	5.01	317.23	0	0	0.9996	0	142.21	1.28	95.30	19.436	48.70	24.82	0	7.3	0	0	260	340	446
358293	NE-28-83-23 W5M	APR 7 1978	0.33	2.00	313.03	0	-0.0994	0	0.4998	232.34	-0.05	118.00	6.24	25.00	40.03	17.2	8	1.04	919	257	462	581
358293	NE-28-83-23 W5M	APR 7 1978	0.33	2.00	313.03	0	-0.0994	0.4998	0	232.34	-0.05	118.00	6.24	25.00	40.03	17.2	8	0	919	257	462	581
358293	NE-28-83-23 W5M	APR 7 1978	0.33	2.00	313.03	0	-0.0994	0.4998	0	232.34	-0.05	118.00	6.24	25.00	40.03	17.2	8	0	919	257	462	581
358293	NE-28-83-23 W5M	AUG 7 1987	0.35	2.00	323.03	0	-0.0056	0.5698	0	270.39	-0.02	118.00	6.24	25.00	39.03	16.6	7.9	0	928	265	455	622
358293	NE-28-83-23 W5M	AUG 7 1987	0.35	2.00	323.03	0	-0.0056	0.5698	0	270.39	-0.02	118.00	6.24	25.00	39.03	16.6	7.9	0	928	265	455	622
358349	SE-33-83-23 W5M	MAY 10 1976	0.43	4.00	344.03	0	-0.0994	0	0.2996	229.34	0.5	105.00	6.548	22.00	33.03	0	7.2	0.85	960	282	396	568
358349	SE-33-83-23 W5M	MAY 10 1976	0.43	4.00	344.03	0	-0.0994	0.2996	0	229.34	0.5	105.00	6.548	22.00	33.03	0	7.2	0	960	282	396	568
358350	SE-33-83-23 W5M	JUN 2 1983	0.44	3.00	319.03	0	-0.0504	0	0.7994	234.34	0.11	114.00	5.832	27.00	37.03	15.6	7.9	0.98	909	262	437	581
358350	SE-33-83-23 W5M	JUN 2 1983	0.44	3.00	319.03	0	-0.0504	0.7994	0	234.34	0.11	114.00	5.832	27.00	37.03	15.6	7.9	0	909	262	437	581
358353	8-33-83-23 W5M		0	0	231.83	6	0	0	0	200.29	1.35	91.30	6.956	28.00	36.93	0	7.75	0	0	200	370	590
358353	8-33-83-23 W5M		0	0	231.83	6	0	0	0	200.29	1.35	91.30	6.956	28.00	36.93	0	7.75	0	0	200	370	590
358354	8-33-83-23 W5M		0	4.00	225.72	0	0	0	0	145.21	40	70.50	6.752	40.10	24.12	0	7.5	0	0	185	275	480
358354	8-33-83-23 W5M		0	4.00	225.72	0	0	0	0	145.21	40	70.50	6.752	40.10	24.12	0	7.5	0	0	185	275	480
358359	SW-34-83-23 W5M	JUN 20 1972	0	2.00	0	0	0	0	0	165.24	-0.1	100.00	0	0	29.02	0	7.3	0	780	259	372	696
358359	SW-34-83-23 W5M	JUN 20 1972	0	2.00	0	0	0	0	1.9992	165.24	-0.1	100.00	0	0	29.02	0	7.3	0	780	259	372	696
358360	SE-34-83-23 W5M	MAY 26 1982	0.27	3.00	310.03	-5.001	-0.0504	2.8476	0	160.24	-0.02	-1	0.612	195.00	-1	15.8	8.3	0	885	256	-5	526
358360	SE-34-83-23 W5M	MAY 26 1982	0.31	3.00	307.03	0	-0.0504	2.6978	0	150.22	-0.02	97.00	5.216	16.00	33.03	16	8.2	0	774	252	377	467
358360	SE-34-83-23 W5M	MAY 26 1982	0.31	3.00	307.03	0	-0.0504	0	2.6978	150.22	-0.02	97.00	5.216	16.00	33.03	16	8.2	0.99	774	252	377	467
358360	SE-34-83-23 W5M	MAY 26 1982	0.31	3.00	307.03	0	-0.0504	2.6978	0	150.22	-0.02	97.00	5.216	16.00	33.03	16	8.2	0	774	252	377	467
358360	SE-34-83-23 W5M	MAY 26 1982	0.27	3.00	310.03	-5.001	-0.0504	0	2.8476	160.24	-0.02	-1	0.612	195.00	-1.00	15.8	8.3	0.97	885	256	-5	526

TABLE 2
ALBERTA WATER WELL RECORDS CHEMISTRY RESULTS
FOR 1.6 KM RADIUS FROM NE27-083-23 W5M
GRIMSHAW SUBDIVISION

Well ID	Location	SampleDate	Fluoride	Chloride	Bicarbonate	Carbonate	Nitrite	Nitrate	Nitrite+Nitrate as Nitrogen	Sulphate	Iron	Calcium	Potassium	Sodium	Magnesium	Silicon dioxide	PH	Ion Balance	Electrical Conductivity	Total Alkalinity	Total Hardness	Total Dissolved Solids
Units			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		%	dS/m	mg/L	mg/L	mg/L
CDWQ[1] Guideline			1.5[2]	250[3]	--	--	1[2]	10[2]	--	500[3]	0.3[3]	--	--	200[3]	--	--	7-10.5[3]	--	--	--	--	500[3]
358361	NW-34-83-23 W5M	AUG 31 1988	0.24	17.42	227.02	0	0.0224	11.5402	0	130.19	-0.01	90.00	5.524	23.00	31.03	17.4	7.2	0	738	186	352	461
358362	NW-34-83-23 W5M		0	39.05	152.52	0	0	7.994	0	166.24	12.3	76.10	5.932	25.50	32.83	0	7.5	0	0	125	325	522
358362	NW-34-83-23 W5M		0	39.05	152.52	0	0	7.994	0	166.24	12.3	76.10	5.932	25.50	32.83	0	7.55	0	0	125	325	522
358363	12-34-83-23 W5M		0	0	128.11	12	0	0	0	102.15	2.35	52.00	5.628	16.60	19.42	0	8.2	0	0	125	210	388
358363	12-34-83-23 W5M		0	0	128.11	12	0	0	0	102.15	2.35	52.00	5.628	16.60	19.42	0	8.2	0	0	125	210	388
358368	SW-35-83-23 W5M		0.53	3.00	468.05	0	-0.0504	0	0.0602	697.01	0.05	252.00	7.06	24.00	102.08	12.3	8.2	1	1693	384	1050	1315
358368	SW-35-83-23 W5M		0.53	3.00	468.05	0	-0.0504	0.0602	0	697.01	0.05	252.00	7.06	24.00	102.08	12.3	8.2	0	1693	384	1050	1315
358369	SW-35-83-23 W5M	JUN 2 1982	0.2	3.00	580.06	0	-0.0504	0	-0.0504	506.74	0.04	154.00	5.42	98.00	80.07	12	8	0.93	1645	476	71	976
358369	SW-35-83-23 W5M	JUN 2 1982	0.2	3.00	580.06	0	-0.0504	-0.0504	0	506.74	0.04	154.00	5.42	98.00	80.07	12	8	0	1645	476	71	976
358372	SW-35-83-23 W5M	APR 12 1984	0.22	44.06	748.08	0	-0.0504	-0.0504	0	1652.40	4.8	450.00	10.232	335.00	120.10	19.8	7.5	0	3740	614	1617	2977
358372	SW-35-83-23 W5M	APR 12 1984	0.22	44.06	748.08	0	-0.0504	0	-0.0504	1652.40	4.8	450.00	10.232	335.00	120.10	19.8	7.5	0.99	3740	614	1617	2977
358377	SW-35-83-23 W5M	SEP 10 1986	0.11	3.00	546.05	0	-0.0504	0	-0.0504	400.58	0.38	144.00	6.14	76.00	86.07	16.6	8.3	1.02	1520	448	713	984
358377	SW-35-83-23 W5M	SEP 10 1986	0.11	3.00	546.05	0	-0.0504	-0.0504	0	400.58	0.38	144.00	6.14	76.00	86.07	16.6	8.3	0	1520	448	713	984
358384	SW-35-83-23 W5M	OCT 20 1988	0.06	6.01	524.05	0	-0.0014	-0.0098	0	560.82	5.7	160.00	6.444	77.00	105.09	13.4	7.82	0	1670	430	832	1172
358596	8-33-83-23 W5M		0	0	97.61	24	0	0	0	189.27	1.62	53.70	5.832	38.50	31.93	0	8.2	0	0	120	265	480
358596	8-33-83-23 W5M		0	0	97.61	24	0	0	0	189.27	1.62	53.70	5.832	38.50	31.93	0	8.2	0	0	120	265	480
358596	8-33-83-23 W5M		0	0	97.61	24	0	0	0	189.27	1.62	53.70	5.832	38.50	31.93	0	8.2	0	0	120	265	480
Averages (geomean)			0.39	88.13	172.55	12		0.80	0.80	208.34	**0.57**	85.49	6.08	37.79	35.80	17.60	7.8	0.9	745	177	366	**585**

Notes:
[1] Health Canada 2017 "Canadian Drinking Water Quality" Guidelines
[2] Maximum Allowable Concentration
[3] Aesthetic Objective
0 - No value reported
BOLD Does not meet applicable guidelines

TABLE 3
PUMPING TESTS ANALYSES RESULTS
WELLS #9516204, 1665261, 358281, and 358279

AEP Well ID	Location	Static Water Level (mbgs)	Aquifer	Available Drawdown	Geometric mean of Hydraulic Conductivities (m/s)	Geometric mean of Transmissivity (m^2/s)	Q20	Q20	Aquifer
			(m)	(m)	(m/sec)	(m^2/sec)	(m^3/sec)	(m3/year)	
9516204	16-27-083-23 W5M	10.12	5.2	43.22	1.53E-06	7.96E-06	1.64E-04	5,162	Sandstone
1665261	SE33-083-23 W5M	18.9	7.72	29.87	1.12E-06	8.65E-06	1.23E-04	3,877	Sandstone
358281	NW27-083-23 W5M	3.96	2.44	1.83	7.65E-03	1.87E-02	3.42E-02	1,077,270	Gravel
358279	NW27-083-23 W5M	1.44	4.97	3.72	1.57E-03	7.80E-03	1.30E-01	4,105,987	Gravel

TABLE 4
IMPACT ASSESSMENT AFTER 20 YEARS
OF PUMPING WELL #9516204 AT Q=2.4 L/MIN

Distance from Well #9516204 (m)	0	400	800	1200	2000
Drawdown at Distance (m)	6	1	0.5	0.2	0

THURBER

APPENDIX C

Pumping Tests Analysis and Piper Plot

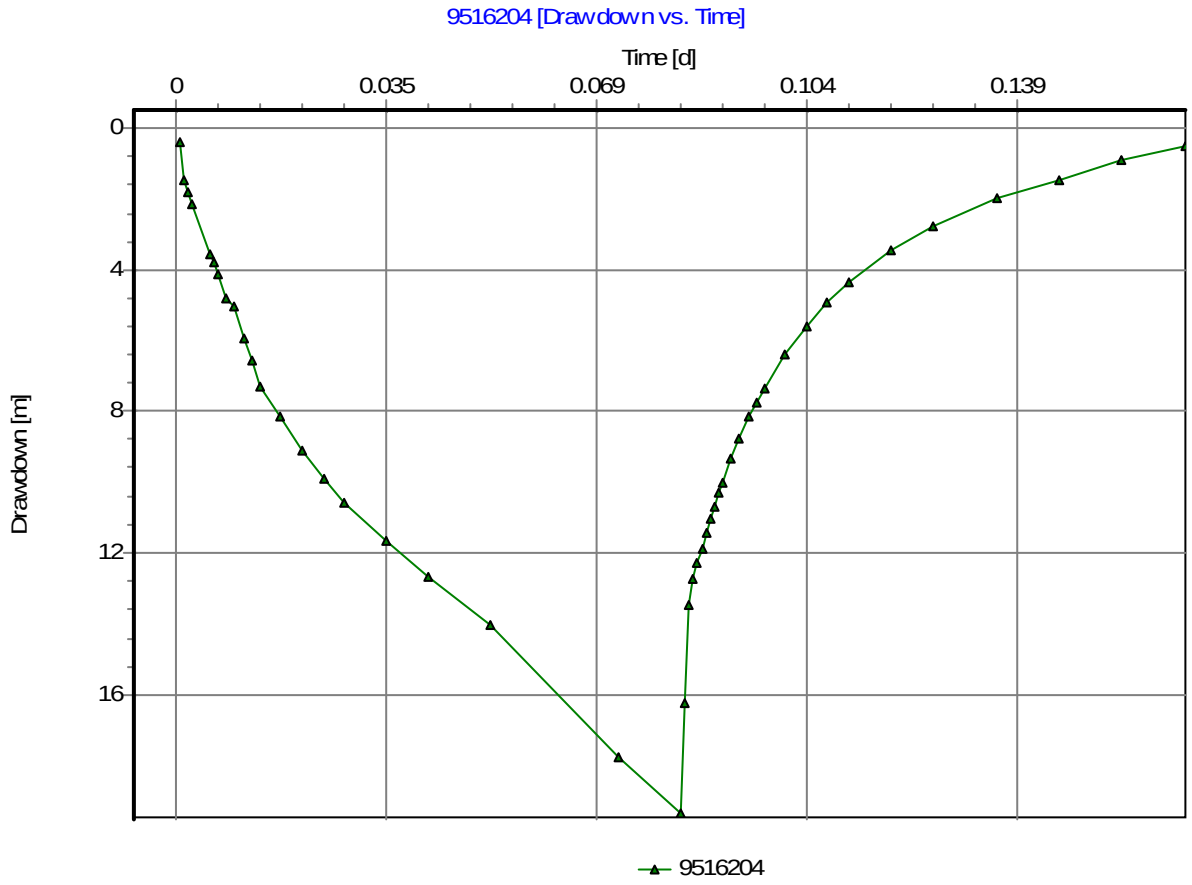
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **9516204**

