



2022 to 2023 Groundwater Monitoring Report

Gull Lake Area

Tp 040 to 042, R 28, W4M, and Tp 040 to 042, R 01, W5M

**Prepared for
Ponoka County**

October 2023

HCL Project No.: MR-0323.23
© 2023 hydrogeological consultants ltd.



Groundwater and Surface Water Solutions for a Changing Environment

17740 – 118 Avenue NW, Edmonton, Alberta T5S 2W3 CANADA
780.483.7240 • 800.661.7972 • hcl.ca

Signatures

Version	Date	Description	Prepared by	Reviewed by
1	2023-10-31	Final Report		

Jennifer Catt, B.Sc.
Project Administrator

Jim Touw, P.Geol.
Senior Hydrogeologist

PERMIT TO PRACTICE
hydrogeological consultants ltd.

Signature _____

Date _____

PERMIT NUMBER P 385
The Association of Professional Engineers and
Geoscientists of Alberta (APEGA)

TABLE OF CONTENTS

Signatures.....	i
1. Introduction	1
1.1. Project Overview.....	1
1.2. Purpose.....	1
1.3. Scope.....	1
2. Background	2
2.1. Previous Work.....	2
2.2. Water Well Details	2
2.3. Site Maps	3
3. Groundwater Monitoring Summary	8
3.1. Water-Level Summary	8
3.2. Groundwater Sampling	8
4. Discussion	9
4.1. Water Levels	9
4.2. Groundwater Quality	13
5. Conclusions and Recommendations	16
6. Bibliography	17

LIST OF FIGURES

Figure 1. Index Map.....	1
Figure 2. Site Map – Gull Lake and Water Wells.....	3
Figure 3. Site Map – 1992 Gull Lake Golf Course WW.....	4
Figure 4. Site Map – 2001 Wegmann WW	5
Figure 5. Site Map – 1983 Jeffrey WW.....	6
Figure 6. Site Map – 2004 WSW – Meridian 1 and 2004 WSW – Meridian 2	7
Figure 7. Hydrograph of the Daily Highest Water-Level Elevations in the Five Water Wells and Gull Lake.....	9
Figure 8. Hydrograph – 1983 Jeffrey WW	11
Figure 9. Hydrograph of the Daily Highest Water-Level Elevations in Gull Lake	12
Figure 10. Piper Tri-Linear Diagram – 1992 Gull Lake Golf Course WW.....	13
Figure 11. Groundwater Quality – 2004 WSW – Meridian 1	14
Figure 12. Groundwater Quality – 2004 WSW – Meridian 2	15

LIST OF TABLES

Table 1. Water Well Details	2
Table 2. Water-Level Summary	8

LIST OF APPENDICES

Appendix A – Water Well Details	
---------------------------------	--

1. Introduction

1.1. Project Overview

Gull Lake is in Tp 040 to 042, R 28, W4M, and Tp 040 to 042, R 01, W5M, approximately 100 kilometres southwest of Edmonton, Alberta, and is in the South Saskatchewan River Basin, as shown in Figure 1. The Lake sees a significant amount of recreational use. Water wells are used to supply groundwater to most of the residents in the area.

In 2011, Ponoka County (the County) initiated a groundwater monitoring program to track changes in the water levels and the chemical quality of the groundwater from five water wells in the Gull Lake Watershed within the County.

1.2. Purpose

Hydrogeological Consultants Ltd. (HCL) was retained by the County to gather groundwater monitoring data from five water wells in the Gull Lake Watershed. The data collected were reviewed and validated, and are summarized in reports that have been prepared approximately annually by HCL since 2012; the present report includes data collected to August 29, 2023.

1.3. Scope

Water-level data and groundwater samples for chemical-quality analysis were collected from the following water wells:

- 1992 Gull Lake Golf Course Water Well (1992 Gull Lake Golf Course WW) [GIC ID: 365500; M35379.066969]
- 2001 Wegmann Domestic Water Well (2001 Wegmann WW) [GIC ID: 499682; M37490.034988]
- 1983 Jeffrey Domestic and Stock Water Well (1983 Jeffrey WW) [GIC ID: 275201; M35377.069370]
 - In previous reports, the 1983 Jeffrey WW was referred to as the 1983 Witham Domestic and Stock Water Well or the 1983 Rogers Domestic and Stock Water Well; water well names are changed to reflect the current landowner.
- 2004 Water Source Well – Meridian Beach 1 (2004 WSW – Meridian 1) [GIC ID: 1035048; M39227.478953]
- 2004 Water Source Well – Meridian Beach 2 (2004 WSW – Meridian 2) [GIC ID: 1035047; M39227.478952]

In addition to the collection of water-level data from the five water wells, water-level data for Gull Lake were obtained from the Water Survey of Canada (WSC).

The groundwater samples were submitted to an accredited laboratory in Alberta.

