BY-LAW NUMBER 2014/42

BY-LAW NO. 2014/42 is a by-law of the County of Wetaskiwin No. 10 in the Province of Alberta, to authorize the adoption of an Area Structure Plan for the purpose of providing a framework for subsequent subdivision and development of 4 lots within SE 10-47-24-W4M in accordance with Section 633 of the Municipal Government Act, Chapter M-26.1, Revised Statutes of Alberta 2000, and amendments thereto.

WHEREAS: the proposed Area Structure Plan has been widely circulated and discussed within the County pursuant to Section 230, 606(1), and 633(1) of the Municipal Government Act, 2000, Chapter M-26.1, and amendments thereto.

NOW THEREFORE: the County of Wetaskiwin No. 10, duly assembled, hereby enacts as follows:

(a) The document attached to this By-law as "Appendix A", together with accompanying maps, is hereby adopted as the *"Bishop (4 lots) within SE 10-47-24-W4M)"*.

2. This by-law comes into effect on the date of third reading.

READ: A First time this 9 day of October, A.D., 2014.

READ: A Second time this 9 day of October, A.D., 2014.

READ: A Third time and finally passed this 9 day of October, A.D., 2014.

REEVE

SECRETARY-TREASURER

Area Structure Plan

Proposed subdivision

SE 10-47-24 W4M Wetaskiwin

Josh and Kimberly Bishop 780.387.8483

County of Wetaskiwin

Prepared May 15, 2014

According to Municipal Policy & Procedures Manual

Contents

Introduction and background,

The intent of this area structure plan is to outline the proposal of subdividing the current parcel, (SE 10 -47-24 W4), into 5 pieces. 4 new residential lots roughly 2.5 acres each. Remaining parcel of roughly 18 acres to remain agricultural land. This quarter section has been previously developed on a few occasions, each time adding a few new lots. This land has been included in "the Millet /Wetaskiwin acreage study", as suitable for development. Surrounding land uses include many country residential acreages, hobby farms, and some farm land. There are no intensive or confined feeding operations in this area. We do not foresee any conflicts with existing land uses. Adjacent landowners have been notified of this plan and were invited to meet at our house or submit any comments through email. We have not received any feedback. Should the proposal be accepted by council and the County of Wetaskiwin we will proceed with an application for sub-division.

Item 1: Geotechnical & Groundwater Percolation Reports

Surface topography is nearly level with low areas lying away from build sites. Groundwater was encountered in ranges from 1.5 to 2.7 meters below ground level. The water table bore hole results show areas of high water table in some areas on the property. We have found that there is no issue with water in basements as a result of high water tables. There has been 3 new basements put in over the past 6 years as development progressed on the previous sub-division on this parcel . Our house has a full basement and sits 2' above water table. Our neighbours to the South have a full basement as well with no issues.

Report attached

Item 2: Sewage treatment

As recommended by item 1 report the proposed methods are for field system where requirements are met and raised mounds where they are not met by local soil conditions.

Item 3: Stormwater Management

As this quarter sits at the top of a hill all runoff makes its way into one of 2 creeks on either the North (Pipestone Creek) or South (Bigstone Creek) Surface soils are primarily sand, and most existing approaches do not even have culverts as there has been no need for them. There is very rarely surface water even after heavy rains. The ditches surrounding the proposed new acreage development very rarely have standing water, even in the spring runoff that we have seen over the past 11 years we have lived on this parcel. The sandy soil helps to soak up any stormwater accumulation. No additional flows should be expected by placement of approaches and culverts on any of the proposed locations. There is only one culvert on any bordering roads, that being at RR 242 and township 472 where there is a 24" culvert going North and South across twp 472 towards Pipestone Creek. As a result of the topography being steeply dropping towards the creek on adjacent parcel there should be no upstream flows to consider.

Item 4: Water Supply

A groundwater availability report was prepared by Geowater Consulting in accordance with section 23 of the water act. The report finds that there is more than the required 6000 cu M available to each lot

``For the proposed subdivision, the aquifer below the site must be able to provide an additional 6000 cubic meters per year. This quantity of water for the four new residential lots will be available beneath the site.`` (page 7 of report) Report attached.

The report recommends the use of individual wells as a source for water supply.

Item 5: Traffic and Roads

In consultation with Dave Dextraze the Director of Public Works, suitable locations for an approach were found for each lot. Closest new Lot to a provincial highway, (2A) is 2.1km The final approach locations will be determined through County inspections. With rr 242A already dividing the quarter in half there is no internal public road design required and all lots will be accessed from the County Public road system. As per Road Contribution Fee Policy 6615, we understand a fee of $2000 per lot for future improvements will be levied.

Item 6: Land Uses and Maps

Four new lots approximately between 2 and 4 acres each are proposed see maps attached. No foreseeable conflicts with the proposed development and existing land uses.

Lot 1: determined by existing fence will have an area of 2 acres

Lot 2: determined by existing fence will have an area of 2 acres

Lot 3: determined by existing fence lines will have an area of approximately 3 to 4 acres

Lot 4: determined by existing fence lines will have an area of approximately 3 to 4 acres

Item 7: Zoning

An application will be made to re-zone the parcel from agricultural to country residential. Spot re-zoning only the areas where the new lots will be and leaving the remainder as agricultural.

Item 8: Plan of Subdivision

Upon approval of ASP subdivision will proceed as follows:

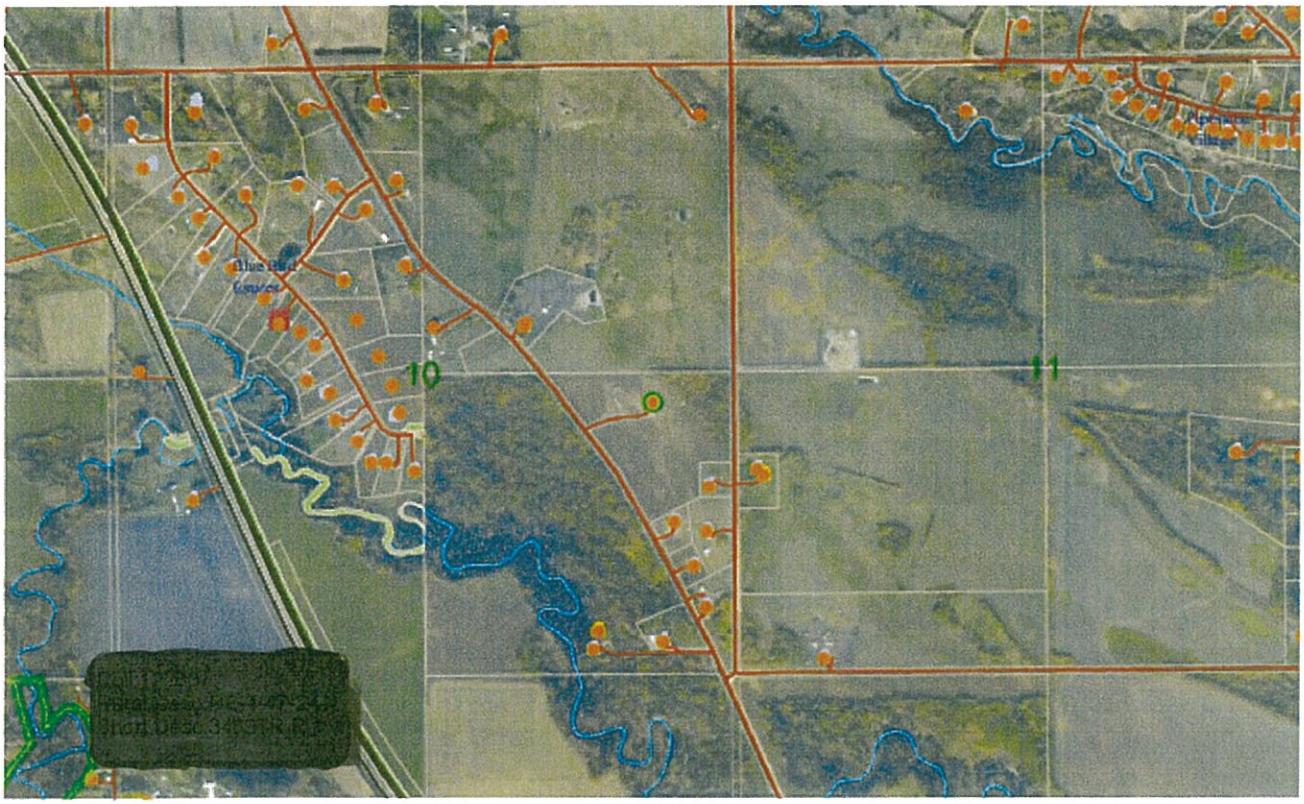
Phase 1

Immediate action to subdivide the 2 lots with access off of RR 242.

Phase 2

Subdivision of the other 2 lots accessing from 242A to proceed within the three year guideline of approval.