Analysis Method: **Drawdown vs. Time**

Analysis Results:

Test parameters:

Pumping Well:	9516204	Aquifer Thickness:	5.2 [m]
Casing radius:	0.056 [m]		
Screen length:	6.1 [m]		
Boring radius:	0.08 [m]		
Discharge Rate:	0.53 [l/s]		

Comments:

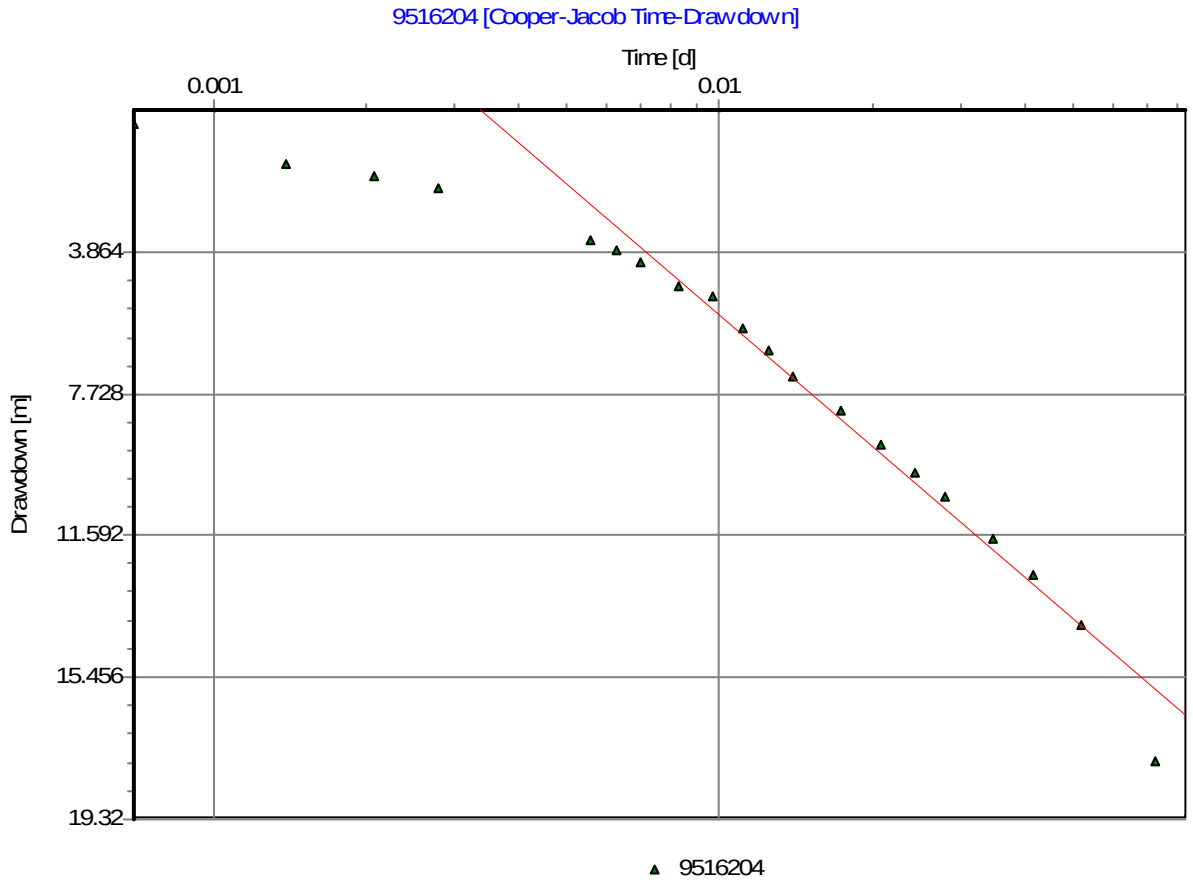
Evaluated by: MJB

Evaluation Date: 12/15/2017

Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project:	Grimshaw Subdivision-Hg Study
Number:	21134
Client:	Borderline Surveys Ltd.



Pumping Test: **9516204**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:				
	Transmissivity:	8.21E-6 [m²/s]	Conductivity:	1.58E-6 [m/s]

Test parameters:				
	Pumping Well:	9516204	Aquifer Thickness:	5.2 [m]
	Casing radius:	0.056 [m]	Confined Aquifer	
	Screen length:	6.1 [m]		
	Boring radius:	0.08 [m]		
	Discharge Rate:	0.53 [l/s]		

Comments:

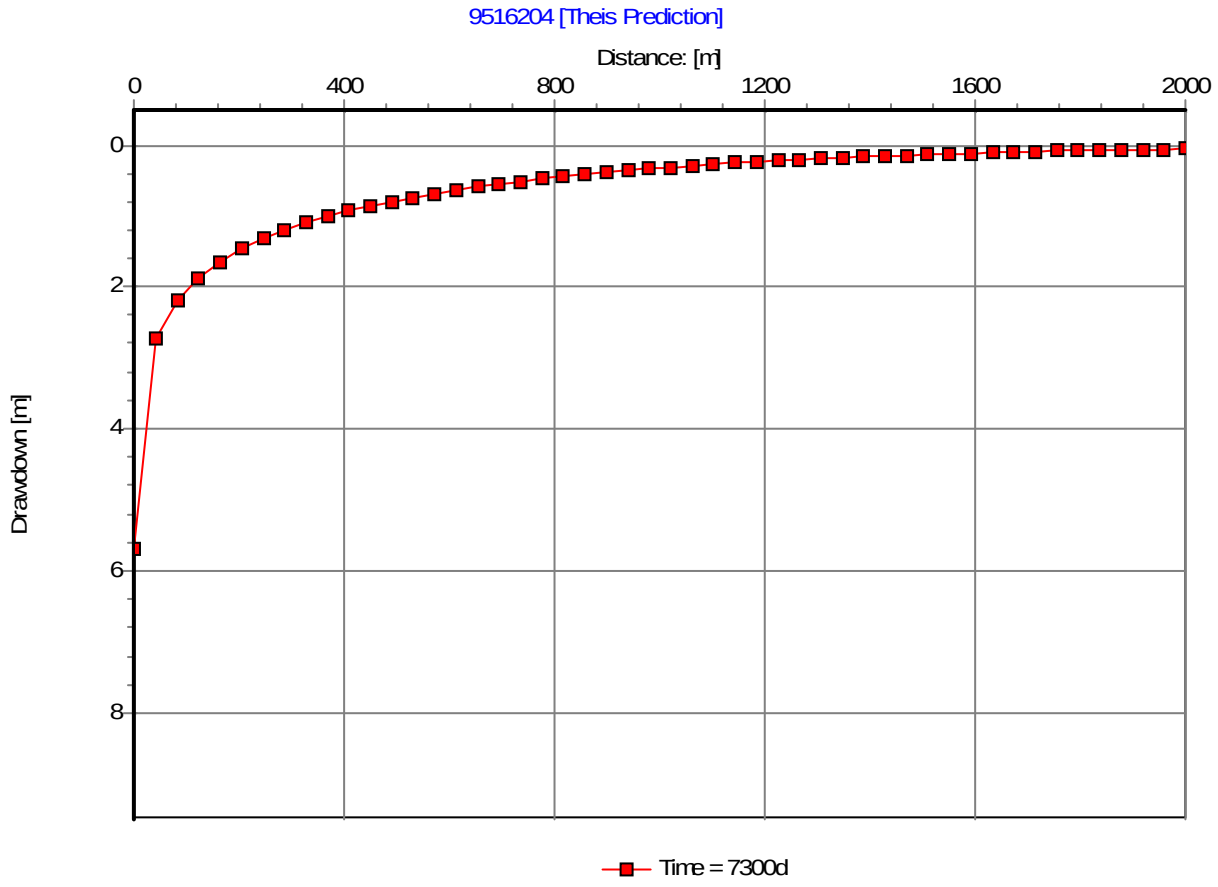
Evaluated by: MJB

Evaluation Date: 12/15/2017

Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project:	Grimshaw Subdivision-Hg Study
Number:	21134
Client:	Borderline Surveys Ltd.



Pumping Test: **9516204**

Analysis Method: **Theis Prediction**

Analysis Results:

Transmissivity:	8.00E-6 [m²/s]
Storativity:	7.00E-3

Test parameters:

Pumping Well:	9516204	Aquifer Thickness:	5.2 [m]
Casing radius:	0.056 [m]	Drawdown vs. Distance	
Screen length:	6.1 [m]	Min. Distance:	1 [m]
Boring radius:	0.08 [m]	Max. Distance:	2000 [m]
Discharge Rate:	0.53 [l/s]	Time:	7300 [d]
Number of Data Points:	50		

Comments:

Evaluated by: MJB

Evaluation Date: 12/20/2017

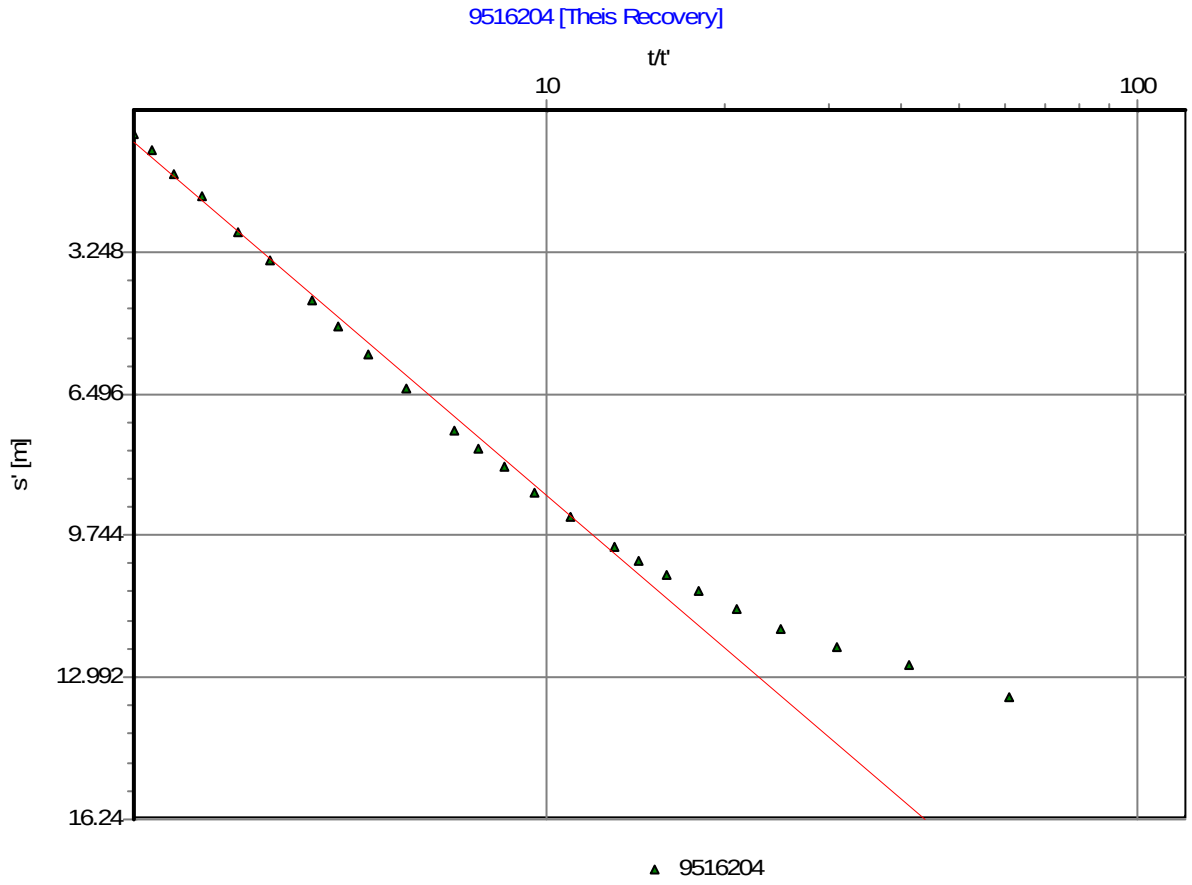
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **9516204**