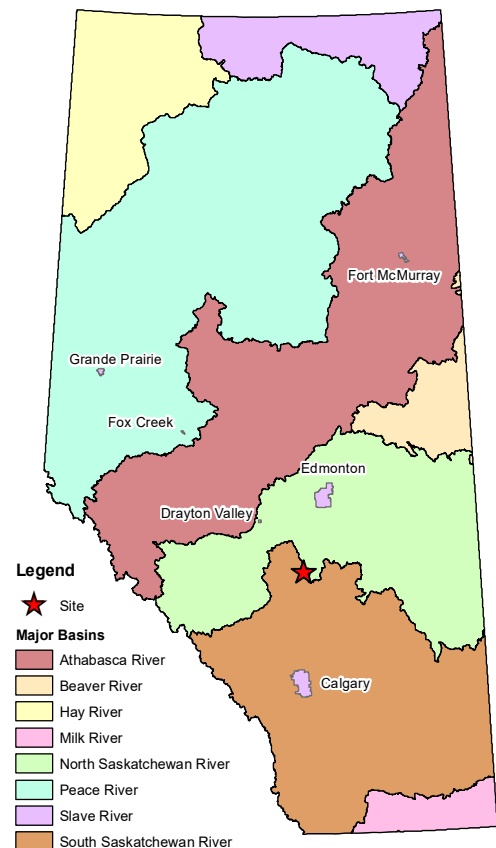


Figure 1. Index Map

2. Background

2.1. Previous Work

In 2015, HCL was retained by the Gull Lake Water Quality Management Society to study potential groundwater connectivity to Gull Lake (HCL, 2015a). Four local aquifers were identified: the Sun155, the Sun169, the Sun180, and the Sun199 aquifers; the aquifer nomenclature is based on the number of metres that the top of each Aquifer is above the base of the Sunchild Member of the Paskapoo Formation. For example, the top of the Sun155 Aquifer is 155 metres above the base of the Sunchild Member. The Sunchild Member, sometimes referred to as the Sunchild Aquifer or the Dalehurst Member, is the uppermost member of the Paskapoo Formation.

Water wells that are completed in the Sun155 Aquifer have non-pumping water-level elevations that may be either above or below the Lake elevation of 900 metres above mean sea level (AMSL). The water levels in the two Meridian Beach water source wells, which are both completed in the Sun155 Aquifer, are approximately 1 metre above the Lake level. However, analysis of the water well data indicates that there is no direct hydraulic connection between the Lake and the Sun155 Aquifer (HCL, 2015a). HCL concluded that the Sun169 and the Sun180 aquifers may be hydraulically connected to Gull Lake (HCL, 2015a). The base of the Sun199 Aquifer is above the Lake level, indicating that there is no direct connection between the Aquifer and the Lake.

2.2. Water Well Details

The five water wells shown in Table 1 are completed in four different aquifers in the Sunchild Member of the Paskapoo Formation.

Water Well Designation	Location	Aquifer	Aquifer Connection to Gull Lake	Depth Completed (m BGL)	Side of Gull Lake
1992 Gull Lake Golf Course WW	04-10-042-01 W5M	Sun199	No direct hydraulic connection	32.0	West
2001 Wegmann WW	16-04-042-01 W5M	Sun180	Possible hydraulic connection	54.9	West
1983 Jeffrey WW	09-04-042-28 W4M	Sun169	Possible hydraulic connection	63.7	East
2004 WSW – Meridian 1	08-12-042-01 W5M	Sun155	No direct hydraulic connection	24.4	East
2004 WSW – Meridian 2	08-12-042-01 W5M	Sun155	No direct hydraulic connection	24.4	East

m BGL – metres below ground level

Table 1. Water Well Details

2.3. Site Maps

Figure 2 is a site map showing Gull Lake and the locations of the five water wells included in the groundwater monitoring program; site maps for the five water wells are also shown in Figures 3 through 6.