Roll:125400
Rural Desc:SE-10-47-24-4
Short Desc: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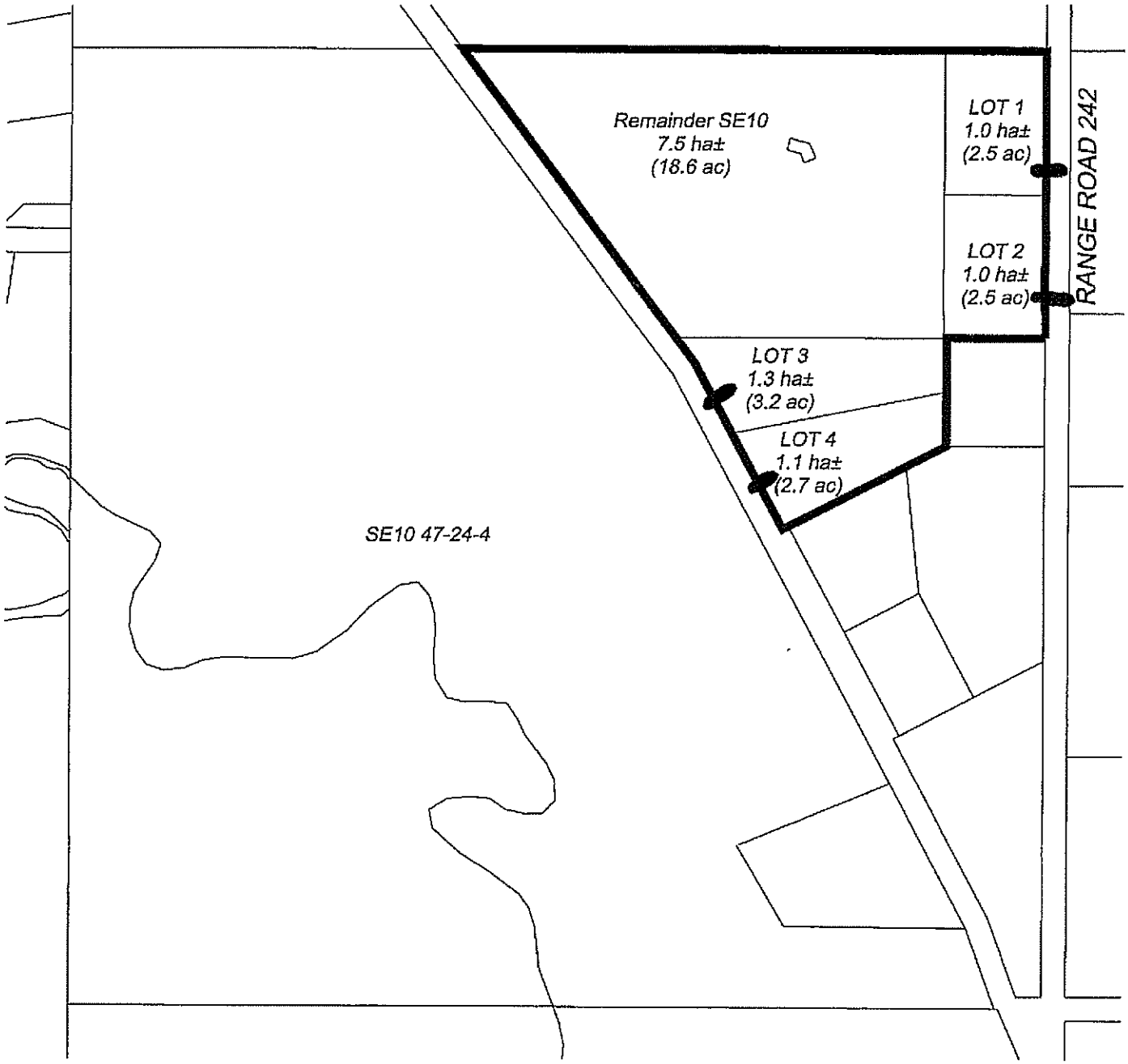
11

New Approach Locations



Groundwater availability for proposed subdivision SE 10-47-24 W4M Wetaskiwin

Prepared for:

JOSH BISHOP

Wetaskiwin

Prepared by:

GEOWATER CONSULTING

19-53 Erin Ridge Dr.
St. Albert, Alberta, T8N 6A3
Tel (780) 419-6331 Fax (780) 419-6331

May, 2014

Certification

This report was prepared by Geowater Consulting under the direction of a professional geologist registered in the Province of Alberta. It is intended solely for the use of the individual, company, government or other entity for which it was prepared, and for the purpose and within the limitations stated in the report.

APEGGA Member Number

M 72261

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

1. INTRODUCTION

Geowater Consulting was retained by Josh Bishop (the client) to complete a Groundwater Availability Study for the property located at SE 10-47-24 W4M (the Site). The property is located about 10 km northwest from Wetaskiwin. Figure 1 shows the Site location. The property plan is shown in Appendix A.

The client intends to add four new residential lots to the existing eight residential lots in SE 10-47-24W4M.

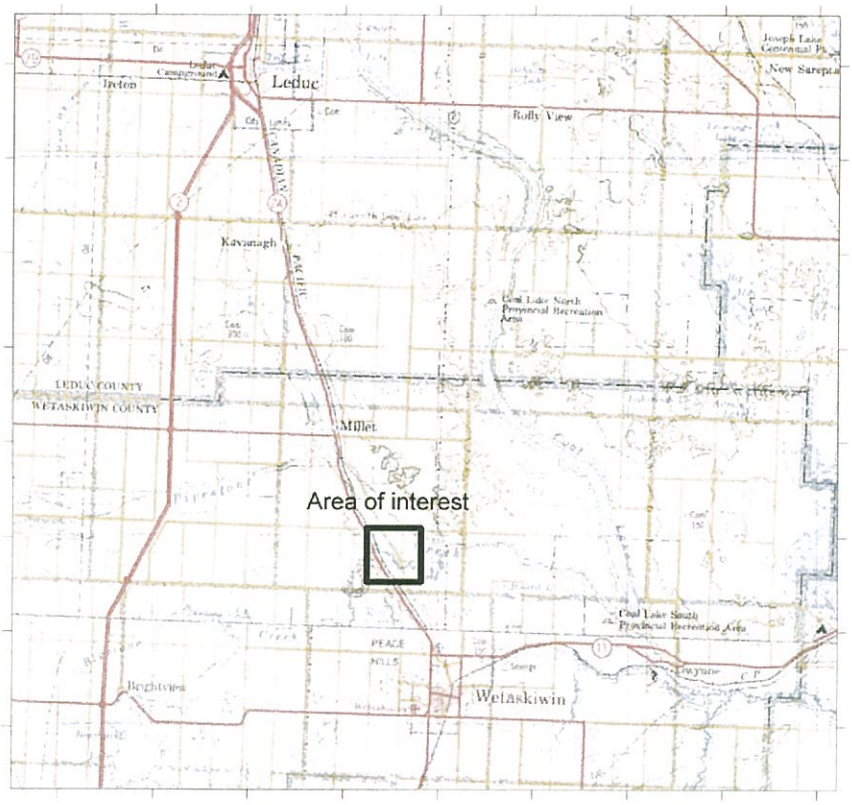


Figure 1 – Site location map

Geowater Consulting has prepared this technical report presenting the findings of the Study. Hydrogeological information for the Site and the surrounding area was assembled and reviewed to complete this Study. Information sources include the information obtained from the published geological and hydrogeological maps and reports relevant to the area of interest and Alberta Environment and Sustainable Resources Development (AESRD) - Alberta Water Well Information Database.

2. OBJECTIVE AND INVESTIGATION GUIDELINES

The purpose of the Study was to evaluate the suitability of the Site for subdivision with respect to groundwater availability.

The Study was conducted in general accordance with the 1998 AENV publication: *Environmental Guideline for the Review of Subdivisions in Alberta*, and in particular with Chapter 2 – Guidelines for the Evaluation of Groundwater Supply for Unserviced Residential Subdivisions. These guidelines are recommended for use in cases where the water supply will be provided by privately owned domestic wells.

The Province of Alberta's Water Act (2014), addresses household diversion directly under Section 23 (3) which states that a person residing within a subdivision on a parcel of land has the right to commence and continue the diversion of water only if

> "a report certified by a professional engineer, professional geologist and professional geophysicist, as defined in the Engineering, Geological and Geophysical Professional Act, was submitted to the subdivision authority as part of the application for subdivision under the Municipal Government Act, and the report states that the diversion of 1,250 cubic metres of water per year for household purposes under Section 21 for each of the households within the subdivision will not interfere with any household users, licensees or traditional agriculture users who exist when the subdivision is approved."

Relevant to the proposed development at SE 1-47-24 W4M, the Water Act states that the diversion of 1 250 m^3/year per household (household use as defined in the Water Act) should not interfere with any household users, licensees, or traditional agriculture users who exist when the subdivision is approved.

In accordance with above, the objective of the Study is to provide a professional opinion, based on information obtained from readily available data, as to whether the aquifer underlying the Site should be able to yield an additional 6 000 m^3/year (0.16 L/s or 2.01 imperial gallons per minute [igpm]) to provide water for four new residential lots.

3. GEOLOGICAL CHARACTERISTICS

There are two main distinguishing geological units present at the Site and the surrounding area (area of interest). The area of interest comprises section 10 and a quarter of each section adjacent to this section).

The first geological unit is surficial deposits and the second is bedrock deposits. These two units are presented in cross section A-B, Figure 2, shown below. The detailed cross section A-B and the location of the cross-section line map are presented in Appendix B.

The geological and hydrogeological characteristics presented in Figure 2 were defined by water well data available from the AESRD Alberta Water Well Information Database, published geological and hydrogeological maps, and reports relevant to the area of interest. The water well data used for geological and hydrogeological interpretation is summarised in Table 1 – Water well survey, Appendix C. Additionally, in Appendix D, there are water well drilling reports for all wells drilled in section SE 10-47-24W4M and a well log for well ID 1030113 at the property.

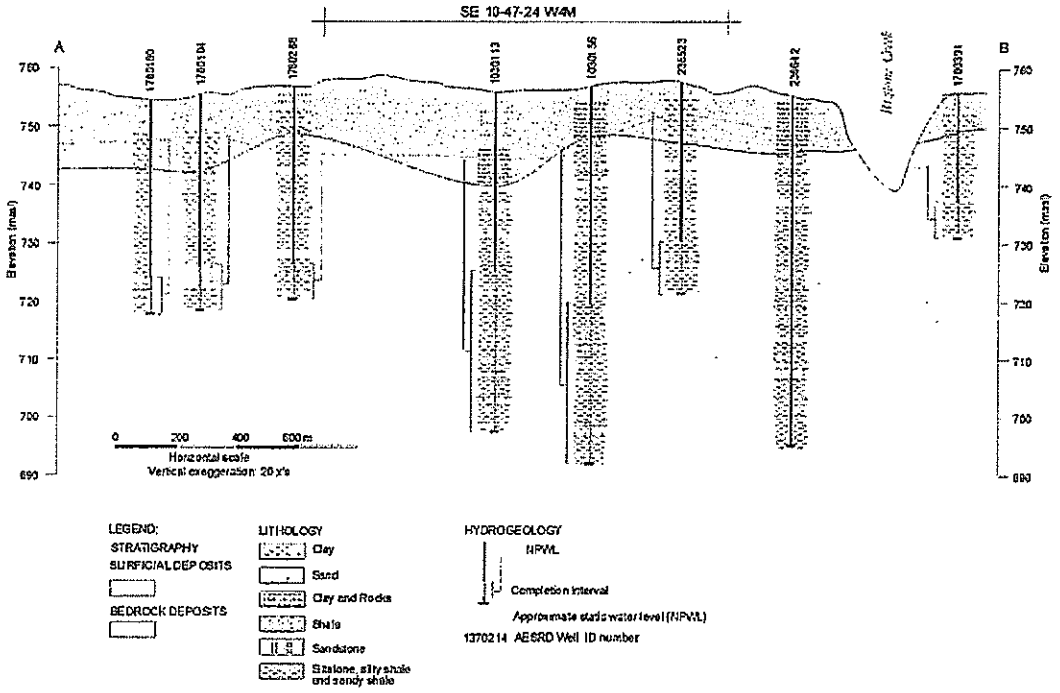


Figure 2 – Cross section A - B

The Drift Thickness of the Edmonton Map Area (Andriashek , 1987) indicates that the average thickness of surficial deposits in the area of interest is between 10 and 30 m.