Analysis Method: **Theis Recovery**

Analysis Results:	Transmissivity:	8.39E-6 [m²/s]	Conductivity:	1.61E-6 [m/s]

Test parameters:				
	Pumping Well:	9516204	Aquifer Thickness:	5.2 [m]
	Casing radius:	0.056 [m]	Confined Aquifer	
	Screen length:	6.1 [m]		
	Boring radius:	0.08 [m]		
	Discharge Rate:	0.53 [l/s]		
	Pumping Time	120 [min]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

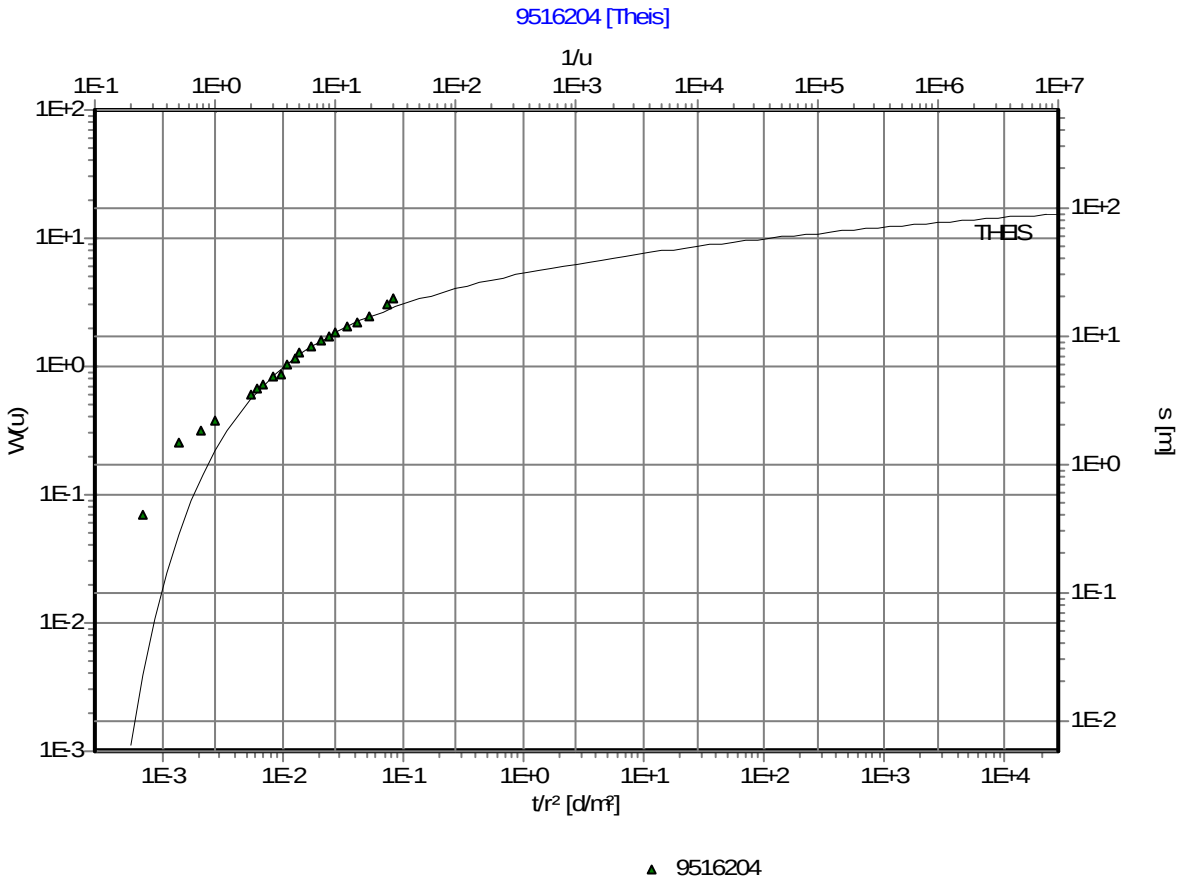
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **9516204**

Analysis Method: **Theis**

Analysis Results:	Transmissivity:	7.33E-6 [m²/s]	Conductivity:	1.41E-6 [m/s]
	Storativity:	7.00E-3		
Test parameters:	Pumping Well:	9516204	Aquifer Thickness:	5.2 [m]
	Casing radius:	0.056 [m]	Confined Aquifer	
	Screen length:	6.1 [m]		
	Boring radius:	0.08 [m]		
	Discharge Rate:	0.53 [l/s]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

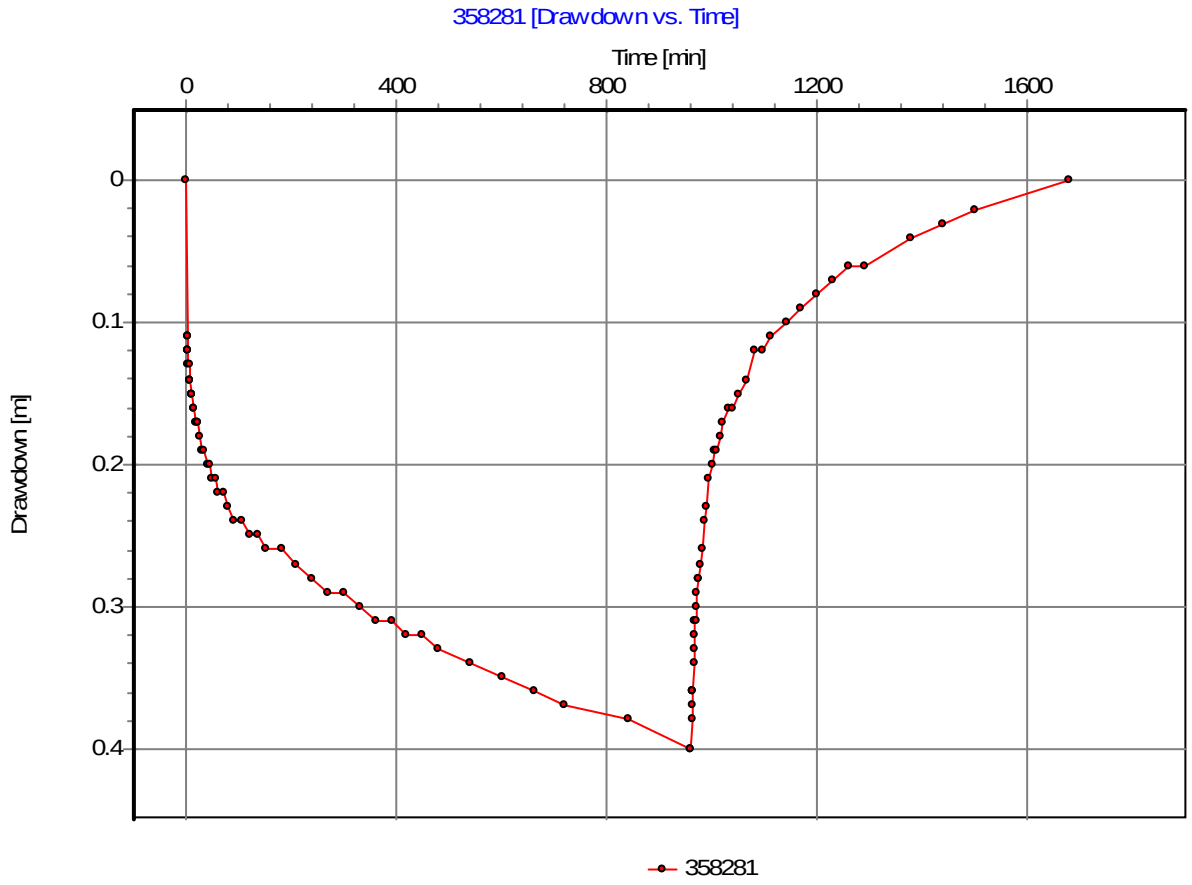
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **358281**

Analysis Method: **Drawdown vs. Time**

Analysis Results:

Test parameters:				
	Pumping Well:	358281	Aquifer Thickness:	2.44 [m]
	Casing radius:	0.08 [m]		
	Screen length:	2.44 [m]		
	Boring radius:	0.1 [m]		
	Discharge Rate:	11.3 [l/s]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

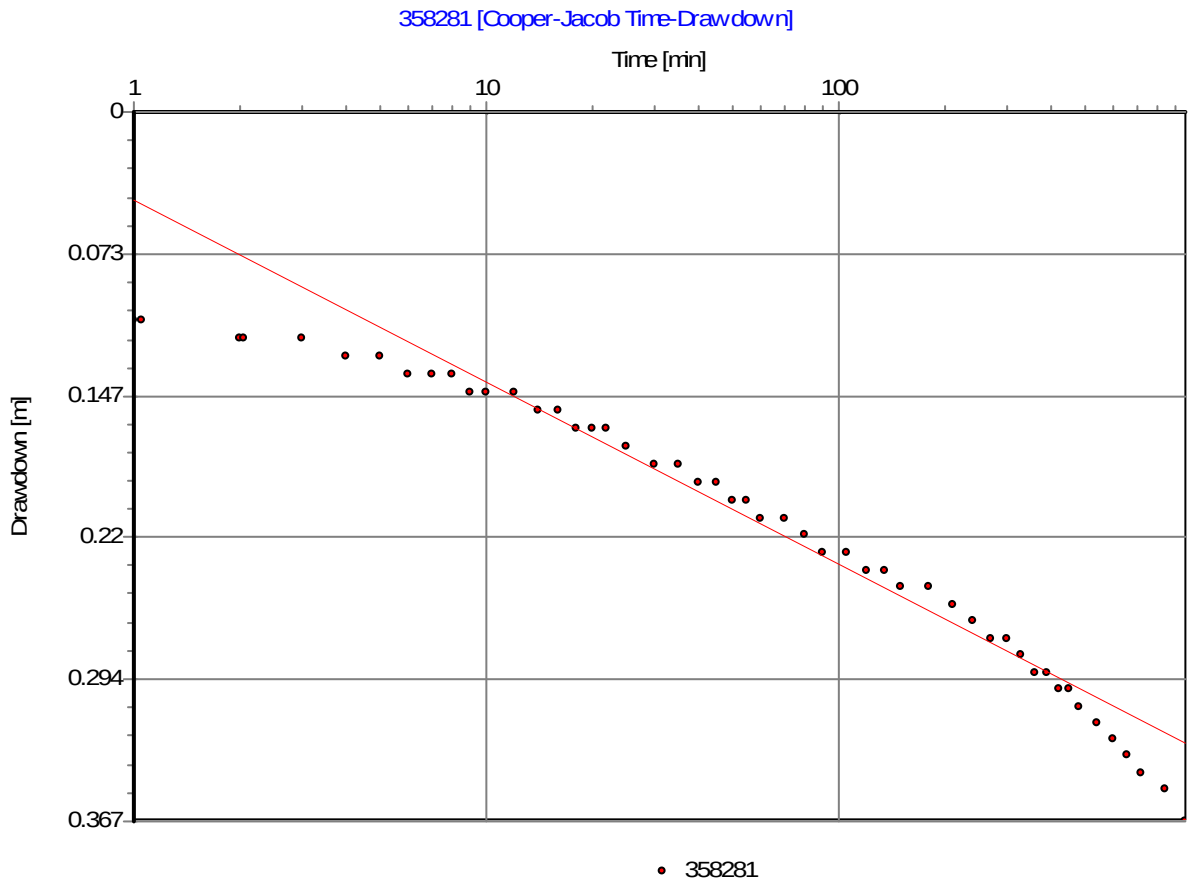
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **358281**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:				
	Transmissivity:	2.19E-2 [m²/s]	Conductivity:	8.99E-3 [m/s]