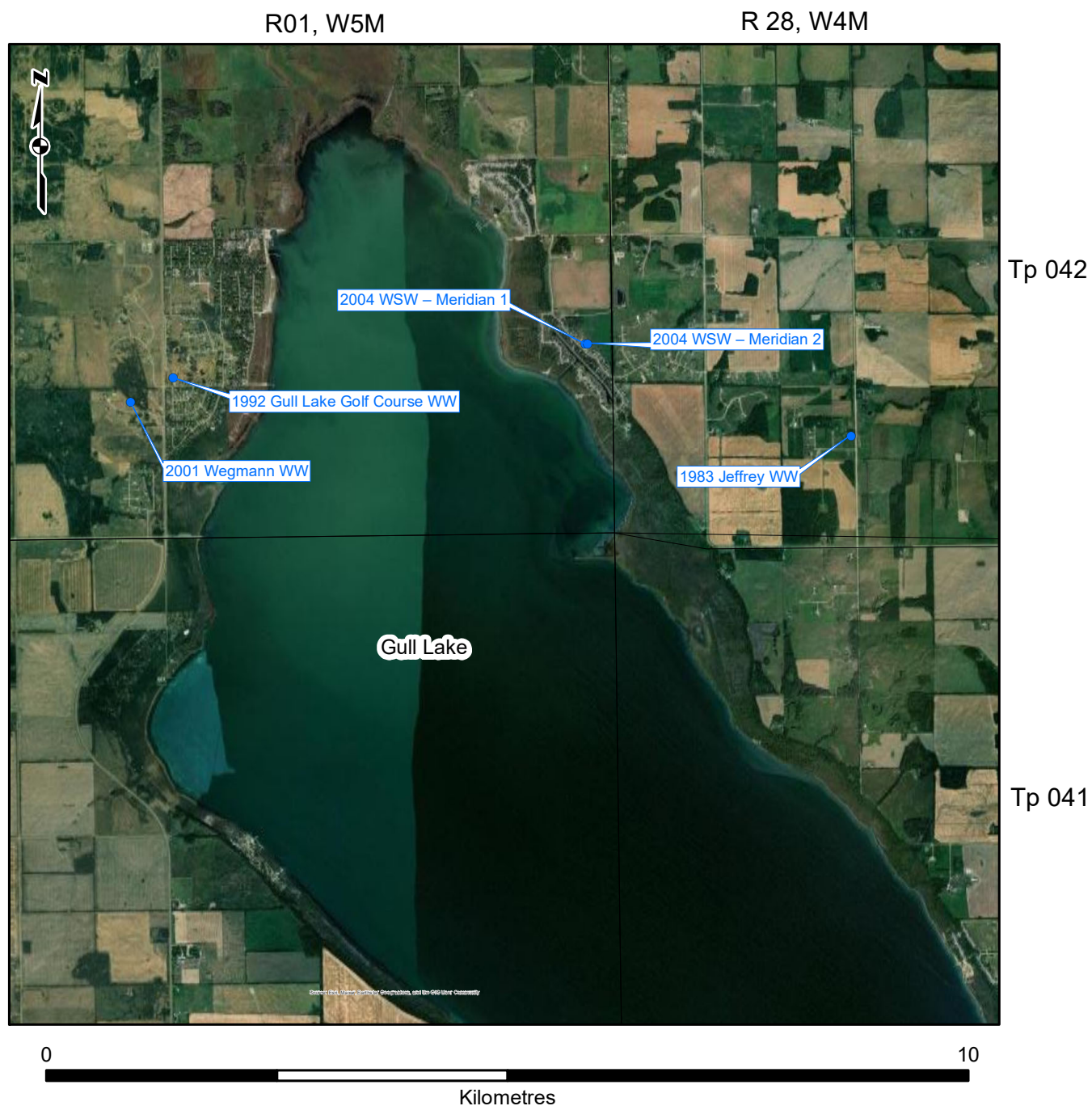


Figure 2. Site Map – Gull Lake and Water Wells

10-042-01 W5M



Figure 3. Site Map – 1992 Gull Lake Golf Course WW

04-042-01 W5M



Figure 4. Site Map - 2001 Wegmann WW



Figure 5. Site Map – 1983 Jeffrey WW

12-042-01 W5M



Figure 6. Site Map - 2004 WSW - Meridian 1 and 2004 WSW - Meridian 2

3. Groundwater Monitoring Summary

3.1. Water-Level Summary

Level TROLL data loggers were installed in the five water wells by HCL personnel on June 28, 2011, and have been programmed to record 24 water-level measurements per day. The water-level data have been downloaded on an annual basis by HCL personnel. The highest and lowest water-level measurements from January 1, 2022, through August 29, 2023, are summarized in Table 2. Additional water well details and hydrographs for the five water wells are in Appendix A.

Water Well Designation	Water Level (metres below reference point)			
	2022		2023*	
	Highest (m)	Lowest (m)	Highest (m)	Lowest (m)
1992 Gull Lake Golf Course WW	21.40	22.11	21.64	22.30
2001 Wegmann WW	35.91	39.23	36.26	40.22
1983 Jeffrey WW	46.05	52.08	45.84	53.28
2004 WSW – Meridian 1	4.60	10.99	5.11	11.08
2004 WSW – Meridian 2	4.76	7.84	5.28	7.81

* Water-level measurements to 2023-08-29

Table 2. Water-Level Summary

3.2. Groundwater Sampling

On August 29, 2023, HCL personnel collected groundwater samples from each of the five water wells. The samples were submitted to Element Materials Technology Canada Inc. (Element) for analysis of routine chemical and physical parameters. The previous groundwater sampling event was in August 2022.

4. Discussion

4.1. Water Levels

4.1.1. General

Figure 7 is a comparative hydrograph showing the daily highest water-level elevations over time for the five water wells and Gull Lake. Over the monitoring interval, the water-level elevations have varied between 898 and 914 metres AMSL. The elevations of the highest daily water levels in the 1992 Gull Lake Golf Course WW (Sun199 Aquifer) and the 1983 Jeffrey WW (Sun169 Aquifer) are more than 9 metres above the elevation of Gull Lake, with the exception of the anomalously low water-level elevations in the 1983 Jeffrey WW in August 2023. The elevations of the highest daily water levels in the 2001 Wegmann WW (Sun180 Aquifer), the 2004 WSW – Meridian 1 (Sun155 Aquifer), and the 2004 WSW – Meridian 2 (Sun155 Aquifer) are within 3 metres of the elevation of Gull Lake.