Surficial deposits are Quaternary unconsolidated deposits that are about 10 to 20 m thick in the area of interest and consist of glacial sediments—mostly till-clay, clay mixed with rocks and

boulders, and sand. They are not able to store a significant amount of groundwater. There is no water wells completed in the surficial deposits in the area of interest.

The upper bedrock is presented by the Horseshoe Canyon Formation. In the Hydrogeological Map (1978) this formation consists of sandstone, shale, bentonitic mudstone, coal, and ironstone beds. In the area of interest water well drilling reports show that upper bedrock consists of light grey and green shale, shale, sandy shale, siltstone, and sandstone. Grain sizes range from fine to coarse.

The depth to the top of the bedrock at the Site is equal to the thickness of the surficial deposits, which is about 10 and 20 m.

4. HYDROGEOLOGICAL CHARACTERISTICS

The Hydrogeology Map of the Edmonton Area (1978) indicates that water wells in the area of interest completed in bedrock deposits have an apparent yield (Q_{20}) between 25 and 100 imperial gallons per minute (igpm) (172 and 690 m^3/day).

Based on information obtained from the AESRD Alberta Water Well Information Database, in the area of interest, all water supply wells are drilled into the bedrock. They are between 16 and 65 m deep. The depth of completion interval in the wells varies from 18 to 65 m from the ground surface. Based on short pumping test performed by the driller the recommended yields vary from 20 to 54 L/s.

Geowater Consulting has calculated the long term apparent yields (Q_{20}) for the water wells drilled into the bedrock at the Site and in its vicinity. The Q_{20} values are shown in Figure 3 below and Table 2 (Appendix E). These yields were calculated based on aquifer transmissivity and available drawdown obtained from short pumping tests that were available from the AESRD Alberta Water Well Information Database. The pumping tests were conducted on wells when they were drilled. Based on this estimation, water wells in the area can yield between 1 600 and 9 000 m^3/year.

The theoretical 20 year yields (Q_{20}) of the wells were determined by using the Farvolden Method:

$Q_{20} = (0.68)*(T)*(H_A)*(0.7)$

Q_{20} – sustainable yield for a 20 year period (m^3/day)

T – transmissivity (m^2/day)

H_A – available drawdown (m)

0.7 – 70% safety factor

The available drawdown (H_A) is measured from the static water level to the depth of the pump.

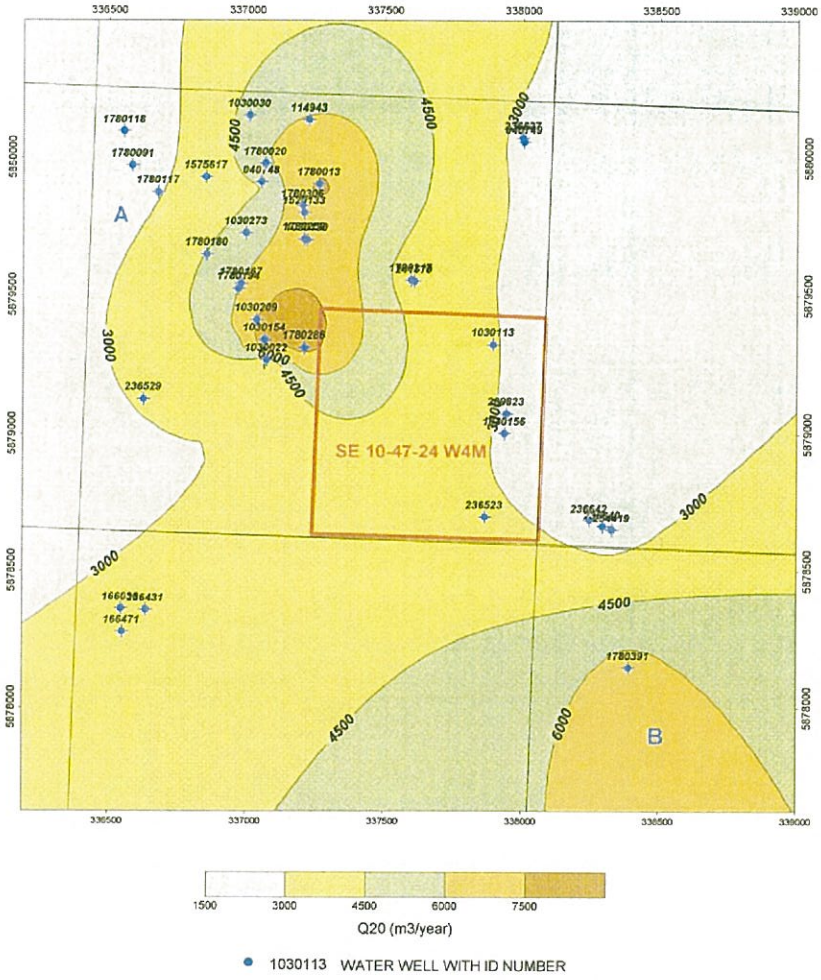


Figure 3 – Apparent yield map

Often it is necessary to capture two or more water bearing sequences at different depths in order to get a suitable amount of groundwater because the aquifer is not continuous.

The depths to the aquifer located in the bedrock vary considerable and range between 18 to 64 m.

The non-pumping static water levels in the aquifer are influenced by the ground surface and strongly vary as well. However, depth to the static water level is mainly between 7 and 12 m from the ground surface.

The aquifer below the Site is made up of weathered sandy shale, shale, and sandstone. The water bearing sequences are at a depth between 30 and 58 m deep from the ground surface. A well

drilled in this aquifer can yield about 3 000 m^3/year. The non-pumping static water level is about 10 m below ground surface.

The aquifer is confined and well protected against potential contamination from the ground surface by surficial deposits, about 10 to 20 m thick, that are made up of till and clay.

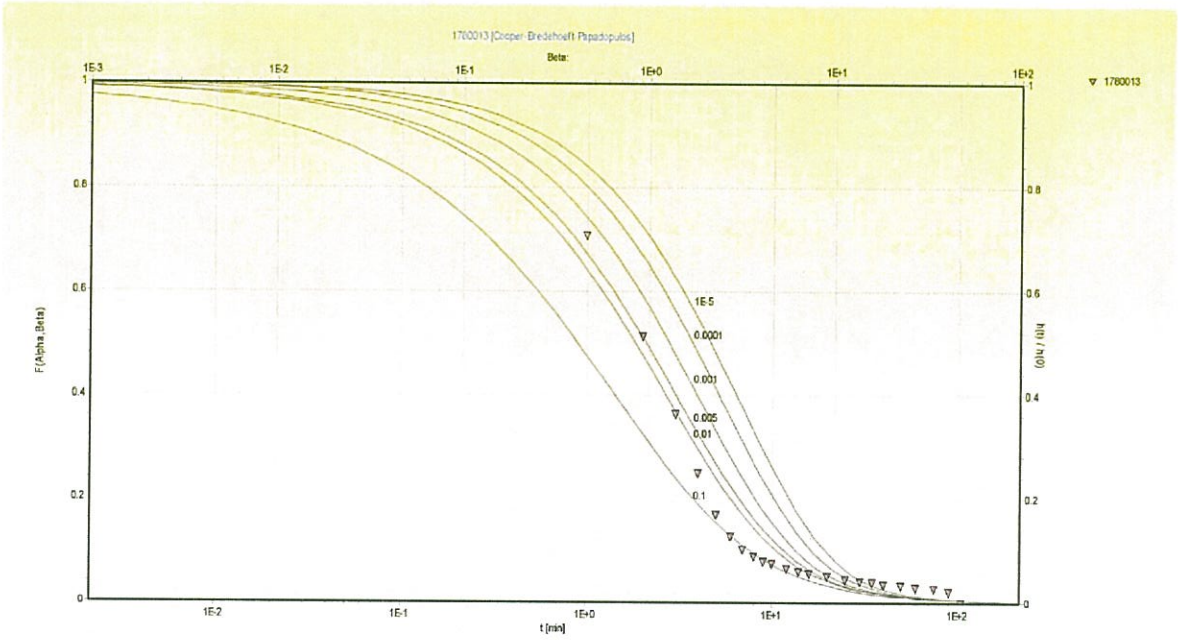


Figure 4 – Cooper-Bredhoeft-Papadopulos analysis graph

The slug test graph in Figure 4 shows an example of how hydrogeological parameters—transmissivity and conductivity—were calculated for the water wells in the area of interest.

5. GROUNDWATER QUALITY

The summary of groundwater chemistry for the water wells in the area of interest is shown in Table 3, Appendix F. These historical data were available from the AESRD Alberta Water Well Information Database.

According to the *Guideline for Canadian Drinking Water Quality* (GCDWQ; Heath Canada 2006) criteria shown in Table 2, the pH, total dissolved solids (TDS), and sodium (Na) exceed the aesthetic objective (AO) outlined in the *Guideline*. The pH slightly exceeds the recommended AO. The maximum pH in some groundwater in the area was reported to be 8.8 and recommended

AO pH is between 6.5 and 8.5. The maximum TDS was 1100 mg/L compare to recommended 500 mg/L. The recommended AO content of sodium is 200 mg/L. All samples of groundwater except one contain between 263 and 418 mg/L of sodium.
However, all these AO exccedances do not represent a major obstacle to the potential use of local groundwater for the water supply since they do not affect human health.
Generally, the groundwater below the Site has a satisfactory quality and can be used for human consumption. Some level of water treatment may be desirable, depending on the actual groundwater quality. The water in this aquifer is soft.