Test parameters:				
	Pumping Well:	358281	Aquifer Thickness:	2.44 [m]
	Casing radius:	0.08 [m]	Unconfined Aquifer	
	Screen length:	2.44 [m]		
	Boring radius:	0.1 [m]		
	Discharge Rate:	11.3 [l/s]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

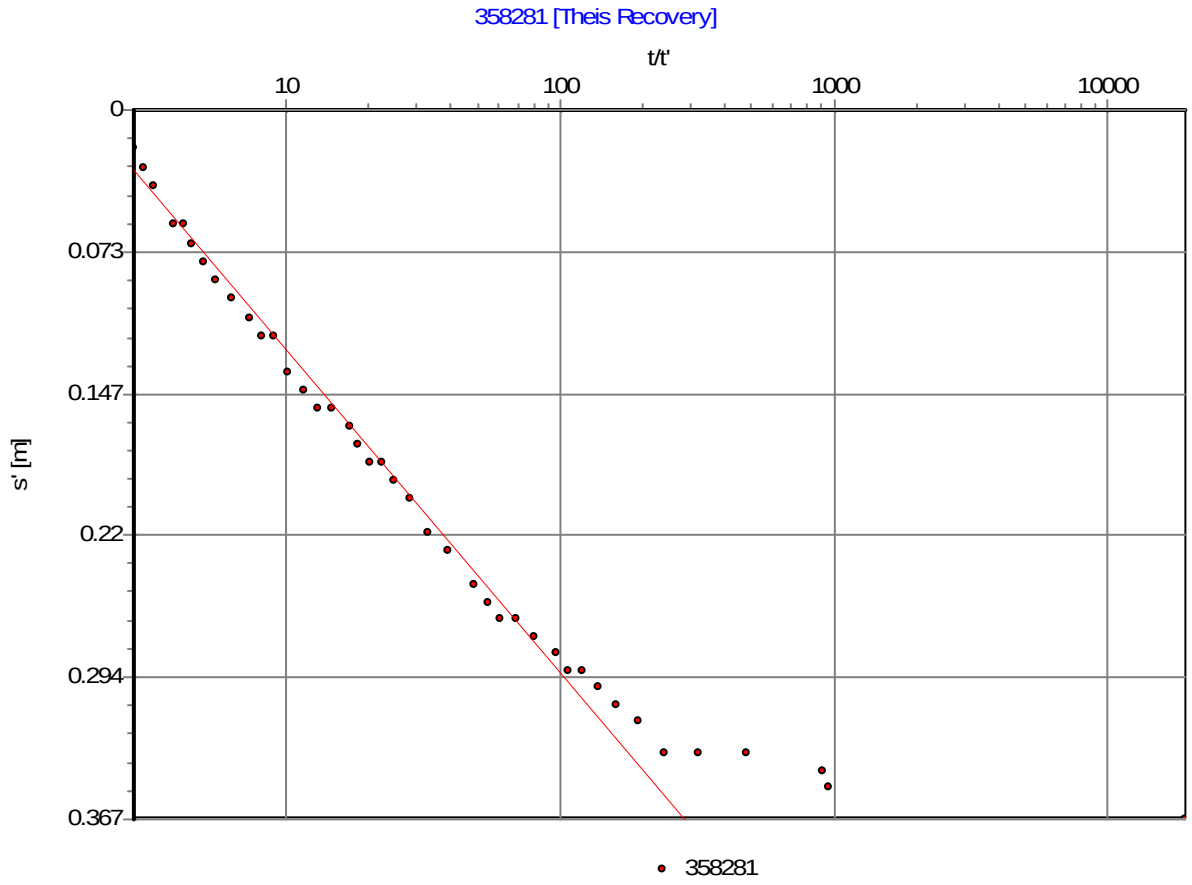
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **358281**

Analysis Method: **Theis Recovery**

Analysis Results:				
	Transmissivity:	1.24E-2 [m²/s]	Conductivity:	5.07E-3 [m/s]

Test parameters:				
	Pumping Well:	358281	Aquifer Thickness:	2.44 [m]
	Casing radius:	0.08 [m]	Unconfined Aquifer	
	Screen length:	2.44 [m]		
	Boring radius:	0.1 [m]		
	Discharge Rate:	11.3 [l/s]		
	Pumping Time	960 [min]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

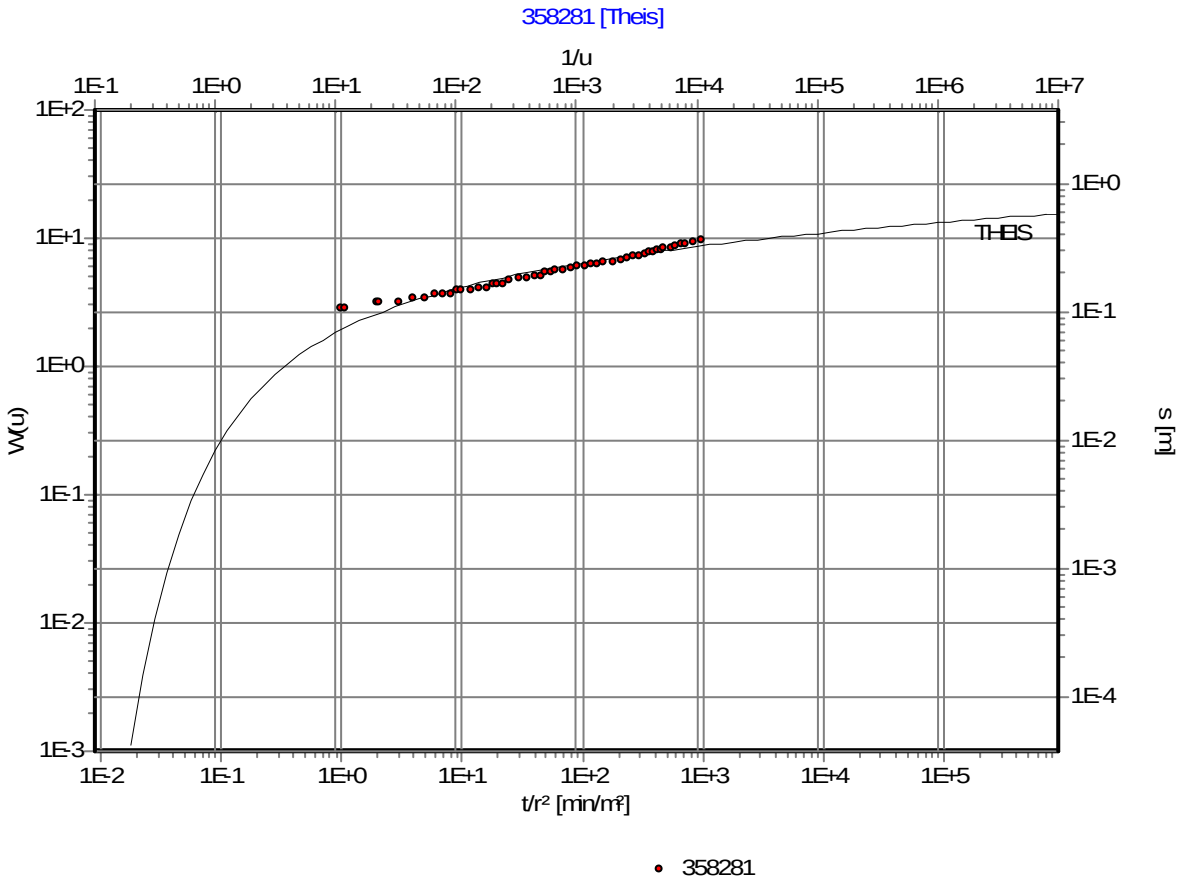
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **358281**

Analysis Method: **Theis**

Analysis Results:				
	Transmissivity:	2.40E-2 [m²/s]	Conductivity:	9.84E-3 [m/s]

Test parameters:				
	Pumping Well:	358281	Aquifer Thickness:	2.44 [m]
	Casing radius:	0.08 [m]	Unconfined Aquifer	
	Screen length:	2.44 [m]		
	Boring radius:	0.1 [m]		
	Discharge Rate:	11.3 [l/s]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

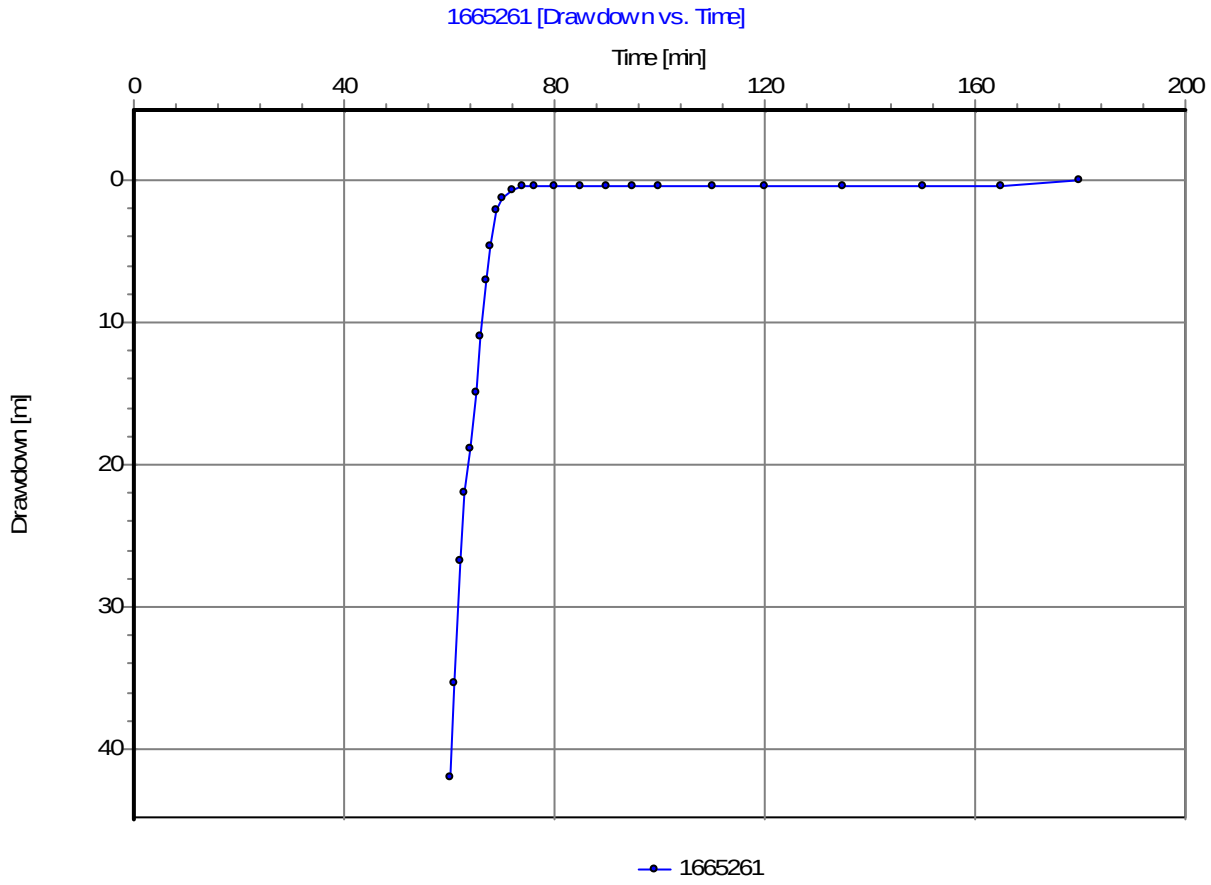
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **1665261**

Analysis Method: **Drawdown vs. Time**

Analysis Results:

Test parameters:				
	Pumping Well:	1665261	Aquifer Thickness:	7.62 [m]
	Casing radius:	0.057 [m]		
	Screen length:	7.62 [m]		
	Boring radius:	0.064 [m]		
	Discharge Rate:	1.82 [l/s]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