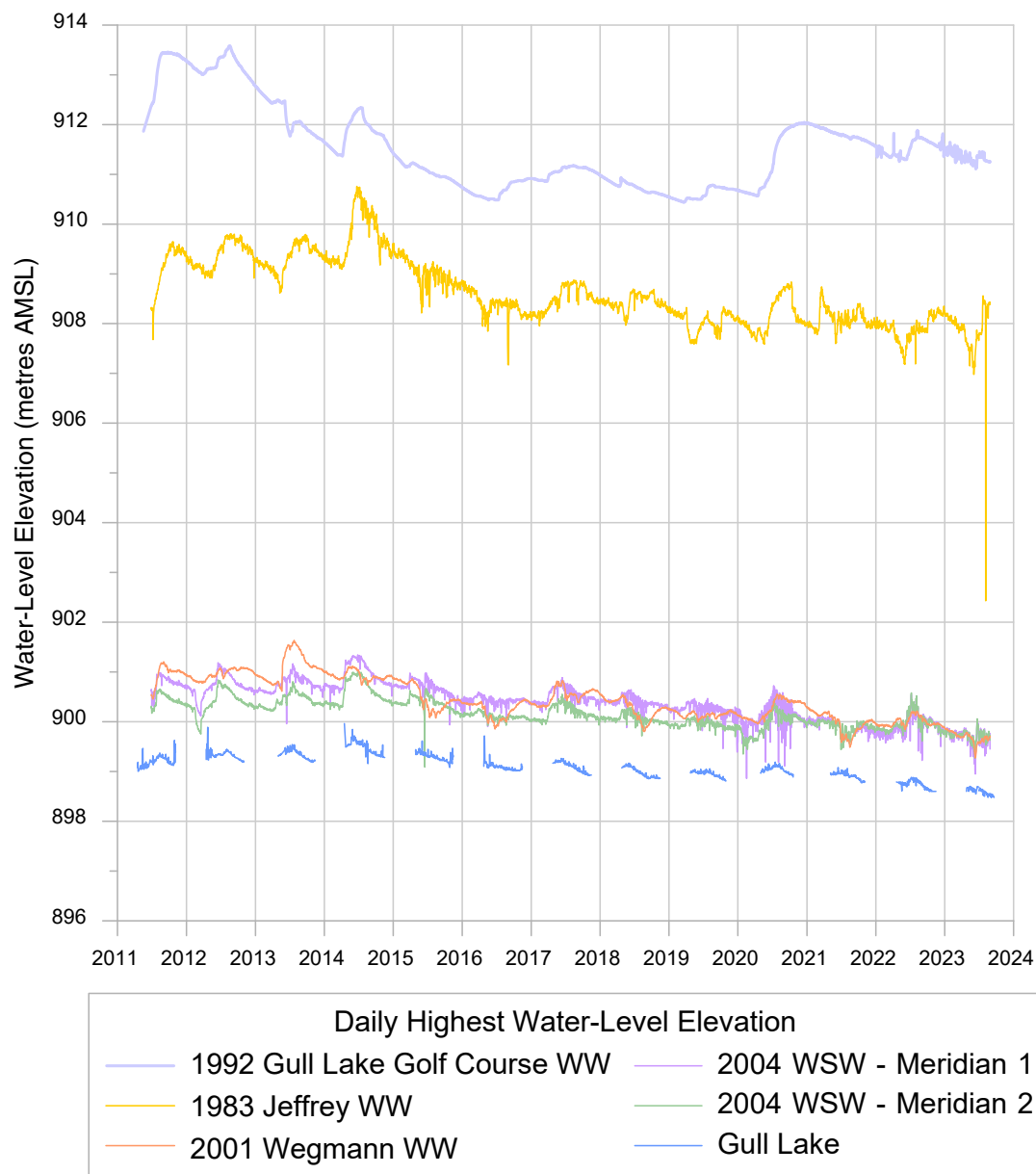


Figure 7. Hydrograph of the Daily Highest Water-Level Elevations in the Five Water Wells and Gull Lake

In most years, each water well exhibits a water-level rise in the spring, followed by a decline until the following spring. This is considered to be a normal seasonal fluctuation and is a result of snow melt infiltrating into the subsurface, causing water levels in the aquifers to rise. This phenomenon is referred to as spring recharge. The timing and degree of spring recharge is expected to vary based on climatic conditions. Water levels typically decline after the spring recharge event because, in Alberta, the volume of precipitation is less than evaporation and vegetation uptake. In some years, there may be a minor water-level rise in the fall that correlates with precipitation and because of the decline in vegetation, resulting in reduced water uptake. In the winter, water levels are expected to decline, as there is typically no liquid precipitation to recharge the aquifer during this period.

4.1.2. 1992 Gull Lake Golf Course Water Well

The 1992 Gull Lake Golf Course WW is completed in the Sun199 Aquifer, which is above the water level in Gull Lake. The Sun199 Aquifer does not have a direct hydraulic connection to Gull Lake and is expected to discharge onto the land surface (HCL, 2015a). Over the monitoring interval, there has been an overall water-level decline of approximately 2 metres. It should be noted that the most recent water levels are still approximately 1 metre higher than the lowest recorded water levels in 2019.

Between 2022 and 2023, there was a greater degree of water-level fluctuation in the 1992 Gull Lake Golf Course WW than has been historically measured and is likely a result of a change in pump operation. In the summer of 2022, there was a water-level rise of approximately 0.5 metres, followed by a decline until the summer of 2023. In the summer of 2023, a minor water-level rise of about 0.1 metres was observed and can be considered to be late spring recharge. The water level in the 1992 Gull Lake Golf Course WW has since declined by approximately 0.1 metres.