6. CONCLUSIONS AND RECOMMENDATIONS

This Study was conducted in accordance with the *Environmental Guidelines for the Review of Subdivisions in Alberta (1998)*.
A supply of 1 250 m^3/day (or 0.04 L/s) of groundwater per household is needed for each lot to satisfy Section 23 (3) of the *Water Act.* Water usage from the wells on the site will not interfere with any other household users, licensees, or traditional agricultural users who existed when the subdivision was approved.

At the area proposed for subdivision there is a perspective aquifer located in bedrock deposits. The aquifer is located in weathered sandy shale and sandstone. A water well drilled in the aquifer below the Site can yield about 3 000 m^3/year (0.1 L/s) on a long-term basis (Q_{20}).

For the proposed subdivision, the aquifer below the Site must be able to provide an additional amount of 6 000 m^3/year (0.16 L/s or 2.01 igpm). This quantity of water for the new four residential lots will be available beneath the Site.

The approximate static water level (NPWL) in the aquifer is between 10 and 15 m below the ground surface. The aquifer is confined and well protected against potential contamination from the ground surface by layers of low permeable glacial sediments about 10 to 20 m thick.

The aquifer can provide the required quantity of water without creating adverse effects on groundwater users in the vicinity that already rely on the local aquifers for their water supply.

The water quality is satisfactory according to the GCDWQ. The aesthetic exccedances (AO) of some constituents do not represent a major obstacle in the potential use of local groundwater for the water supply; however, some level of water treatment may be desirable, depending on the actual groundwater quality in any given well.

Chemical and bacteriological analyses of water should be conducted for every new well.

It is recommended that local health authorities be contacted regarding groundwater quality.

7. REFERENCES

1. Hydrogeology Map Edmonton Area, Alberta, NTS 83H-SW segment, Alberta, W.J. Ceroici, Research Council of Alberta, 1978.

2. Lexicon of Canadian Stratigraphy, Volume 4 Western Canada, Canadian Society of Petroleum Geologists, Calgary, Alberta, 1997.

3. Drift Thickness of the Edmonton Map Area, Alberta, L. D. Andiashek, Alberta Energy, 1987.

4. Quaternary Geology Central Alberta, Scale 1: 500 000, Alberta Research Council, 1990.

5. Summary of Guidelines for Canadian Drinking Water Quality, prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment, 2004.

6. Environmental Guidelines for the Review of Subdivisions in Alberta, Alberta Environment Protection, 1998.

Respectfully submitted;

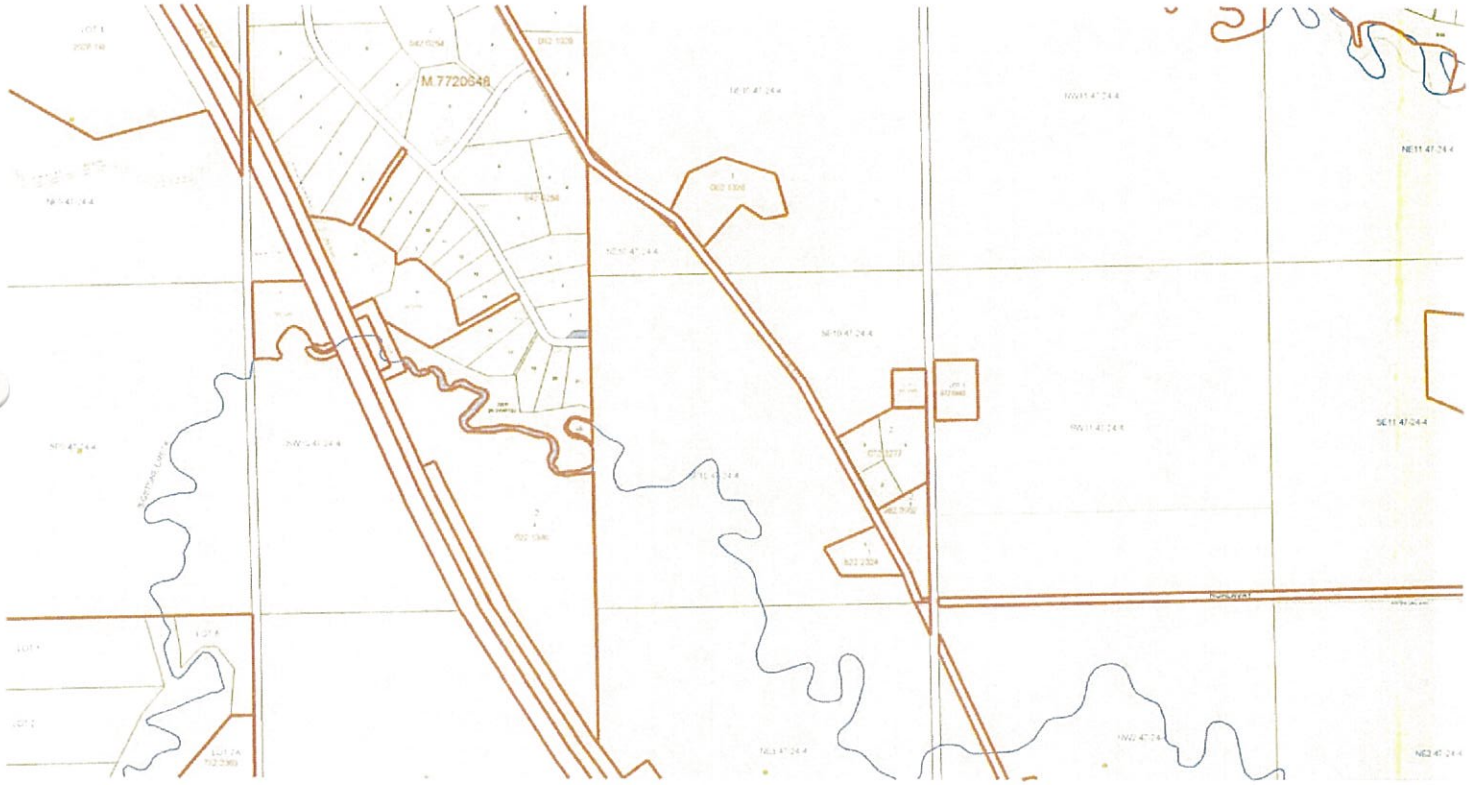
GEOWATER CONSULTING

Prepared by:

Senija Butorac P. Geol.

APPENDIX A

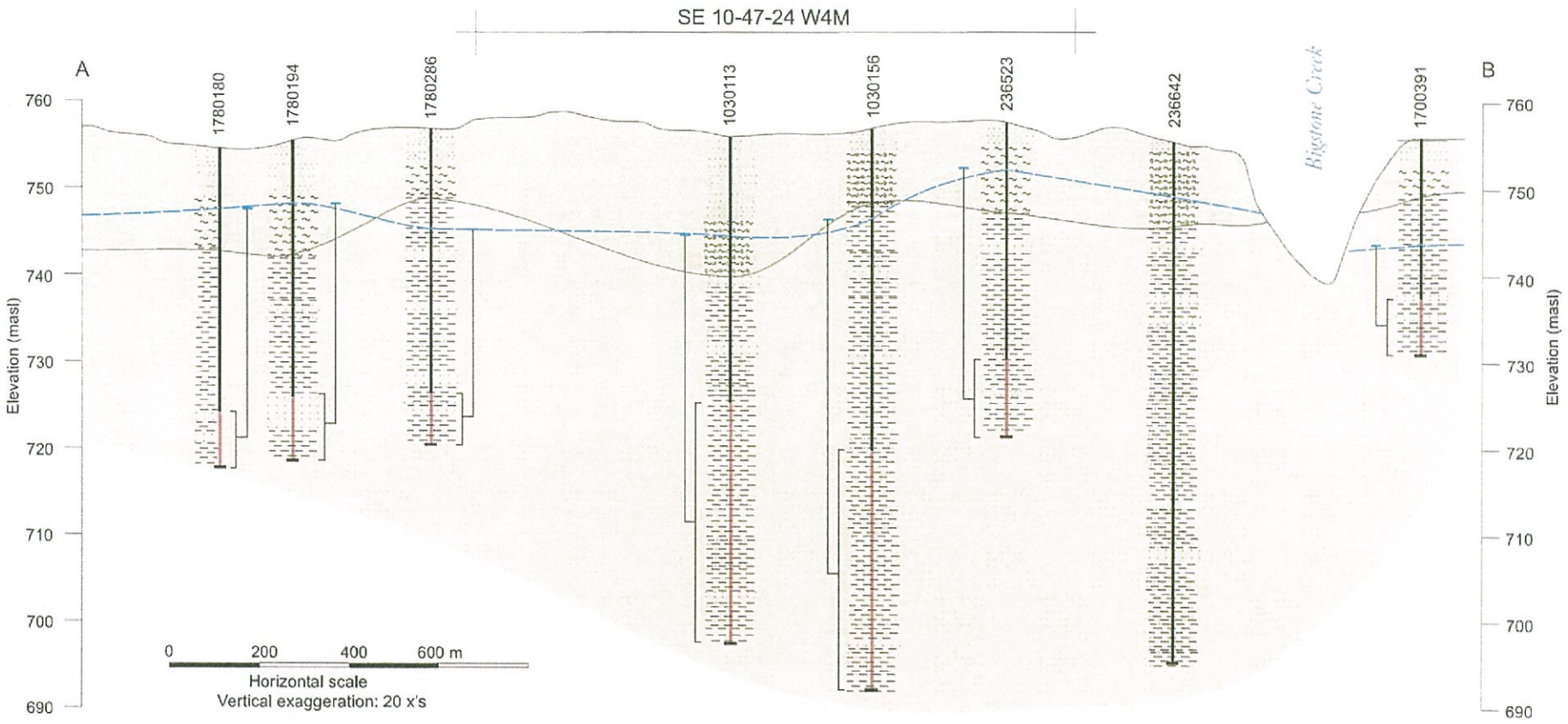
PROPERTY PLAN



10:23AM Friday April 25, 2014

APPENDIX B

CROSS-SECTION A - B



LEGEND:

STRATIGRAPHY

SURFICIAL DEPOSITS

BEDROCK DEPOSITS

LITHOLOGY

- Clay
- Sand
- Clay and Rocks
- Shale
- Sandstone
- Siltstone, silty shale and sandy shale

HYDROGEOLOGY

- NPWL
- Completion interval
- Approximate static water level (NPWL)

1370214 AESRD Well ID number

GEOWATER CONSULTING	LEGAL LOCATION: SE-10-47-24W4M
CROSS-SECTION A-B	
CLIENT NAME: BISHOP, JOSH	PROJECT No: 102 2014
LOCATION: WETASKIWIN	DATE: APRIL, 2014

A ——— B CROSS-SECTION LINE

● 1030113 WATER WELL WITH AENV ID NUMBER

NAD83 UTM12

GEOWATER CONSULTING		LEGAL LOCATION: SE-10-47-24W4M
LOCATION OF CROSS-SECTION A-B		
CLIENT NAME: BISHOP, JOSH	PROJECT No:	102 2014
LOCATION: WETASKIWIN	DATE:	APRIL, 2014

APPENDIX C

TABLE 1 - WATER WELL SURVEY

Table 1 - Water well survey

	well ID	legal location W4M	type of work	proposed well use	well depth	casing bottom at	perfor. top at	perfor. bottom at	perfor. from 1	perfor. to 1	perfor. from 2	perfor. to 2	NPWL	yield (L/m)	date completed	well owner
					(meter)											
1	040747	NW-10-047-24	New Well	Domestic	36.58	25.91	24.35	36.69	24.38	30.58			7.62	53.05	2002-05-16	REIMCHEN, TED
2	040748	NW-10-047-24	New Well	Domestic	47.24	31.39	28.96	47.24	28.96	47.24			10.67	54.55	2002-05-09	CULFORD, RAY
3	040749	NE-10-047-24	New Well	Domestic	42.67	26.82	25.91	42.67	30.48	42.67			12.80	31.82	2002-06-26	THOMPSON, JAMES/TARA
4	114943	NW-10-047-24	New Well	Domestic	33.53	11.89							4.27	45.46	1971-06-10	STIENE, JOE
5	166039	NW-03-047-24	New Well	Stock	30.48	21.65							6.71	45.46	1980-04-30	FINNMAN, GERALD
6	165471	NW-03-047-24	New Well	Domestic	33.53	22.56	21.34	33.53	21.34	33.53			6.71	45.46	1992-03-13	FINNMAN, GERALD
7	236334	NW-02-047-24	Federal Well Survey	Unknown	16.46								12.19		1906-01-01	LUCAS, S.
8	236337	NW-02-047-24	Reconditioned	Unknown	60.05								10.06	9.09	1974-10-01	COOK, ROY
9	236345	NW-02-047-24	Chemistry	Domestic	33.53											LUCAS, SAM
10	236431	NW-03-047-24	New Well	Domestic	30.48	20.42							5.79	36.37	1970-05-28	FINNMAN, HELMAR
11	236434	NW-03-047-24	Chemistry	Domestic	60.96											FINNMAN, H.
12	236519	SE-10-047-24	Chemistry	Domestic	42.67								15.24			CAMPBELL, MARY
13	236520	SE-10-047-24	Chemistry	Domestic	39.62											CRICHTON, DAVE
14	236523	SE-10-047-24	New Well	Domestic	30.58	27.74							9.75	54.55	1982-04-03	JACOBE, DON H.
15	236527	SE-10-047-24	Chemistry	Domestic	0.00	0.00										GRAPENTINE, ED
16	236529	SW-10-047-24	New Well	Domestic & Stock	27.43	15.24							6.10	45.46	1965-08-13	STENGEL, ART
17	236531	NW-10-047-24	Chemistry	Domestic	53.34											KOSTER, LEO (TARCEE NURSERIES)
18	236532	10-10-047-24	Federal Well Survey	Unknown	33.53										1935-01-01	THOMPSON, V.
19	236535	10-10-047-24	Federal Well Survey	Unknown	55.76										1935-01-01	THOMPSON, V.
20	236627	10-10-047-24	Test Hole	Unknown	37.49										1957-01-01	ARC #TH1
21	236633	SW-11-047-24	Test Hole	Unknown	19.81								8.78		1980-12-28	#TH32
22	236639	SW-11-047-24	Chemistry	Domestic	0.00											SMITH, MARTY
23	236640	04-11-047-24	New Well	Domestic & Stock	42.67	21.64							10.05	27.28	1975-10-15	WATT, DON
24	236642	SW-11-047-24	Test Hole	Unknown	60.96										1957-11-18	ARC #TH5
25	236644	SW-11-047-24	New Well	Industrial	60.96	8.23	22.86	35.05					9.14	68.19	1957-01-01	SUN OIL CO
26	241570	NE-10-047-24	New Well	Domestic	36.58	22.85	21.34	36.58	21.34	27.43	33.53	36.58	10.67	45.46	1994-08-08	WILLIAMS, KEN
27	254418	SW-11-047-24	New Well	Domestic	36.58	24.08	23.77	36.58	30.48	35.56			7.01	45.46	1994-10-10	GRAPANTINE, ED
28	269823	NE-10-047-24	New Well	Domestic	41.15	27.43	25.91	41.15	35.05	41.16			11.89	22.73	1998-08-04	HAWKINS, ORVAL/RUTH
29	1030022	SW-10-047-24	New Well	Domestic	48.77	38.40	35.58	48.77					9.14	54.55	2005-04-21	JENSEN, JACK & CONNIE
30	1030030	NW-10-047-24	New Well	Domestic	48.77	37.19	35.58	48.77					9.75	45.46	2004-07-15	BROWN, IAN & ANN
31	1030113	SE-10-047-24	Unknown		57.91	32.02	30.48	57.91					11.43	54.55	2006-09-21	BISHOP, JACK & KIMBERLY
32	1030130	NW-10-047-24	New Well	Domestic	48.77	32.92	30.48	48.77					8.23	54.55	2006-07-03	DEMUND, JAKOB
33	1030154	SW-10-047-24	New Well	Domestic	51.21	34.14	17.07	51.21					7.92	45.46	2007-02-22	WILLIS, ANDY
34	1030156	1-10-47-24	New Well	Domestic	64.62	28.71	37.19	64.62					10.67	45.46	2007-05-24	STEFFENSEN, MATT & MELISSA
35	1030209	11-10-047-24	New Well	Domestic	64.86	34.75	33.53	64.86					9.14	45.46	2006-10-11	MOISAN, DANNY & JASMINE
36	1030273	13-10-47-24	New Well	Domestic	64.86	34.14	33.53	64.86					7.62	54.55	2011-08-09	AMBROSE, STEVE
37	1520133	13-10-47-24	New Well	Domestic	28.26	28.26	20.12	25.91					14.02	36.37	2001-05-16	BITTNER, BRIAN
38	1575517	1-10-47-24	New Well	Domestic	33.53	18.29	24.38	30.48					10.74	63.05	2007-10-07	VANDECK, COLIN
39	1760013	NW-10-047-24	New Well	Domestic	36.58	24.99							7.60	45.46	2004-04-07	VENOASEN, HENRY
40	1760015	NW-10-047-24	New Well	Domestic	38.10	26.52	32.00	38.10					8.00	31.82	2004-08-18	VENOASEN, HENRY (B & H HOMES)
41	1760020	NW-10-047-24	New Well	Domestic	38.10	25.91	25.91	38.10					9.00	31.82	2004-08-12	VENOASEN, HENRY (B & A HOMES)
42	1760091	13-10-47-24	New Well	Domestic	36.58	25.91	30.48	36.58					9.00	36.37	2006-09-14	SETCHEL, ANGIE AND DAVE
43	1760117	13-10-47-24	New Well	Domestic	36.58	22.80	27.43	36.58					9.00	45.46	2005-03-29	BRVNEAU, DONNA & GEORGE
44	1760118	NW-10-047-24	New Well	Domestic	39.01	27.43	27.43	39.01					9.76	20.46	2004-04-02	KLEIN, SUE & BART
45	1760167	12-10-47-24	New Well	Domestic	36.58	24.38	24.38	36.58					9.00	45.46	2007-07-13	LETOURNEAU, JOE
46	1760180	12-10-47-24	New Well	Domestic	36.58	24.69	30.48	36.58					7.00	45.46	2007-10-02	FILLION, KELLY & CARRIE
47	1760193	NW-10-047-24	New Well	Domestic	36.58	25.30	30.48	36.58					7.80	36.37	2007-05-25	REIMCHEN, TED
48	1760194	11-10-47-24	New Well	Domestic	36.58	25.91	30.48	36.58					7.80	36.37	2007-05-21	FLEWELLING, JOHN & ANNAMARIE
49	1760217	NE-10-47-24	New Well	Domestic	33.53	22.86	27.43	33.53					10.04	44.55	2008-07-23	MCKINNEY, CLARENCE
50	1760259	NW-10-47-24	New Well	Domestic	38.10	20.42	25.91	38.10					9.66	45.46	2009-05-21	REIMCHEN, TED
51	1760285	SW-10-47-24	New Well	Domestic	36.58	26.52	30.48	36.58					8.41	40.10	2009-10-27	HENDRICKS, OTIS
52	1760306	NW-10-47-24	New Well	Domestic	36.58	22.56	24.38	36.58					11.43	27.28	2010-07-07	HIGGINS, GERRY
53	1760391	12-2-47-24	New Well	Domestic	24.38	12.80	18.29	24.38					12.01	27.28	2012-08-28	LUCAS, DANNI

wells located in section SE 10-47-24W4M (drilling logs available in Appendix x)