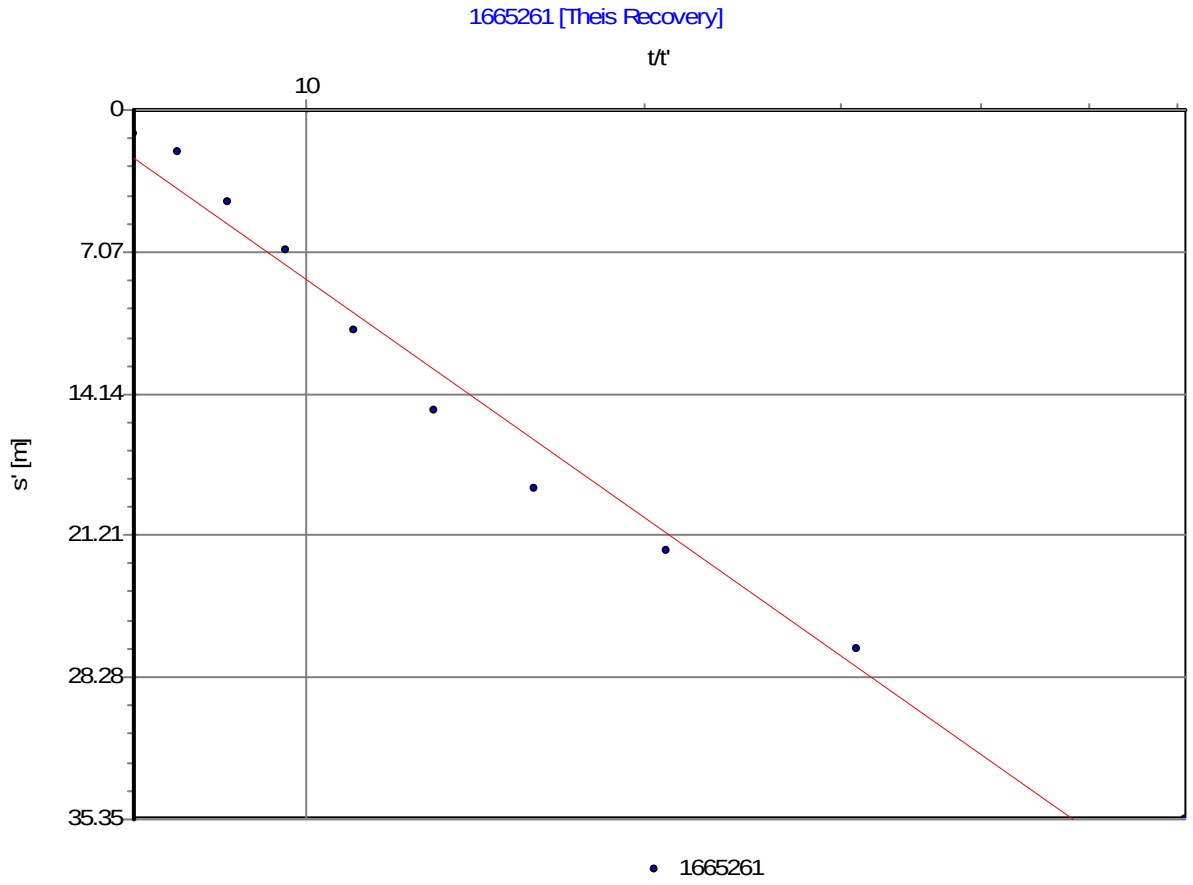
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **1665261**

Analysis Method: **Theis Recovery**

Analysis Results:				
	Transmissivity:	8.50E-6 [m²/s]	Conductivity:	1.12E-6 [m/s]

Test parameters:				
	Pumping Well:	1665261	Aquifer Thickness:	7.62 [m]
	Casing radius:	0.057 [m]	Confined Aquifer	
	Screen length:	7.62 [m]		
	Boring radius:	0.064 [m]		
	Discharge Rate:	1.82 [l/s]		
	Pumping Time	60 [min]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

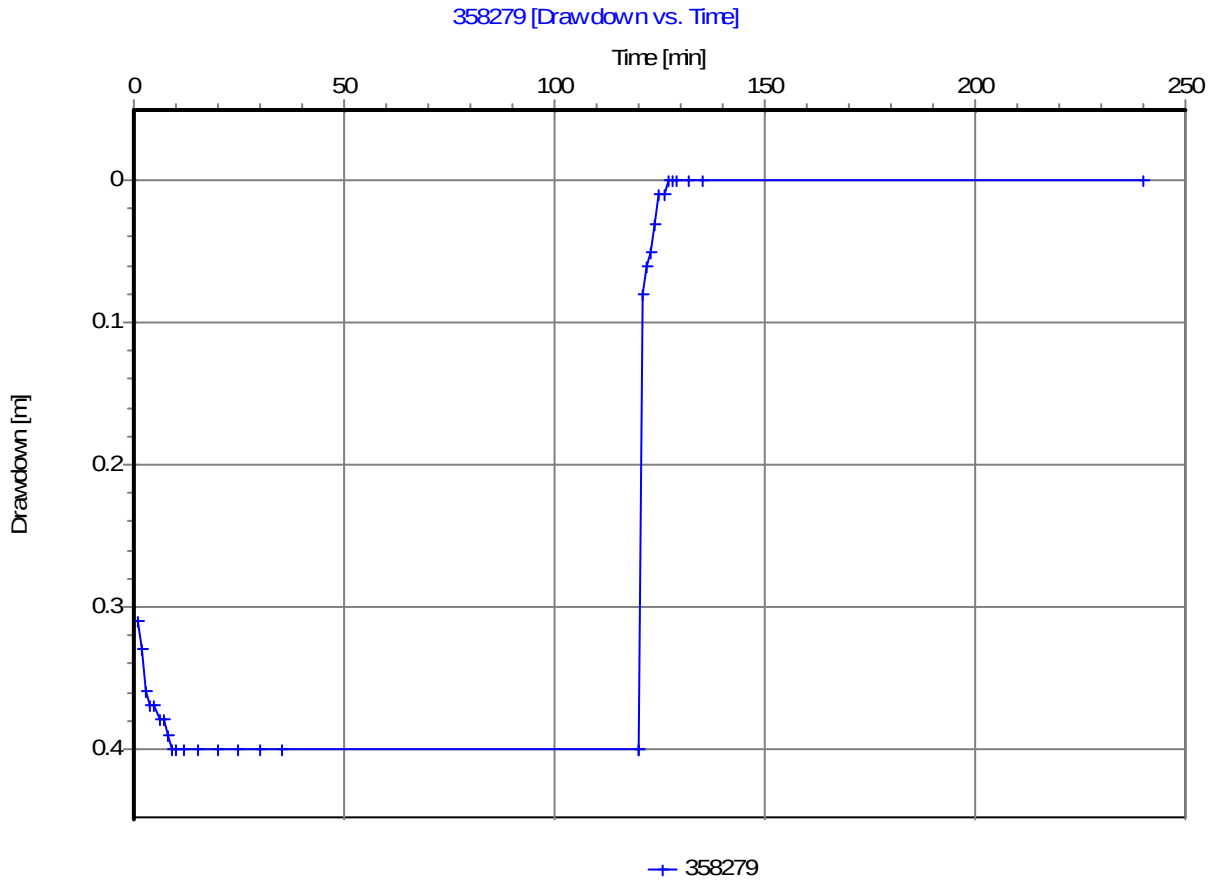
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **358279**

Analysis Method: **Drawdown vs. Time**

Analysis Results:

Test parameters:				
	Pumping Well:	358279	Aquifer Thickness:	4.97 [m]
	Casing radius:	0.079 [m]		
	Screen length:	1.83 [m]		
	Boring radius:	0.1 [m]		
	Discharge Rate:	4.5 [l/s]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

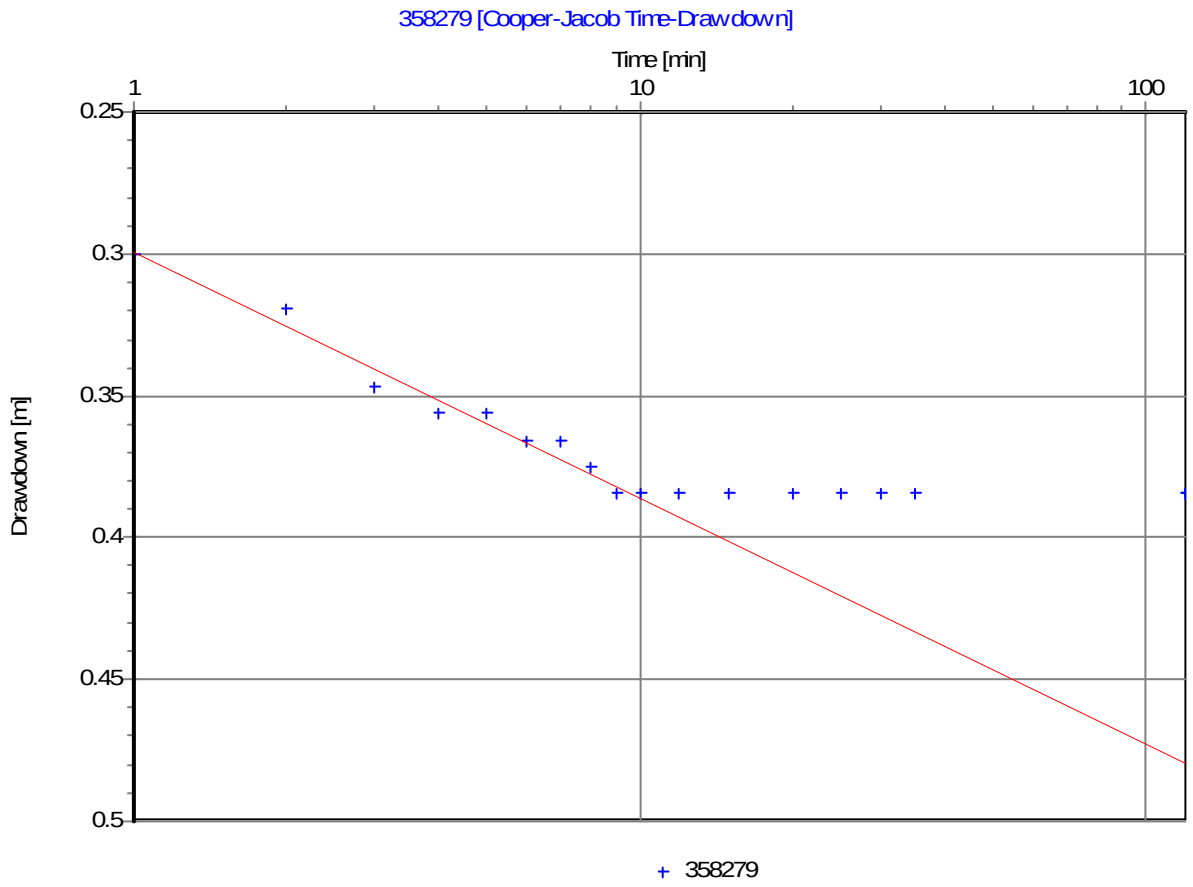
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **358279**

Analysis Method: **Cooper-Jacob Time-Drawdown**

Analysis Results:				
	Transmissivity:	9.49E-3 [m²/s]	Conductivity:	1.91E-3 [m/s]

Test parameters:				
	Pumping Well:	358279	Aquifer Thickness:	4.97 [m]
	Casing radius:	0.079 [m]	Unconfined Aquifer	
	Screen length:	1.83 [m]		
	Boring radius:	0.1 [m]		
	Discharge Rate:	4.5 [l/s]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