4.1.3. 1983 Jeffrey Domestic and Stock Water Well

The 1983 Jeffrey WW is completed in the Sun169 Aquifer, which may be hydraulically connected to Gull Lake (HCL, 2015a). Over the monitoring interval, the water level in the 1983 Jeffrey WW has exhibited a decline of approximately 1 metre.

In 2022, the water level declined in the late spring, but rose in the summer to recover to similar elevations as those in the winter of 2021. The rising trend continued until the end of the year. In 2023, the water level declined by approximately 1.25 metres until the summer, when the water level rose by approximately 1.5 metres.

The highest daily water levels below an elevation of approximately 907 metres AMSL are a result of nearly continuous groundwater diversion from the 1983 Jeffrey WW between August 5 and 7, 2023; previously, the pump was operated in short intervals only, allowing water levels to recover the same day. Figure 8 on the following page depicts the raw water-level data from the 1983 Jeffrey WW and demonstrates a pattern of drawdown and recovery in the water well.

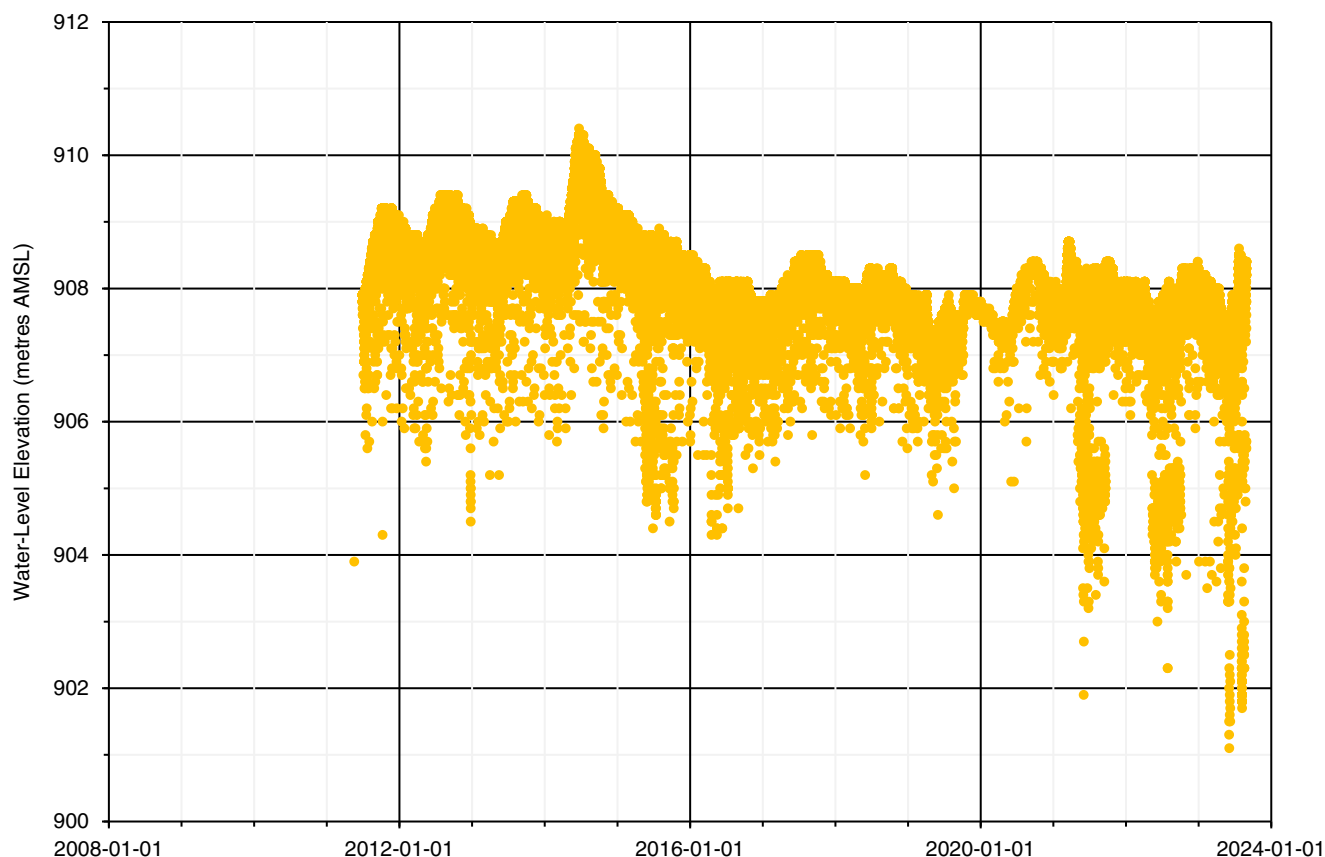


Figure 8. Hydrograph - 1983 Jeffrey WW

4.1.4. 2001 Wegmann Domestic Water Well

The 2001 Wegmann WW is completed in the Sun180 Aquifer and may be hydraulically connected to Gull Lake (HCL, 2015a). Over the monitoring interval, the water level in the 2001 Wegmann WW has exhibited an overall decline of approximately 1.25 metres.