APPENDIX D

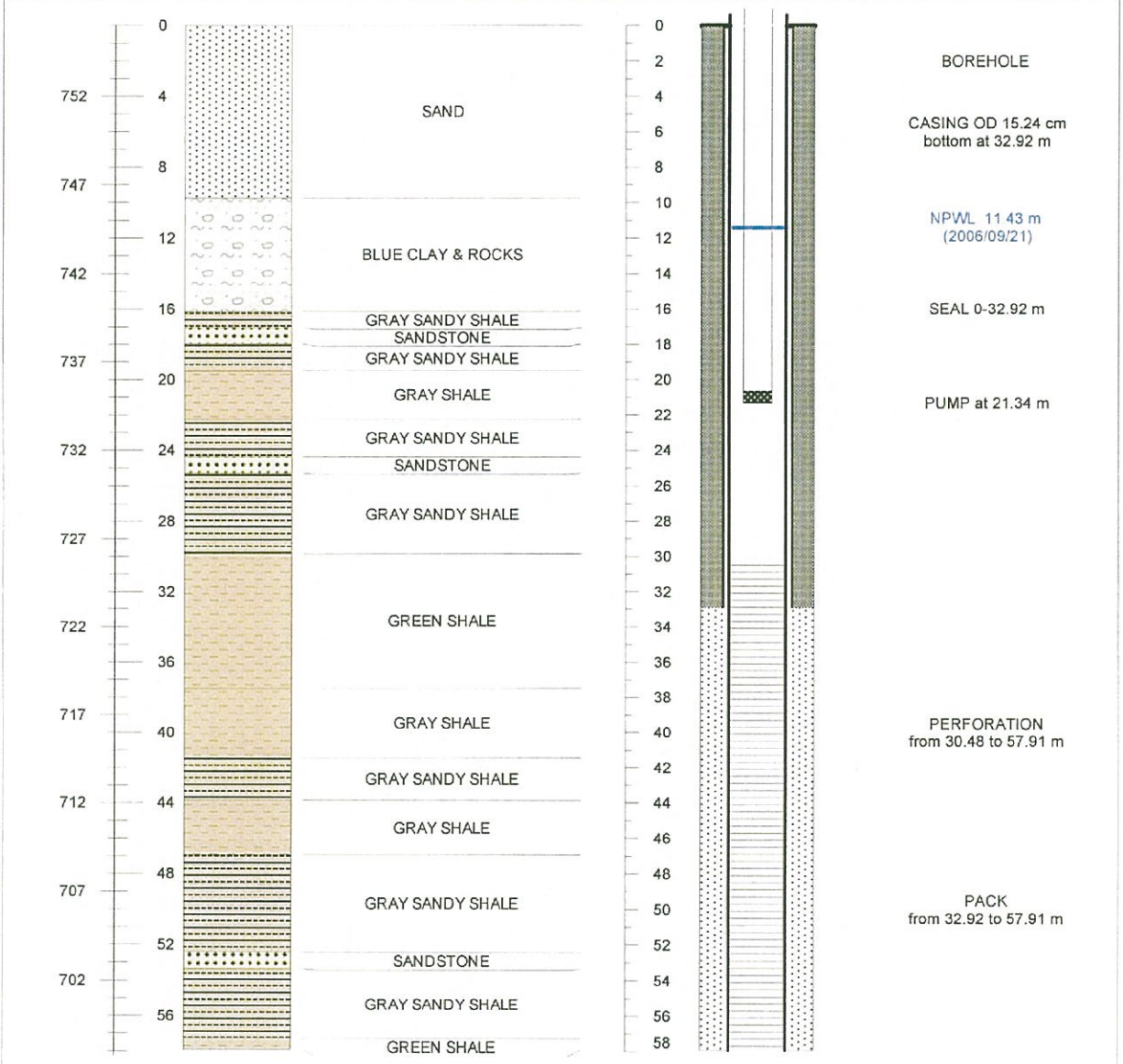
WELL ID 1030113 DRILLING LOG

WATER WELL DRILLING REPORTS

GEOWATER CONSULTING

WATER WELL DRILLING LOG
ID 1030113
LOCATION: WETSKIWIN
OWNER: BISHOP, JOSH
DATE DRILLED: September 21,2006

LEGAL LOCATION SE 10- 47-24 W4M
COORDINATES NAD83 UTM12
X: 337893.6 Y: 5879324.04 Z: 756 m
WELL DEPTH 57.91 m
TOP OF CASING 0.61 m (from the ground)



Government of Alberta

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 1030113
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
BISHOP, JACK & KIMBERLY	P.O. BOX 20 RR3	WETASKIWIN	AB	CA	T9A 1X1

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	10	047	24	4				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.036100 Longitude -113.421000
How Location Obtained: Not Verified

Elevation m
How Elevation Obtained: Not Obtained

Drilling Information

Method of Drilling: Unknown
Proposed Well Use:
Type of Work: Unknown

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
9.75		Sand
16.15		Blue Clay & Rocks
17.07		Gray Sandy Shale
17.98		Sandstone
19.51		Gray Sandy Shale
22.25		Gray Shale
24.38		Gray Sandy Shale
25.30		Sandstone
29.87		Gray Sandy Shale
37.49		Green Shale
41.45		Gray Shale
43.89		Gray Sandy Shale
46.94		Gray Shale
52.43		Gray Sandy Shale
53.34		Sandstone
57.30		Gray Sandy Shale
57.91		Green Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 54.55 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
2006/09/21	54.55	11.43

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
		2006/09/20	2006/09/21

Borehole

Diameter (cm)	From (m)	To (m)

Surface Casing (if applicable): Plastic
Size OD : 15.24 cm
Wall Thickness : 1.118 cm
Bottom at : 32.92 m

Well Casing/Liner: Plastic
Size OD : 11.43 cm
Wall Thickness : 0.602 cm
Top at : 30.48 m
Bottom at : 57.91 m

Perforations

From (m)	To (m)	Diameter or Slot Width(cm)	Slot Length(cm)	Hole or Slot Interval(cm)
30.48	57.91	0.051		15.24

Perforated by: Saw

Annular Seal: Driven & Bentonite
Placed from 0.00 m to 32.92 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: BRIAN MAYGARD
Certification No: 10167A
Company Name: ACTION WATER WELLS LTD.
Copy of Well report provided to owner
Date approval holder signed

Government of Alberta

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 1030113
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
BISHOP, JACK & KIMBERLY	P.O. BOX 20 RR3	WETASKIWIN	AB	CA	T9A 1X1

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	10	047	24	4				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.036100 Longitude -113.421000
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 60.96 cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 54.55 L/min
Recommended Pump Intake Depth (From TOC) 27.43 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

NOTE: BLEW WITH AIR COMPRESSOR @ 70' FOR 2 HRS
DRILLING WATER FROM WETASKIWIN, 1500 GAL

Yield Test

Taken From Ground Level
Depth to water level

Measurement in Metric

Test Date	Start Time	Static Water Level
2006/09/21	12:00 AM	11.43 m

Method of Water Removal
Type Air
Removal Rate 54.55 L/min
Depth Withdrawn From 21.34 m

If water removal period was < 2 hours, explain why

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
	1:00	18.29
	2:00	15.54
	3:00	13.56
	4:00	12.95
	5:00	12.50
	6:00	11.99
	7:00	11.81
	8:00	11.73
	9:00	11.68
	10:00	11.63
	12:00	11.58
	14:00	11.53

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
BRIAN MAYGARD

Certification No
10167A

Company Name
ACTION WATER WELLS LTD.

Copy of Well report provided to owner Date approval holder signed

Government of Alberta

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 1030156
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2007/06/28

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
STEFFENSEN, MATT & MELISSA	P.O. BOX 39 RR 3 SITE 2	WETASKIWIN	ALBERTA	CA	T9A 1X1

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	1	10	47	24	4	3	2	0721277	

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.036004 Longitude -113.417332
How Location Obtained
Lat/Long calculated to centre of lot

Elevation m
How Elevation Obtained
Not Obtained

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
3.66		Sand
5.49		Brown Clay
8.53		Blue Clay & Rocks
14.02		Green Shale
16.15		Gray Sandy Shale
17.07		Sandstone
18.90		Gray Sandy Shale
23.16		Gray Shale
25.60		Gray Sandy Shale
26.21		Sandstone
28.04		Gray Shale
35.36		Green Shale
37.19		Gray Sandy Shale
37.80		Gray Shale
43.28		Green Shale
44.20		Gray Shale
46.94		Gray Sandy Shale
53.64		Green Shale
57.00		Gray Shale
59.13		Gray Sandy Shale
60.05		Sandstone
63.70		Gray Sandy Shale
64.62		Green Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 45.46 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
2007/05/24	45.46	10.67

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
64.62 m	64.62 m	2007/05/22	2007/05/24

Borehole

Diameter (cm)	From (m)	To (m)
20.00	0.00	64.62

Surface Casing (if applicable)
Plastic
Size OD : 15.24 cm
Wall Thickness : 1.113 cm
Bottom at : 38.71 m

Well Casing/Liner
Plastic
Size OD : 11.43 cm
Wall Thickness : 0.602 cm
Top at : 37.19 m
Bottom at : 64.62 m

Perforations

From (m)	To (m)	Diameter or Slot Width(cm)	Slot Length(cm)	Hole or Slot Interval(cm)
37.19	64.62	0.051		15.24

Perforated by Saw

Annular Seal Driven & Bentonite
Placed from 0.00 m to 38.71 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
BRIAN MAYGARD

Certification No
10167A

Company Name
ACTION WATER WELLS LTD.

Copy of Well report provided to owner
Yes

Date approval holder signed
2007/05/28

Government of Alberta

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 1030156
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2007/06/28

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
STEFFENSEN, MATT & MELISSA	P.O. BOX 39 RR 3 SITE 2	WETASKIWIN	ALBERTA	CA	T9A 1X1

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	1	10	47	24	4	3	2	0721277	

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.036004 Longitude -113.417332
How Location Obtained
Lat/Long calculated to centre of lot

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 45.46 L/min
Recommended Pump Intake Depth (From TOC) 33.53 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

WATER USED TO DRILL THE WELL FROM CITY OF WETASKIWIN H2O STN 2007/05/22 9:00 AM 1500 GALLONS,

Yield Test

Measurement in Metric

Test Date	Start Time	Static Water Level
2007/05/24	12:00 AM	10.67 m

Method of Water Removal
Type Air
Removal Rate 45.46 L/min
Depth Withdrawn From 27.43 m

If water removal period was < 2 hours, explain why

MEASUREMENTS FROM TOP OF CASING, BLEW WITH COMPRESSOR @ 90 FT FOR 2 HRS,

Taken From Ground Level
Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
10.67	0:00	27.43
	1:00	24.13
	2:00	21.64
	3:00	19.76
	4:00	18.29
	5:00	16.97
	6:00	16.05
	7:00	15.19
	8:00	14.53
	9:00	14.02
	10:00	13.56
	12:00	13.11
	14:00	12.70
	16:00	12.34
	20:00	11.79
	25:00	11.43
	30:00	10.97
	35:00	10.87
	40:00	10.80
	50:00	10.67

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
BRIAN MAYGARD

Certification No
10167A

Company Name
ACTION WATER WELLS LTD.