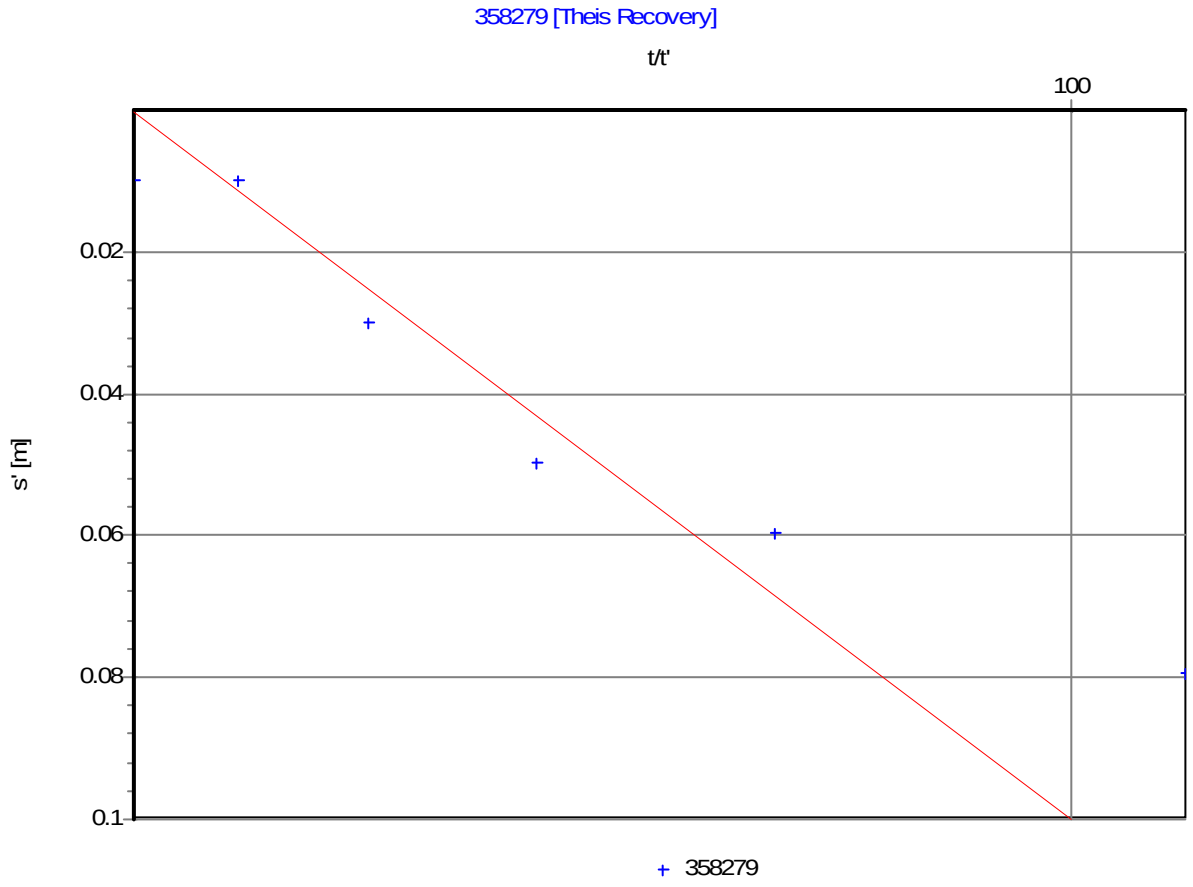
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **358279**

Analysis Method: **Theis Recovery**

Analysis Results:				
	Transmissivity:	5.60E-3 [m²/s]	Conductivity:	1.13E-3 [m/s]

Test parameters:				
	Pumping Well:	358279	Aquifer Thickness:	4.97 [m]
	Casing radius:	0.079 [m]	Unconfined Aquifer	
	Screen length:	1.83 [m]		
	Boring radius:	0.1 [m]		
	Discharge Rate:	4.5 [l/s]		
	Pumping Time	120 [min]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

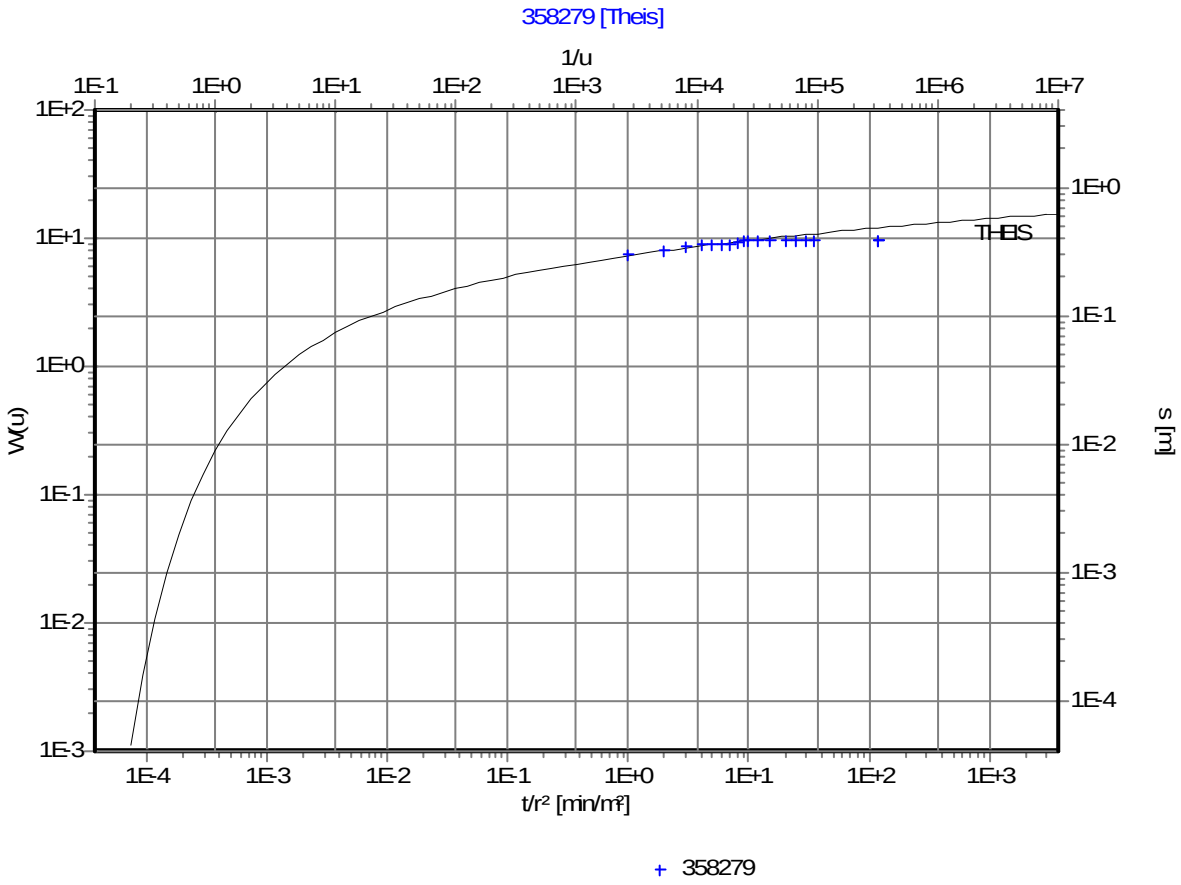
Thurber Engineering Ltd.
4127 Roper Road
Edmonton, Alberta, T6B 3S5
Phone: 780 438-1460

Pumping Test Analysis Report

Project: Grimshaw Subdivision-Hg Study

Number: 21134

Client: Borderline Surveys Ltd.



Pumping Test: **358279**

Analysis Method: **Theis**

Analysis Results:				
	Transmissivity:	8.89E-3 [m²/s]	Conductivity:	1.79E-3 [m/s]

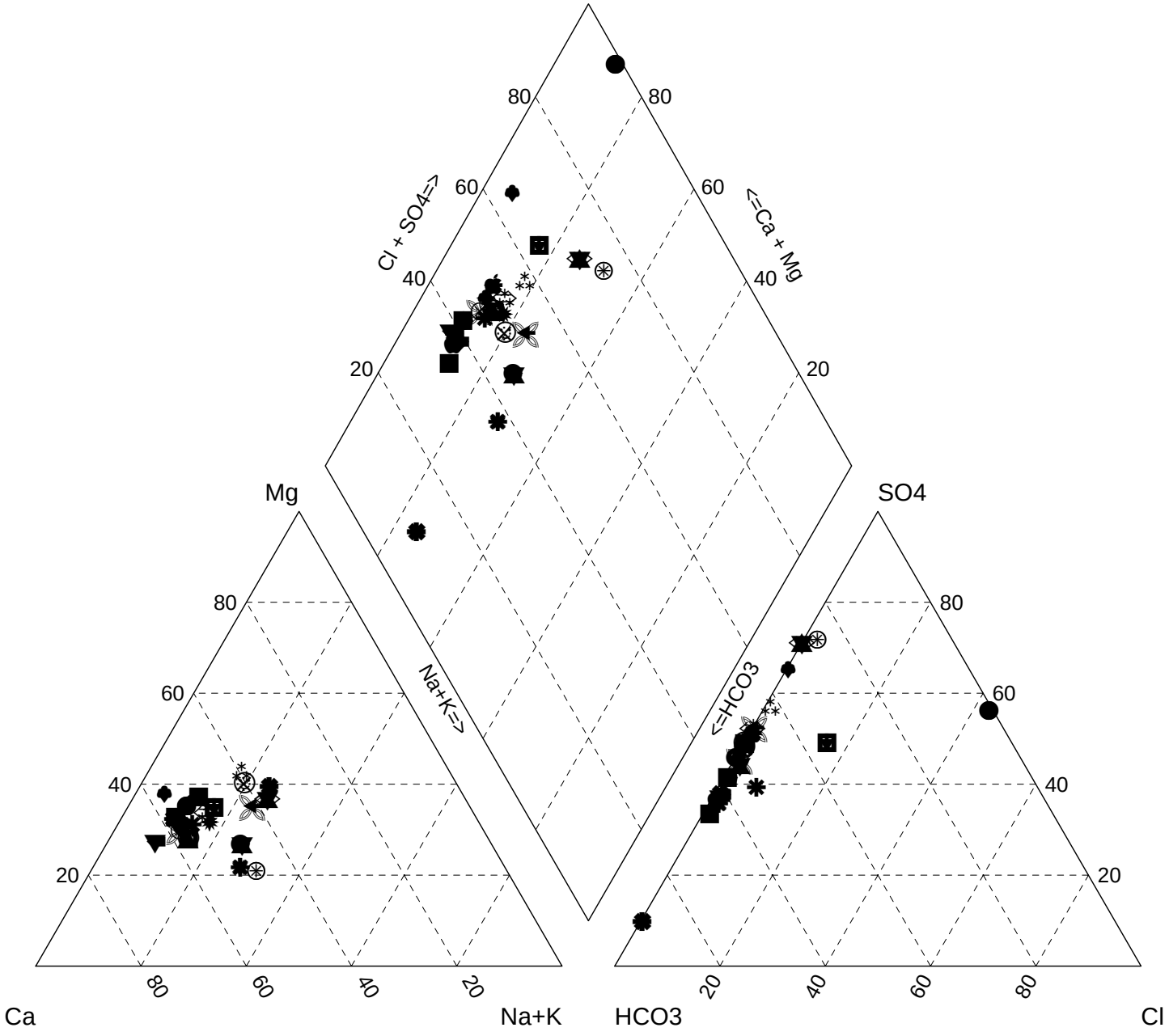
Test parameters:				
	Pumping Well:	358279	Aquifer Thickness:	4.97 [m]
	Casing radius:	0.079 [m]	Unconfined Aquifer	
	Screen length:	1.83 [m]		
	Boring radius:	0.1 [m]		
	Discharge Rate:	4.5 [l/s]		

Comments:

Evaluated by: MJB

Evaluation Date: 12/15/2017

Piper Plot



DESCRIPTION: Water Wells completed in surficial deposits

THURBER ENGINEERING LTD.	PROJECT: Grimshaw Subdivision	PROJECT NO: 21134
	CLIENT: Borderline Surveys Ltd.	DATE: 20 December 2017

THURBER

APPENDIX D

WW Records

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 1665261
GoA Well Tag No.
Drilling Company Well ID
Date Report Received
GOWN ID

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
TOM YASINSKI TRUCKING	P.O. BOX 1468	GRIMSHAW	AB	CA	T0H 1W0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	33	83	23	5				SHOP

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.236600 Longitude -117.564000
How Location Obtained: Not Verified

Elevation m
How Elevation Obtained: Not Obtained

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Domestic & Industrial

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
1.83		Gray Clay
5.49		Light Brown Fine Grained Sand
18.29		Gravel
27.43		Dark Gray Clay
32.00		Dark Gray Shale
35.05		Light Brown Fine Grained Sandstone
48.77		Dark Gray Shale
56.39	Yes	Gray Water Bearing Sandstone
60.96		Gray Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 27.28 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
2005/09/01	109.11	18.90

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
60.96 m		2005/09/01	2005/09/01

Borehole

Diameter (cm)	From (m)	To (m)
12.70	0.00	60.96

Surface Casing (if applicable)
Steel
Size OD : 14.13 cm
Wall Thickness : 0.655 cm
Bottom at : 29.57 m

Well Casing/Liner
Plastic
Size OD : 11.43 cm
Wall Thickness : 0.544 cm
Top at : 6.10 m
Bottom at : 60.96 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)
48.77	56.39	0.051		7.62

Perforated by: Machine

Annular Seal Driven
Placed from 6.10 m to 29.57 m
Amount

Other Seals

Type	At (m)

Screen Type
Size OD : cm

From (m)	To (m)	Slot Size (cm)

Attachment
Top Fittings
Bottom Fittings

Pack
Type Unknown
Grain Size
Amount Unknown

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
BRADLEY SAVILLE

Certification No
VA7612

Company Name
SAVILLE DRILLING LTD.