Two water-level rises were observed in the spring and summer of 2022. The first water-level rise was approximately 0.1 metres; the second rise was approximately 0.2 metres and was followed by a water-level decline. A very slight water-level rise of less than 0.1 metres was observed in the spring of 2023, followed by a decline of approximately 0.25 metres. Following the decline, the water level in the 2001 Wegmann WW exhibited a slight rising trend into the fall of 2023.

4.1.5. Meridian Beach Water Source Wells

The top of the Sun155 Aquifer is below the base of Gull Lake; no hydraulic connection is expected between the Aquifer and the Lake (HCL, 2015a). The 2004 WSW – Meridian 1 and the 2004 WSW – Meridian 2 are in close proximity to each other and are both completed in the Sun155 Aquifer. Both water source wells have similar water-level trends, with the 2004 WSW – Meridian 1 having slightly higher water levels. Over the monitoring interval, the water levels in both water source wells have exhibited a declining trend of approximately 1 metre.

In the spring of 2022, there was a small water-level decline in the two water source wells. The 2022 recharge event for both water source wells took place in July 2022, which was later than in previous years. Following this water-level rise, water levels in the water source wells declined by approximately 0.5 metres until the summer of 2023, when water levels rose by approximately 0.25 metres and have since been on a declining trend.

4.1.6. Gull Lake

Water-level data for Gull Lake are collected by the WSC. Per the WSC, water-level measurements from October 25, 1999, through September 21, 2023, are considered to be provisional and preliminary.¹ Figure 9 shows the water-level data for Gull Lake from 2011 through September 21, 2023, at a higher resolution than in Figure 7; the water level in Gull Lake has declined by approximately 1.3 metres during this time. The data collected during the 2022 to 2023 monitoring interval show an overall water-level decline of approximately 0.2 metres. In 2023, the water level in the Lake was the lowest it has been since the start of the monitoring program.