Copy of Well report provided to owner
Yes

Date approval holder signed
2007/05/28

Government of Alberta

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 1575617
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2009/01/06

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
VANBECK, COLIN	P.O. BOX 181	MILLET	ALBERTA	CA	T0C 1Z0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	1	10	47	24	4	2	2	0721277	

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.035140 Longitude -113.416811
How Location Obtained
Lat/Long calculated to centre of lot

Elevation m
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Rotary

Type of Work
New Well

Proposed Well Use
Domestic

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description
8.53		Sand
12.50		Clay
19.51		Shale
30.18		Sandstone & Shale Ledges
33.53		Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 63.65 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
2007/11/07	63.65	10.74

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
33.53 m	33.53 m	2007/10/07	2007/10/07

Borehole

Diameter (cm)	From (m)	To (m)
20.00	0.00	33.53

Surface Casing (if applicable)
Plastic
Size OD : 15.24 cm
Wall Thickness : 0.838 cm
Bottom at : 18.29 m

Well Casing/Liner
Plastic
Size OD : 11.43 cm
Wall Thickness : 0.584 cm
Top at : 15.24 m
Bottom at : 33.53 m

Perforations

From (m)	To (m)	Diameter or Slot Width(cm)	Slot Length(cm)	Hole or Slot Interval(cm)
24.38	30.48	0.152		15.24

Perforated by Saw

Annular Seal Driven & Shale Trap
Placed from 15.24 m to 18.29 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
DARREN PAPLEY

Certification No
5896A

Company Name
PAPLEY DRILLING LTD.

Copy of Well report provided to owner
Yes

Date approval holder signed
2008/05/21

Government of Alberta

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 1575617
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2009/01/06

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
VANBECK, COLIN	P.O. BOX 181	MILLET	ALBERTA	CA	T0C 1Z0

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	1	10	47	24	4	2	2	0721277	

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.035140 Longitude -113.416811
How Location Obtained
Lat/Long calculated to centre of lot

Elevation m
How Elevation Obtained
Not Obtained

Additional Information

Measurement in Metric

Distance From Top of Casing to Ground Level 45.72 cm
Is Artesian Flow
Rate L/min
Is Flow Control Installed
Describe

Recommended Pump Rate 63.65 L/min
Recommended Pump Intake Depth (From TOC) 22.86 m
Pump Installed Yes
Type SUB @ 75'
Depth m
Make
H.P. .5
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
BOREHOLE DIAMETER 7.875" CASING & 5.125" LINER

Yield Test

Measurement in Metric

Test Date	Start Time	Static Water Level
2007/11/07	12:00 AM	10.74 m

Method of Water Removal
Type Pump
Removal Rate 63.65 L/min
Depth Withdrawn From 22.86 m

If water removal period was < 2 hours, explain why
MEASUREMENTS FROM TOP OF WELL

Taken From Ground Level
Depth to water level

Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)
10.74	0:00	16.31
12.57	1:00	13.36
13.26	2:00	12.42
13.62	3:00	12.14
13.84	4:00	12.02
14.00	5:00	11.94
14.15	6:00	11.89
14.25	7:00	11.84
14.33	8:00	11.79
14.38	9:00	11.76
14.45	10:00	11.73
14.55	12:00	11.68
14.63	14:00	11.63
14.71	16:00	11.58
14.86	20:00	11.53
14.99	25:00	11.48
15.11	30:00	11.43
15.22	35:00	11.43
15.32	40:00	11.38
15.49	50:00	11.33
15.65	60:00	11.28
15.85	75:00	11.23
16.03	90:00	11.18
16.18	105:00	11.15
16.31	120:00	11.13

Water Diverted for Drilling

Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification

Name of Journeyman responsible for drilling/construction of well
DARREN PAPLEY

Certification No
5896A

Company Name
PAPLEY DRILLING LTD.

Copy of Well report provided to owner
Yes

Date approval holder signed
2008/05/21

Government of Alberta

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 236523
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1982/07/19

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
JACOBE, DON H.	4117-53A ST, WETASKIWIN				T9A 1S2

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	10	047	24	4				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.036143 Longitude -113.421203
How Location Obtained
Not Verified

Elevation 758.95 m
How Elevation Obtained
Estimated

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
3.05		Sand
10.67		Blue Clay
13.72		Blue Shale
15.24		Sandstone
27.43		Green Shale
29.57		Gray Shale
32.00		Sand & Shale
35.05		Green Shale
36.58		Sand & Shale

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 45.46 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1982/04/03	54.55	9.75

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
36.58 m		1982/04/01	1982/04/03

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	36.58

Surface Casing (if applicable)
Steel
Size OD : 14.12 cm
Wall Thickness : 0.000 cm
Bottom at : 27.74 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 27.74 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

Contractor Certification

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

Company Name
WARNKE DRILLING LTD.

Certification No
1

Copy of Well report provided to owner
Date approval holder signed

Government of Alberta

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 236523
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1982/07/19

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
JACOBE, DON H.	4117-53A ST, WETASKIWIN				T9A 1S2

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	10	047	24	4				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.036143 Longitude -113.421203
How Location Obtained: Not Verified

Elevation 758.95 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: 45.46 L/min
Recommended Pump Intake Depth (From TOC): 21.34 m
Pump Installed: Yes Depth: m
Type: SUB Make: H.P.: .5
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 (Excel)

Additional Comments on Well
WATER IS SOFT.

Yield Test

Taken From Ground Level
Measurement in Metric

Test Date	Start Time	Static Water Level
1982/04/03	12:00 AM	9.75 m

Drawdown (m)	Depth to water level: Elapsed Time Minutes:Sec	Recovery (m)

Method of Water Removal
Type: Pump
Removal Rate: 54.55 L/min
Depth Withdrawn From: 14.94 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
WARNKE DRILLING LTD.

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

Government of Alberta

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 236527
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1985/09/06

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
GRAPENTINE, ED	P.O. BOX 6544 WETASKIWIN				T9A 2G2

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	10	047	24	4				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.036143 Longitude -113.421203
How Location Obtained
Not Verified

Elevation m
How Elevation Obtained
Not Obtained

Drilling Information

Method of Drilling
Unknown

Proposed Well Use
Domestic

Type of Work
Chemistry

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description

Yield Test Summary

Measurement in Metric

Recommended Pump Rate L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
0.00 m			

Borehole

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

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

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

Attachment
Top Fittings
Bottom Fittings

Pack
Type
Grain Size
Amount

Contractor Certification

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

Certification No
1

Company Name
UNKNOWN DRILLER

Copy of Well report provided to owner
Date approval holder signed

Government of Alberta

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 236520
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1975/12/18

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CRICHTON, DAVE	P.O. BOX 6544 WETASKIWIN				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	10	047	24	4				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.036143 Longitude -113.421203
How Location Obtained
Not Verified

Elevation 757.43 m
How Elevation Obtained
Estimated

Drilling Information

Method of Drilling
Drilled

Proposed Well Use
Domestic

Type of Work
Chemistry

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description

Yield Test Summary

Measurement in Metric

Recommended Pump Rate L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
39.62 m			

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	39.62

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

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

Attachment
Top Fittings
Bottom Fittings

Pack
Type
Grain Size
Amount

Contractor Certification

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

Company Name
UNKNOWN DRILLER

Certification No
1

Copy of Well report provided to owner
Date approval holder signed

Government of Alberta

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 236519
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1974/08/09

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CAMPBELL, MARY	5511-113A ST, EDMONTON				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	10	047	24	4				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.036143 Longitude -113.421203
How Location Obtained: Map

Elevation 746.76 m
How Elevation Obtained: Estimated

Drilling Information

Method of Drilling: Drilled
Proposed Well Use: Domestic
Type of Work: Chemistry

Formation Log

Measurement in Metric

Depth from ground level (m)	Water Bearing	Lithology Description

Yield Test Summary

Measurement in Metric

Recommended Pump Rate 0.00 L/min

Test Date	Water Removal Rate (L/min)	Static Water Level (m)
1974/07/30		15.24

Well Completion

Measurement in Metric

Total Depth Drilled	Finished Well Depth	Start Date	End Date
42.67 m			

Borehole

Diameter (cm)	From (m)	To (m)
0.00	0.00	42.67

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

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

Attachment
Top Fittings
Bottom Fittings

Pack
Type
Grain Size
Amount

Contractor Certification

Name of Journeyman responsible for drilling/construction of well: UNKNOWN NA DRILLER
Certification No: 1
Company Name: UNKNOWN DRILLER
Copy of Well report provided to owner
Date approval holder signed

Government of Alberta

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 236519
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1974/08/09

Well Identification and Location

Measurement in Metric

Owner Name	Address	Town	Province	Country	Postal Code
CAMPBELL, MARY	5511-113A ST, EDMONTON				

Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description
	SE	10	047	24	4				

Measured from Boundary of
m from
m from

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude 53.036143 Longitude -113.421203
How Location Obtained
Map

Elevation 746.76 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 (Excel)

Additional Comments on Well

Yield Test

Taken From Ground Level
Measurement in Metric

Test Date	Start Time	Static Water Level
1974/07/30	12:00 AM	15.24 m

Depth to water level		
Drawdown (m)	Elapsed Time Minutes:Sec	Recovery (m)

Method of Water Removal
Type
Removal Rate 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
UNKNOWN DRILLER

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

APPENDIX E

SUSTAINABLE YIELD

(TABLE 2 AND MAP Q_{20})