Copy of Well report provided to owner
Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 1665261
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
TOM YASINSKI TRUCKING	P.O. BOX 1468	GRIMSHAW	AB	CA	T0H 1W0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	33	83	23	5				SHOP

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.236600 Longitude -117.564000
How Location Obtained: Not Verified

Elevation m
How Elevation Obtained: Not Obtained

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level 91.44 cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 27.28 L/min
Recommended Pump Intake Depth (From TOC) 45.72 m
Pump Installed Yes
Type SUB @ 150'
Depth m
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth m
Gas
Depth m
Well Disinfected Upon Completion
Geophysical Log Taken
Submitted to ESRD
Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well

Yield Test

Taken From Ground Level
Measurement in Metric

Test Date	Start Time	Static Water Level
2005/09/01	12:00 AM	18.90 m

Method of Water Removal

Type Air
Removal Rate 109.11 L/min
Depth Withdrawn From 60.96 m

If water removal period was < 2 hours, explain why

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
18.90	0:00	60.96
	1:00	54.25
	2:00	45.72
	3:00	40.84
	4:00	37.80
	5:00	33.83
	6:00	29.87
	7:00	25.91
	8:00	23.47
	9:00	21.03
	10:00	20.12
	12:00	19.51
	14:00	19.20
	16:00	19.20
	20:00	19.20
	25:00	19.20
	30:00	19.20
	35:00	19.20
	40:00	19.20
	50:00	19.20
	60:00	19.20
	75:00	19.20
	90:00	19.20
	105:00	19.20
60.96	120:00	18.90

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
BRADLEY SAVILLE

Certification No
VA7612

Company Name
SAVILLE DRILLING LTD.

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 1665876
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2008/11/07

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
PARKER, BRYAN	P.O. BOX 1325	GRIMSHAW	ALBERTA	CA	T0H 1W0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	14	26	83	23	5	1	1	9821349	

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.232330 Longitude -117.523240
How Location Obtained
Hand held autonomous GPS 20-30m

Elevation 618.13 m
How Elevation Obtained
Hand held autonomous GPS 20-30m

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Domestic

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
13.72		Dark Gray Clay
15.24		Gray Medium Grained Sand
23.47		Brown Medium Grained Sand
24.69	Yes	Gray Medium Grained Sandstone

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 45.46 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
2008/08/26	227.30	5.94

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
24.69 m	24.69 m	2008/08/26	2008/08/26

Borehole

Diameter (cm)	From (m)	To (m)
17.15	0.00	23.47
12.70	23.47	24.69

Surface Casing (if applicable)
Steel
Size OD : 14.12 cm
Wall Thickness : 0.655 cm
Bottom at : 23.47 m

Well Casing/Liner
Plastic
Size OD : 11.43 cm
Wall Thickness : 0.544 cm
Top at : 5.49 m
Bottom at : 24.69 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)

Perforated by Unknown

Annular Seal
Placed from m to m
Amount

Other Seals

Type	At (m)
Driven	23.47

Screen Type Stainless Steel
Size OD : 10.16 cm

From (m)	To (m)	Slot Size (cm)
23.47	24.69	0.051

Attachment Telescoped
Top Fittings Packer
Bottom Fittings Plug

Pack
Type Natural
Grain Size
Amount Unknown

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
CHASE SAVILLE

Certification No
75496A

Company Name
SAVILLE DRILLING LTD.

Copy of Well report provided to owner
Yes

Date approval holder signed
2008/08/26

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 1665876
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2008/11/07

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
PARKER, BRYAN	P.O. BOX 1325	GRIMSHAW	ALBERTA	CA	T0H 1W0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	14	26	83	23	5	1	1	9821349	

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.232330 Longitude -117.523240
How Location Obtained
Hand held autonomous GPS 20-30m

Elevation 618.13 m
How Elevation Obtained
Hand held autonomous GPS 20-30m

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level 91.44 cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 45.46 L/min
Recommended Pump Intake Depth (From TOC) 15.24 m
Pump Installed
Depth m
Type
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth m
Gas
Depth m
Well Disinfected Upon Completion
Geophysical Log Taken
Submitted to ESRD
Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well

77' - 81' ALSO FRACTURED, DRIVEN FROM 20' - 77',

Yield Test

Taken From Top of Casing
Depth to water level

Measurement in Metric

Test Date	Start Time	Static Water Level
2008/08/26	11:00 AM	5.94 m

Method of Water Removal

Type Air
Removal Rate 227.30 L/min
Depth Withdrawn From 24.38 m

If water removal period was < 2 hours, explain why

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
5.94	0:00	24.38
	1:00	17.07
	2:00	13.72
	3:00	10.97
	4:00	9.75
	5:00	9.14
	6:00	8.53
	7:00	7.92
	8:00	7.62
	9:00	7.32
	10:00	7.01
	12:00	6.71
	14:00	6.40
	16:00	6.10
	20:00	6.10
	25:00	6.10
	30:00	6.10
	35:00	6.10
	40:00	6.10
	50:00	6.10
	60:00	6.10
	75:00	6.10
	90:00	6.10
	105:00	6.10
	120:00	5.94

Water Diverted for Drilling

Water Source	Amount Taken		Diversion Date & Time
SE-4-67-22-W5	3182.26	L	2008/08/26 6:00 AM

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
CHASE SAVILLE

Certification No
75496A

Company Name
SAVILLE DRILLING LTD.

Copy of Well report provided to owner
Yes

Date approval holder signed
2008/08/26

Water Well Drilling Report

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

View in Imperial | Export to Excel

GIC Well ID 358264
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1981/06/22

GOWN ID

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
MIGHTY PEACE GOLF & COUNTRY CL	P.O. BOX 624 PEACE RIVER			CANADA	

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	23	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.214762 Longitude -117.511648
How Location Obtained: Map

Elevation 576.07 m
How Elevation Obtained: Estimated

Drilling Information

Method of Drilling
Cable Tool

Type of Work
New Well

Proposed Well Use
Domestic

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
1.22		Topsoil
6.71		Clay
11.28		Clay & Sand
17.68		Sand
18.29		Clay
21.64		Sand & Gravel

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 18.18 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1981/05/13	18.18	7.92

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
21.64 m		1981/05/11	1981/05/13

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	21.64

Surface Casing (if applicable)
Steel
Size OD : 16.81 cm
Wall Thickness : 0.516 cm
Bottom at : 21.34 m

Well Casing/Liner
Size OD : 0.00 cm
Wall Thickness : 0.000 cm
Top at : 0.00 m
Bottom at : 0.00 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)

Perforated by

Annular Seal Driven
Placed from 0.00 m to 20.73 m
Amount

Other Seals

Type	At (m)

Screen Type
Size OD : 0.00 cm

From (m)	To (m)	Slot Size (cm)

Attachment
Top Fittings
Bottom Fittings

Pack
Type
Grain Size
Amount 0.00

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
GRIMSHAW WATER WELL DRILLING LTD.

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 358264
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1981/06/22

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
MIGHTY PEACE GOLF & COUNTRY CL	P.O. BOX 624 PEACE RIVER			CANADA	

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	23	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.214762 Longitude -117.511648
How Location Obtained: Map

Elevation 576.07 m
How Elevation Obtained: Estimated

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level: cm
Is Artesian Flow:
Rate: L/min
Is Flow Control Installed:
Describe:

Recommended Pump Rate: 18.18 L/min
Recommended Pump Intake Depth (From TOC): m
Pump Installed:
Depth: m
Type:
Make:
H.P.:
Model (Output Rating):

Did you Encounter Saline Water (>4000 ppm TDS):
Depth: m
Gas:
Depth: m
Well Disinfected Upon Completion:
Geophysical Log Taken:
Submitted to ESRD:

Sample Collected for Potability:
Submitted to ESRD:

Additional Comments on Well
WELL WAS DEEPENED TO 235' 82/06/09.

Yield Test

Taken From Ground Level
Measurement in Metric

Test Date	Start Time	Static Water Level
1981/05/13	12:00 AM	7.92 m

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)

Method of Water Removal

Type: Pump
Removal Rate: 18.18 L/min
Depth Withdrawn From: 19.81 m

If water removal period was < 2 hours, explain why

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
GRIMSHAW WATER WELL DRILLING LTD.

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 358279
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1975/03/05

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
PEACE, MD OF	P.O. BOX 34 BERWYN				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NW	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229390 Longitude -117.550986
How Location Obtained
Field

Elevation 624.84 m
How Elevation Obtained
Estimated

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Municipal

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
0.30		Gravel
2.44		Sand
6.40		Coarse Grained Gravel
12.19		Clay

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 0.00 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1980/01/01	0.00	0.91
1974/12/17	272.77	1.43
1974/12/31	272.77	1.43

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
12.19 m		1974/12/16	1974/12/17

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	12.19

Surface Casing (if applicable)
Size OD : 0.00 cm
Wall Thickness : 0.000 cm
Bottom at : 0.00 m

Well Casing/Liner
Steel
Size OD : 16.81 cm
Wall Thickness : 0.478 cm
Top at : 0.00 m
Bottom at : 6.40 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)
4.57	6.40	0.000		0.00

Perforated by

Annular Seal Cement/Grout
Placed from 0.00 m to 3.96 m
Amount

Other Seals

Type	At (m)

Screen Type
Size OD : 0.00 cm

From (m)	To (m)	Slot Size (cm)

Attachment
Top Fittings Bottom Fittings

Pack
Type Grain Size
Amount 0.00

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
BUFFALO LAKE DRILLING

Copy of Well report provided to owner Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 358279
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1975/03/05

GOWN ID

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
PEACE, MD OF	P.O. BOX 34 BERWYN				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NW	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229390 Longitude -117.550986

How Location Obtained
Field

Elevation 624.84 m

How Elevation Obtained
Estimated

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 0.00 L/min
Recommended Pump Intake Depth (From TOC) 3.66 m
Pump Installed
Type
Depth m
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth m
Gas
Depth m
Well Disinfected Upon Completion
Geophysical Log Taken
Submitted to ESRD

Sample Collected for Potability
Submitted to ESRD Yes

Additional Comments on Well

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
BUFFALO LAKE DRILLING

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 358279
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1975/03/05

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
PEACE, MD OF	P.O. BOX 34 BERWYN				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NW	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229390 Longitude -117.550986
How Location Obtained
Field

Elevation 624.84 m
How Elevation Obtained
Estimated

Yield Test

Taken From Ground Level | Measurement in Metric

Test Date	Start Time	Static Water Level
1980/01/01	12:00 AM	0.91 m

Method of Water Removal

Type
Removal Rate 0.00 L/min
Depth Withdrawn From 0.00 m

If water removal period was < 2 hours, explain why

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)

Yield Test

Taken From Ground Level | Measurement in Metric

Test Date	Start Time	Static Water Level
1974/12/17	12:00 AM	1.43 m

Method of Water Removal

Type Pump
Removal Rate 272.77 L/min
Depth Withdrawn From 0.00 m

If water removal period was < 2 hours, explain why

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)

Yield Test

Taken From Ground Level | Measurement in Metric

Test Date	Start Time	Static Water Level
1974/12/31	12:00 AM	1.43 m

Method of Water Removal

Type Pump
Removal Rate 272.77 L/min
Depth Withdrawn From 0.00 m

If water removal period was < 2 hours, explain why

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
1.44	0:00	1.84
1.75	1:00	1.52
1.77	2:00	1.50
1.80	3:00	1.49
1.81	4:00	1.47
1.81	5:00	1.45
1.82	6:00	1.45
1.82	7:00	1.44
1.83	8:00	1.44
1.84	9:00	1.44
1.84	10:00	
1.84	12:00	1.44
1.84	15:00	1.44
1.84	20:00	
1.84	25:00	
1.84	30:00	
1.84	35:00	
1.84	120:00	1.44

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
BUFFALO LAKE DRILLING

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 358281
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1989/08/17

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
GRIMSHAW WATER CO-OP#PW 89-1	GRIMSHAW				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NW	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229390 Longitude -117.550986
How Location Obtained: Map

Elevation 639.78 m
How Elevation Obtained: Estimated

Drilling Information

Method of Drilling
Rotary

Proposed Well Use
Domestic & Stock

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
0.61		Clay & Rocks
6.40		Gravel
9.14		Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 0.00 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1989/08/02	0.00	3.05
1989/08/04	677.37	3.96

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
9.14 m		1989/08/01	1989/08/02

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	9.14

Surface Casing (if applicable)
Steel
Size OD : 17.78 cm
Wall Thickness : 0.635 cm
Bottom at : 3.66 m

Well Casing/Liner
Size OD : 0.00 cm
Wall Thickness : 0.000 cm
Top at : 0.00 m
Bottom at : 0.00 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)

Perforated by

Annular Seal
Placed from 0.00 m to 0.00 m
Amount

Other Seals

Type	At (m)

Screen Type Stainless Steel
Size OD : 17.78 cm

From (m)	To (m)	Slot Size (cm)
3.66	6.71	0.064

Attachment: Attached To Casing
Top Fittings: Coupler
Bottom Fittings: Bail

Pack
Type: Artificial
Grain Size: 12/20
Amount: 6.00 Bags

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
HI-RATE DRILLING 1985 LTD.