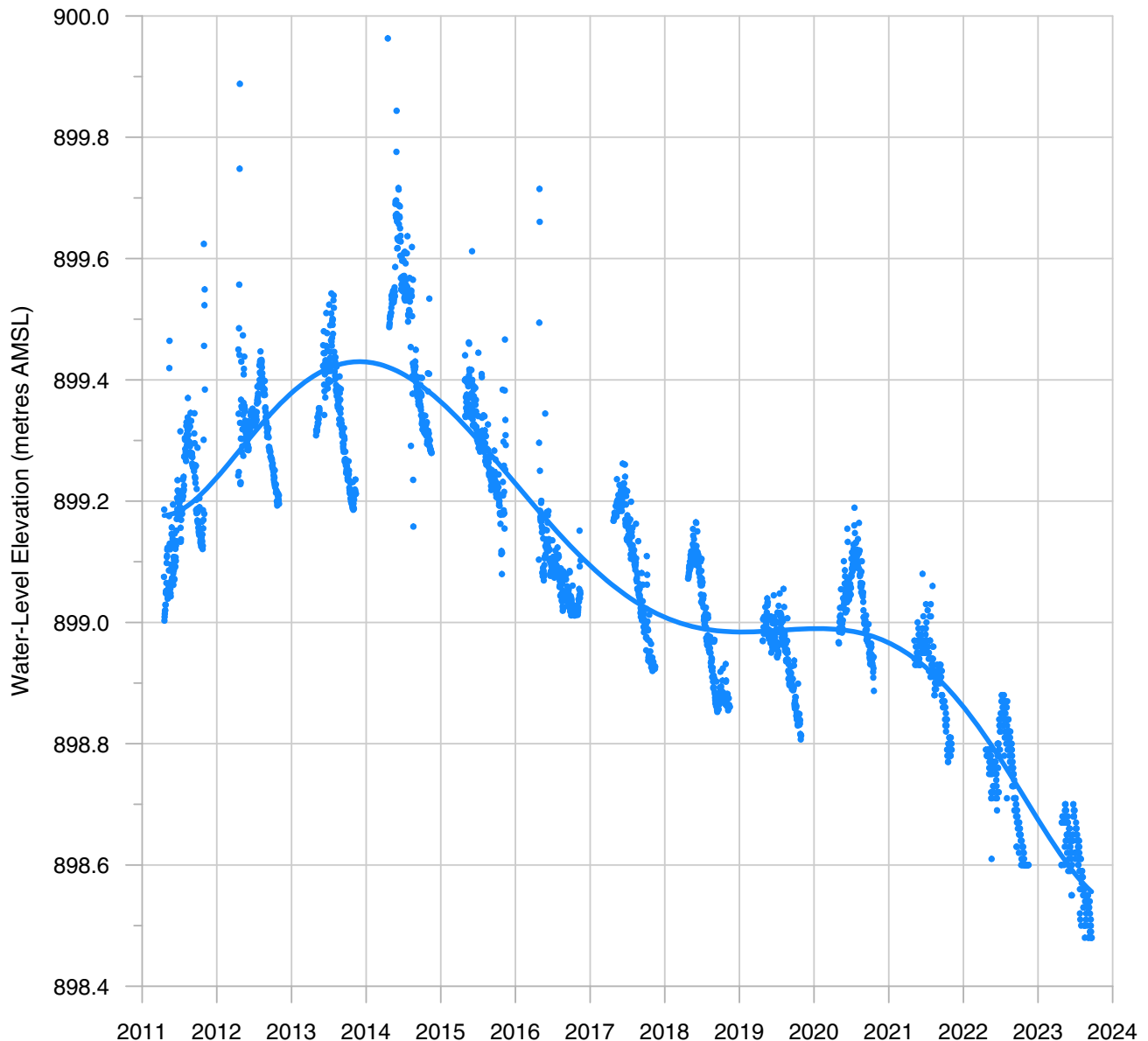


Figure 9. Hydrograph of the Daily Highest Water-Level Elevations in Gull Lake

¹ <https://rivers.alberta.ca>

4.2. Groundwater Quality

Groundwater samples from the five water wells were collected by HCL personnel on August 29, 2023, and submitted to Element for analysis of routine chemical and physical parameters. A sample from Gull Lake was not collected in 2023. The analysis results were reported by Element on September 5, 2023; copies of the results are in Appendix A. The 2023 analysis results showed that there was no significant change in the chemical quality of the groundwaters from the 2001 Wegmann WW or the 1983 Jeffrey WW.

An anomaly was observed in the 2022 analysis results for the 1992 Gull Lake Golf Course WW. Figure 10 is a Piper tri-linear diagram showing all available analysis results for the 1992 Gull Lake Golf Course WW. In 2022, a chloride concentration of 64.4 milligrams per litre (mg/L) was reported, which is significantly higher than the historical average chloride concentration of 8.7 mg/L. This higher value can be attributed to shock chlorination of the water well, which occurred shortly before the groundwater sample was collected. The 2023 chloride concentration was 9.9 mg/L, which is in line with the historical analysis results.