Table 2 - Summary of hydrogeological parameters

			well	completion interval						depth to	available	app. yield
	water well ID	legal location	depth	from	to	NPWL	yield	T	C	pump	drawdown (H_A)	Q_{20}
		W4M	(meter)				(L/min)	(m^2/s)	(m/s)	(meter)		(m^3/year)
1	040747	NW-10-047-24	36.58	24.38	36.58	7.62	53.05	1.94E-05	1.59E-06	21.34	13.72	4.00E+03
2	040748	NW-10-047-24	47.24	28.96	47.24	10.67	54.55	2.67E-05	1.27E-06	21.34	10.67	4.28E+03
3	040749	NE-10-047-24	42.67	30.48	42.67	12.8	31.82	1.11E-05	7.29E-07	28.96	16.16	2.69E+03
4	254419	SW-11-047-24	36.58	30.48	36.58	7.01	45.46	7.35E-06	8.03E-07	27.43	20.42	2.25E+03
5	289823	NE-10-047-24	41.15	35.05	41.15	11.89	45.46	1.23E-05	1.01E-06	27.43	15.54	2.87E+03
6	1030113	SE-10-047-24	57.91	30.48	57.91	10.51	54.55	1.28E-05	4.67E-07	27.43	16.92	3.25E+03
7	1030154	SW-10-047-24	51.21	30.48	48.77	7.92	45.46	3.65E-05	1.05E-06	25.91	17.99	9.86E+03
8	1030156	1-10-47-24	64.62	37.19	64.62	10.67	45.46	1.49E-05	5.43E-07	27.43	16.76	3.75E+03
9	1030209	11-10-047-24	54.86	33.53	54.86	9.14	45.46	2.20E-05	9.76E-07	30.48	21.34	7.05E+03
10	1030273	13-10-47-24	54.86	33.53	54.86	7.62	54.55	2.20E-05	9.76E-07	22.86	15.24	5.03E+03
11	1575617	1-10-47-24	33.53	24.38	30.48	10.74	63.65	1.51E-05	1.08E-06	22.86	12.12	2.75E+03
12	1780013	NW-10-047-24	36.58	24.99	36.58	7.6	45.46	3.80E-05	1.92E-06	21.34	13.74	7.84E+03
13	1780020	NW-10-047-24	38.10	25.91	38.10	9	31.82	2.16E-05	1.29E-06	27.43	18.43	5.98E+03
14	1780118	NW-10-047-24	39.01	27.43	39.01	9.76	20.46	5.33E-06	4.17E-07	29.87	20.11	1.61E+03
15	1780286	SW-10-47-24	36.58	30.48	36.58	8.41	40.10	2.85E-05	4.68E-06	27.44	19.03	8.14E+03
16	1780391	12-2-47-24	24.38	18.29	24.38	12.01	27.28	4.69E-05	5.13E-06	21.34	9.33	6.57E+03

T - transmissivity (m^2/s)

C - conductivity (m/s)

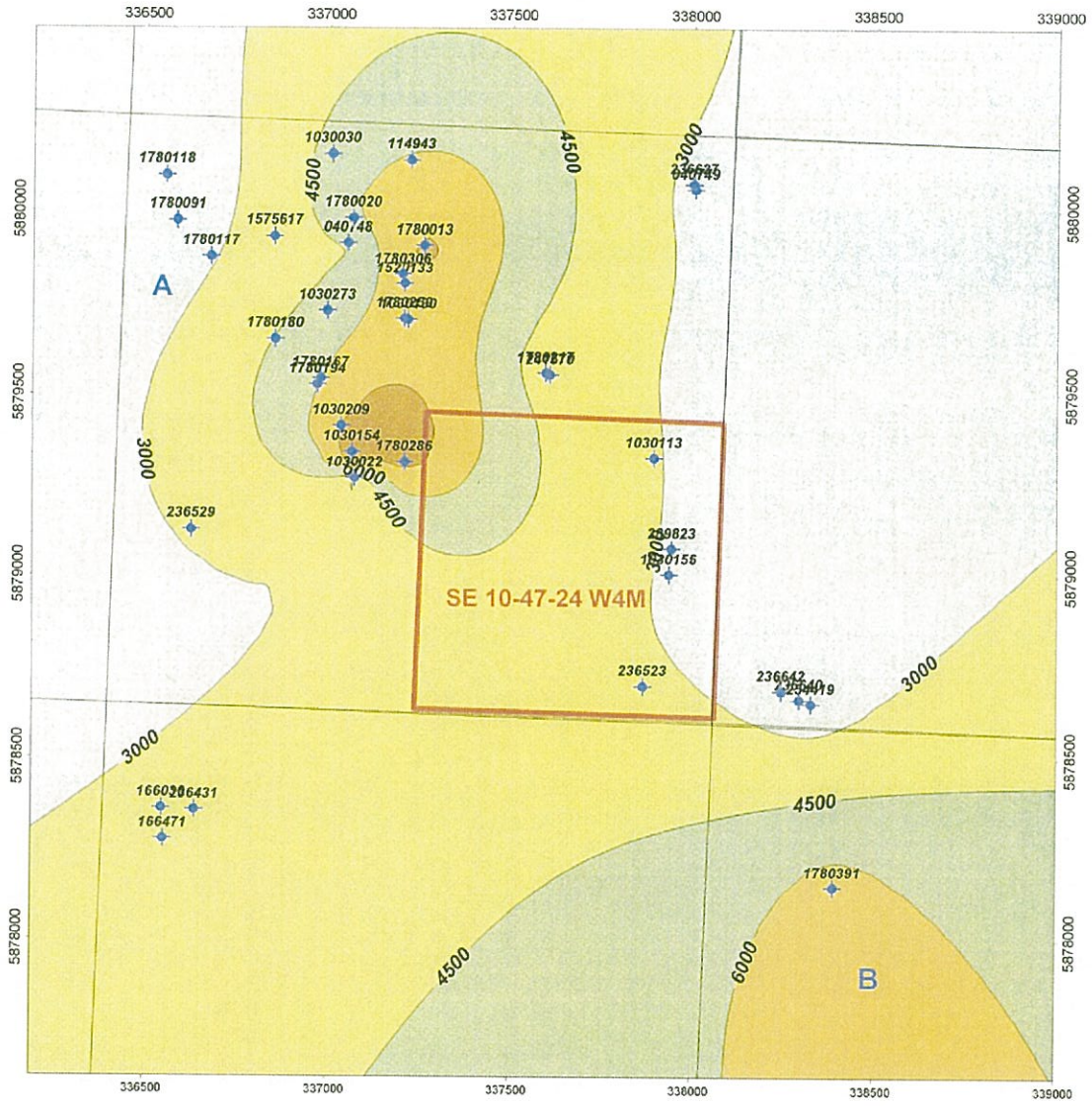
Q_{20} - sustainable yield for 20 years period (m^3/year)

H_A - available drawdown {depth to pump — static water level (NPWL)} (m)

0.7 - 70% safty factor

$Q_{20} = 0.6 * T * H_A * 0.7$

☐ well at the property



NAD83 UTM12

GEOWATER CONSULTING	LEGAL LOCATION: SE-10-47-24W4M
APPARENT YIELD Q20	
CLIENT NAME: BISHOP, JOSH	PROJECT No: 102 2014
LOCATION: WETASKIWIN	DATE: APRIL, 2014

APPENDIX F

TABLE 3 - WATER CHEMISTRY

Table 3 - Groundwater chemistry

	well ID	legal location	well depth	pH	TDS	Ca	Mg	K	Na	NO_2_N	NO_3_N	Cl	SO_4	CO_3	HCO_3	F	NO_2_NO_3_N	Fe	TH	analysis date
		W4M	(m)									(mg/L)								
1	236334	NW-02-047-24	16.5		814						0.2	59.1	98.9					1.2	4.2	24-Jun-58
2	236345	NW-02-047-24	33.5	8.7	1120	246.5	-1.0	0.9	367	-0.1		40.1	72.0	39.0	707.8		-0.03	0.2	12.4	02-Jul-75
3	236345	NW-02-047-24	33.5	8.5	833	3.0	-1.0	0.7	333	-0.1		34.0	15.0	18.0	834.7	1.6	-0.03	-0.1	0.2	12-Sep-75
4	236434	NW-03-047-24	61.0	8.6	662	-1.0	-1.0	0.6	275	-0.1		29.0	16.0	16.0	656.8	2.2	-0.01	0.1	-0.1	01-Mar-85
5	236531	NW-10-047-24	53.3	8.6	1047	6.0	-1.0	0.8	418	-0.1		-1.0	149.9	19.0	916.7	1.1	-0.01	0.1	0.4	22-Jun-85
6	236519	SE-10-047-24	42.7	7.7	684	2.0	-1.0	0.4	283	-0.1	-0.1	123.2	-10.0		532.8	1.6		-0.1	0.1	16-Aug-74
7	236519	SE-10-047-24	42.7	8.5	744	3.0	-1.0	0.5	298	-0.1		134.2	-10.0	9.0	586.8	1.9	-0.01	0.1	0.2	18-Sep-78
8	236520	SE-10-047-24	39.6	8.8	503	-1.0	-1.0	0.4	197	-0.1		6.0	38.0	21.0	487.8	1.5	-0.03	-0.1	0.0	07-Jan-76
9	236523	SE-10-047-24	36.6	8.3	697	2.1	0.3		301			121.9	1.0			2.2		0.2	0.1	24-Apr-87
10	236529	SW-10-047-24	27.4		826							5.0	41.0							13-Sep-65
11	236529	SW-10-047-24	27.4	8.7	702	-2.0	-1.0	0.5	279	-0.1		15.0	55.0	21.0	667.8	1.9	-0.01	0.7	0.2	18-Sep-78

- Indicates concentration less than

CDWQG - Canadian Drinking Water Quality Guidelines 2006

	pH	TDS				Sodium	Nitrite N		Chloride	Sulphate			Fluoride	NO_2 + NO_3	Iron
MAC (mg/L)							1						1.5*	10.00	
AO (mg/L)	6.5-8.5	≤500				≤200			≤250	≤500					≤0.3

* It is recommended that concentration of fluoride be adjusted to 0.8- 1.0 mg/L, which is optimum range for the control of caries.
MAC - Maximum Acceptable Concentration (affects health)
AO - Aesthetic Objective (does not affect health but affects odour, taste, etc.)