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 358281
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1989/08/17

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
GRIMSHAW WATER CO-OP#PW 89-1	GRIMSHAW				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NW	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229390 Longitude -117.550986
How Location Obtained: Map

Elevation 639.78 m
How Elevation Obtained: Estimated

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level: cm
Is Artesian Flow:
Rate: L/min
Is Flow Control Installed:
Describe:

Recommended Pump Rate: 0.00 L/min
Recommended Pump Intake Depth (From TOC): 0.00 m
Pump Installed:
Depth: m
Type:
Make:
H.P.:
Model (Output Rating):

Did you Encounter Saline Water (>4000 ppm TDS):
Depth: m
Gas:
Depth: m
Well Disinfected Upon Completion:
Geophysical Log Taken: Electric
Submitted to ESRD:
Sample Collected for Potability:
Submitted to ESRD:

Additional Comments on Well

PUMP TEST TIME 1080 - 4320(MIN) SEE ORIGINAL FILE. SEE MOELL (MCINNIS REPORT).

Yield Test

Taken From Ground Level
Measurement in Metric

Test Date	Start Time	Static Water Level
1989/08/02	12:00 AM	3.05 m

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)

Method of Water Removal

Type: Unknown
Removal Rate: 0.00 L/min
Depth Withdrawn From: 0.00 m

If water removal period was < 2 hours, explain why

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
HI-RATE DRILLING 1985 LTD.

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

View in Imperial | Export to Excel

GOWN ID

GIC Well ID 358281
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1989/08/17

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
GRIMSHAW WATER CO-OP#PW 89-1	GRIMSHAW				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NW	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229390 Longitude -117.550986
How Location Obtained
Map

Elevation 639.78 m
How Elevation Obtained
Estimated

Yield Test

Taken From Ground Level | Measurement in Metric

Test Date	Start Time	Static Water Level
1989/08/04	1:12 AM	3.96 m

Method of Water Removal

Type Pump
Removal Rate 677.37 L/min
Depth Withdrawn From 0.00 m

If water removal period was < 2 hours, explain why

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
3.98	0:05	3.59
4.00	1:00	3.57
4.00	1:05	3.56
4.01	2:00	3.55
4.62	2:00	0.00
4.01	2:05	0.00
4.01	3:00	3.55
4.02	4:00	3.55
4.02	5:00	3.53
4.03	6:00	3.52
4.03	7:00	3.51
4.03	8:00	3.50
4.04	9:00	3.50
4.04	10:00	3.49
4.04	12:00	3.48
4.05	14:00	3.47
4.05	16:00	3.47
4.06	18:00	3.46
4.06	20:00	3.45
4.06	22:00	0.00
4.07	25:00	3.43
4.08	30:00	3.42
4.08	35:00	3.40
4.09	40:00	3.39
4.09	45:00	3.38
4.10	50:00	3.38
4.10	55:00	3.37
4.11	60:00	3.36
4.11	70:00	3.35
4.12	80:00	3.35
4.13	90:00	3.34
4.13	105:00	3.33
4.14	120:00	3.31
4.14	135:00	3.31
4.15	150:00	3.30
4.15	180:00	3.29
4.16	210:00	3.28
4.17	240:00	3.27
4.18	270:00	3.26
4.18	300:00	3.25
4.19	330:00	3.25
4.20	360:00	2.24
4.20	390:00	0.00
4.21	420:00	3.23
4.21	450:00	0.00
4.22	480:00	3.22
4.23	540:00	3.21
4.24	600:00	0.00
4.25	660:00	0.00
4.26	720:00	3.19
4.27	840:00	0.00
4.29	960:00	0.00

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
HI-RATE DRILLING 1985 LTD.

Copy of Well report provided to owner | Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GOWN ID

GIC Well ID 358281
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1989/08/17

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
GRIMSHAW WATER CO-OP#PW 89-1	GRIMSHAW				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NW	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229390 Longitude -117.550986
How Location Obtained
Map

Elevation 639.78 m
How Elevation Obtained
Estimated

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
HI-RATE DRILLING 1985 LTD.

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

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GOWN ID

GIC Well ID 358285
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1979/09/06

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
COOPER, BASIL	GRIMSHAW				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229390 Longitude -117.538006
How Location Obtained
Map

Elevation 629.41 m
How Elevation Obtained
Estimated

Drilling Information

Method of Drilling
Cable Tool

Proposed Well Use
Domestic

Type of Work
New Well

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
6.71		Clay
7.62		Clay & Rocks
22.25		Clay
23.47		Sand & Gravel
23.77		Clay

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 0.00 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1979/08/10	13.64	10.67

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
23.77 m		1979/08/10	1979/08/10

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	23.77

Surface Casing (if applicable)
Size OD : 0.00 cm
Wall Thickness : 0.000 cm
Bottom at : 0.00 m

Well Casing/Liner
Steel
Size OD : 14.12 cm
Wall Thickness : 0.478 cm
Top at : 0.00 m
Bottom at : 23.77 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)
22.25	23.77	0.000		0.00

Perforated by Torch

Annular Seal Driven
Placed from 0.00 m to 0.00 m
Amount

Other Seals

Type	At (m)

Screen Type
Size OD : 0.00 cm

From (m)	To (m)	Slot Size (cm)

Attachment
Top Fittings
Bottom Fittings

Pack
Type
Grain Size
Amount 0.00

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
SANDERSON, LLOYD

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID 358285
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1979/09/06

GOWN ID

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
COOPER, BASIL	GRIMSHAW				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	NE	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229390 Longitude -117.538006
How Location Obtained: Map

Elevation 629.41 m
How Elevation Obtained: Estimated

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 0.00 L/min
Recommended Pump Intake Depth (From TOC) 0.00 m
Pump Installed
Depth m
Type
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth m
Gas
Depth m
Well Disinfected Upon Completion
Geophysical Log Taken
Submitted to ESRD

Sample Collected for Potability
Submitted to ESRD Yes

Additional Comments on Well

Yield Test

Taken From Ground Level
Measurement in Metric

Test Date	Start Time	Static Water Level
1979/08/10	12:00 AM	10.67 m

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)

Method of Water Removal

Type Pump
Removal Rate 13.64 L/min
Depth Withdrawn From 0.00 m

If water removal period was < 2 hours, explain why

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
UNKNOWN NA DRILLER

Certification No
1

Company Name
SANDERSON, LLOYD

Copy of Well report provided to owner

Date approval holder signed

Water Well Drilling Report

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

View in Imperial | Export to Excel

GIC Well ID: 9516204
GoA Well Tag No.:
Drilling Company Well ID: ANDERSON WATER SERVICES LTD
Date Report Received: 2016/08/17

GOWN ID:

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CONNOLLEY, DAVE	P.O. BOX 265	GRIMSHAW	ALBERTA	CANADA	T0H 1W0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	16	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229393 Longitude -117.538034
How Location Obtained: Hand held autonomous GPS 20-30m

Elevation m
How Elevation Obtained: Not Obtained

Drilling Information

Method of Drilling: Rotary - Air

Type of Work: New Well

Proposed Well Use: Domestic

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
4.27	Yes	Brown Clayey Gravel
14.63	Yes	Dark Gray Clayey Gravel
15.24	Yes	Unknown Silty Unknown
24.38	Yes	Gray Gravelly Clay
26.21	Yes	Gray Gravelly Sand
26.33	Yes	Dark Gray Unknown Silt
27.13	Yes	Unknown Gravelly Clay & Silt
37.80	Yes	Unknown Shaly Till & Clay
41.15	Yes	Unknown Weathered Shale & Siltstone
41.76	Yes	Unknown Shaly Siltstone
43.28		Gray Shaly Siltstone
47.24		Gray Shaly Siltstone
54.25		Gray Shaly Siltstone
59.44	Yes	Unknown Fine Grained Sandstone

Yield Test Summary

Measurement in Metric

Recommended Pump Rate: 13.64 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
2016/08/09	31.82	10.12

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
59.44 m	59.44 m	2016/07/18	2016/07/19

Borehole

Diameter (cm)	From (m)	To (m)
15.56	47.85	59.44

Surface Casing (if applicable): Steel
Size OD : 16.83 cm
Wall Thickness : 0.556 cm
Bottom at : 47.85 m

Well Casing/Liner: Plastic
Size OD : 12.55 cm
Wall Thickness : 0.630 cm
Top at : 4.57 m
Bottom at : 59.44 m

Perforations

From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval(cm)
53.34	59.44	0.508		

Perforated by: Machine

Annular Seal: Bentonite Slurry
Placed from 0.00 m to 18.29 m
Amount 150.00 Pounds

Other Seals

Type	At (m)
Drive Shoe	47.85

Screen Type
Size OD : cm

From (m)	To (m)	Slot Size (cm)

Attachment:
Top Fittings: Bottom Fittings:

Pack
Type: Artificial Grain Size: 20-50
Amount: 45.00 Feet

Contractor Certification

Name of Journeyman responsible for drilling/construction of well: WILLIAM WIEBE
Certification No: 024545NQ
Company Name: ANDERSON WATER SERVICES LTD.
Copy of Well report provided to owner: Yes
Date approval holder signed: 2016/08/09

Water Well Drilling Report

View in Imperial | Export to Excel

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID: 9516204
GoA Well Tag No.:
Drilling Company Well ID: ANDERSON WATER SERVICES LTD
Date Report Received: 2016/08/17

GOWN ID

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CONNOLLEY, DAVE	P.O. BOX 265	GRIMSHAW	ALBERTA	CANADA	T0H 1W0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	16	27	83	23	5				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 56.229393 Longitude -117.538034
How Location Obtained: Hand held autonomous GPS 20-30m

Elevation m
How Elevation Obtained: Not Obtained

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level: 60.96 cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate: 13.64 L/min
Recommended Pump Intake Depth (From TOC): 46.94 m
Pump Installed
Depth m
Type
Make
H.P.
Model (Output Rating)

Did you Encounter Saline Water (>4000 ppm TDS)
Depth m
Gas
Depth m
Well Disinfected Upon Completion: Yes
Geophysical Log Taken
Submitted to ESRD
Sample Collected for Potability
Submitted to ESRD

Additional Comments on Well
154 FEET MAX FOR RECOMMENDED PUMP SET

Yield Test

Taken From Top of Casing
Measurement in Metric

Test Date	Start Time	Static Water Level
2016/08/09	11:00 AM	10.12 m

Method of Water Removal

Type: Pump
Removal Rate: 31.82 L/min
Depth Withdrawn From: 59.44 m

If water removal period was < 2 hours, explain why

Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
5.57	0:00	29.44
10.52	1:00	26.36
11.60	2:00	23.55
11.94	3:00	22.84
12.27	4:00	22.41
	5:00	22.00
	6:00	21.55
	7:00	21.15
13.66	8:00	20.78
13.93	9:00	20.42
14.27	10:00	20.12
14.91	12:00	19.45
15.18	14:00	18.90
16.07	16:00	18.27
16.67	18:00	17.88
17.40	20:00	17.46
18.29	25:00	16.50
19.25	30:00	15.71
20.00	35:00	15.06
20.67	40:00	14.50
21.78	50:00	13.56
22.80	60:00	12.90
24.15	75:00	12.10
25.35	90:00	11.57
27.86	105:00	11.03
29.44	120:00	10.66

Pump Test Attachments

DAVE CONNOLLEY.pdf

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well: WILLIAM WIEBE
Certification No: 024545NQ
Company Name: ANDERSON WATER SERVICES LTD.
Copy of Well report provided to owner: Yes
Date approval holder signed: 2016/08/09