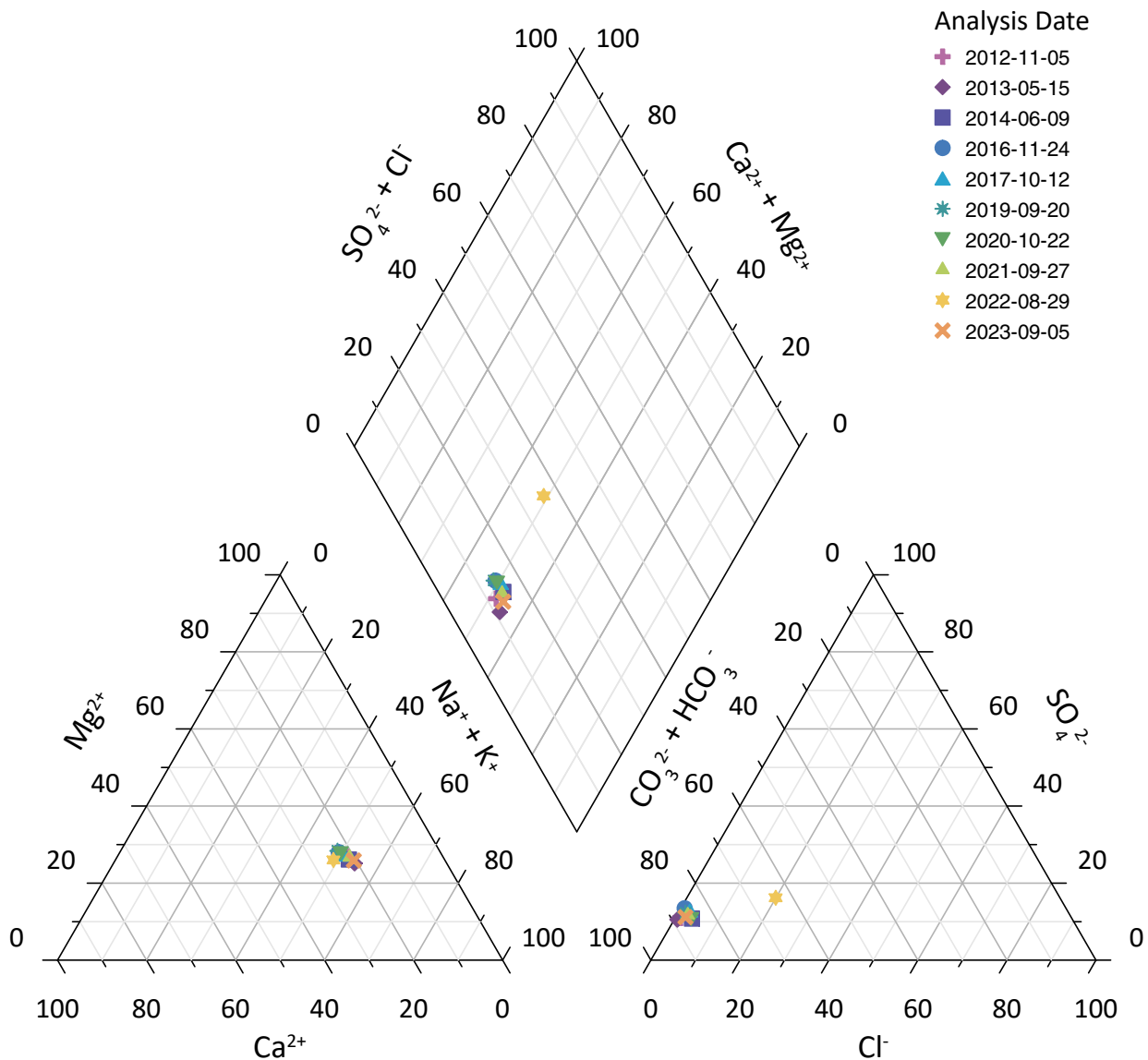


Figure 10. Piper Tri-Linear Diagram – 1992 Gull Lake Golf Course WW

Groundwaters from the 2004 WSW – Meridian 1 and the 2004 WSW – Meridian 2 have exhibited chemical-quality changes over the monitoring interval. In the 2004 WSW – Meridian 1, the changing groundwater quality can be attributed to an increasing trend in the concentrations of calcium, magnesium, and chloride, accompanied by an overall declining trend in the concentration of sodium, as seen in Figure 11.

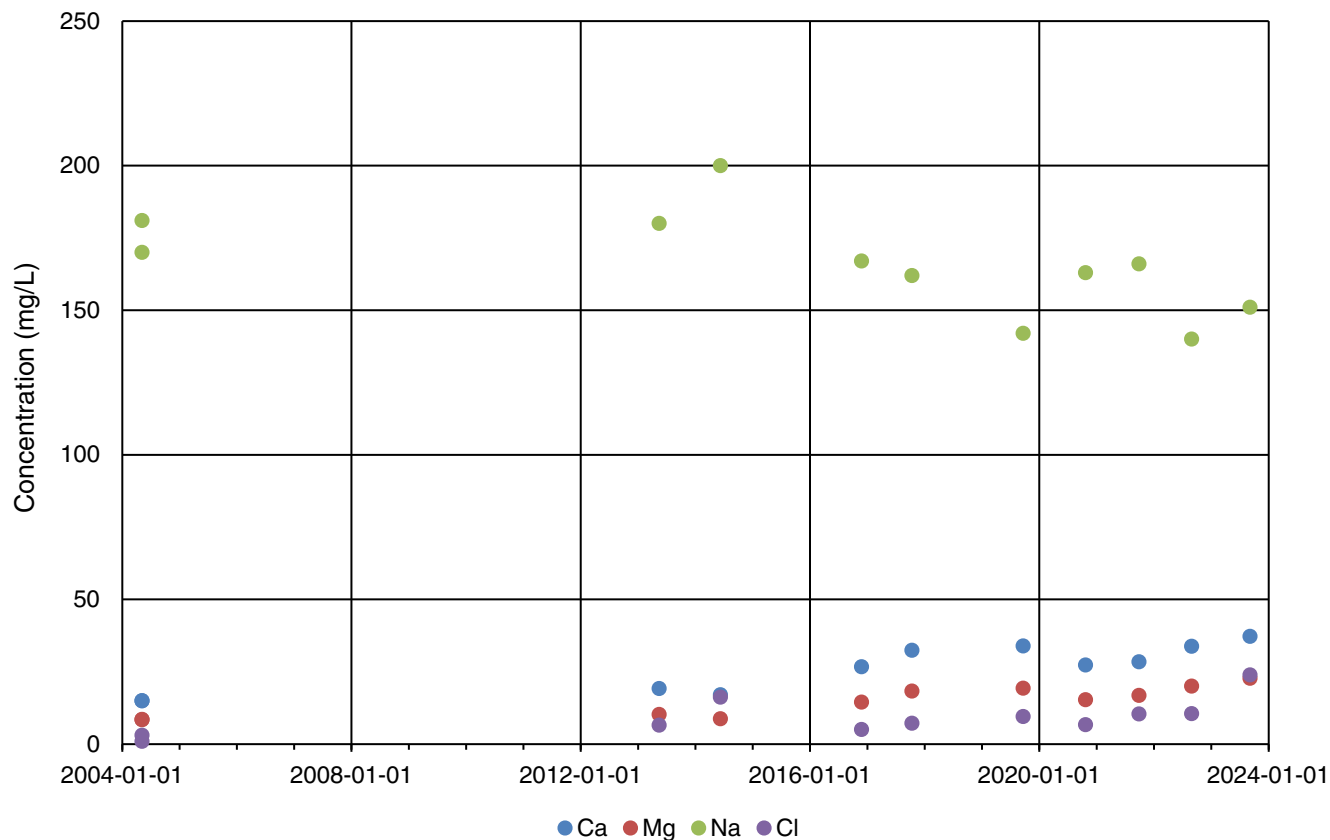


Figure 11. Groundwater Quality - 2004 WSW - Meridian 1

Figure 12 on the following page shows the concentrations of constituents in the groundwater from the 2004 WSW – Meridian 2 over time. Similar to the 2004 WSW – Meridian 1, the groundwater from the 2004 WSW – Meridian 2 shows an increasing trend in the concentrations of calcium and magnesium, accompanied by a decreasing trend in the concentration of sodium, with the exception of the 2012 measurements. While the chloride concentration in the groundwater from the 2004 WSW – Meridian 2 has varied over time, there is no apparent trend.

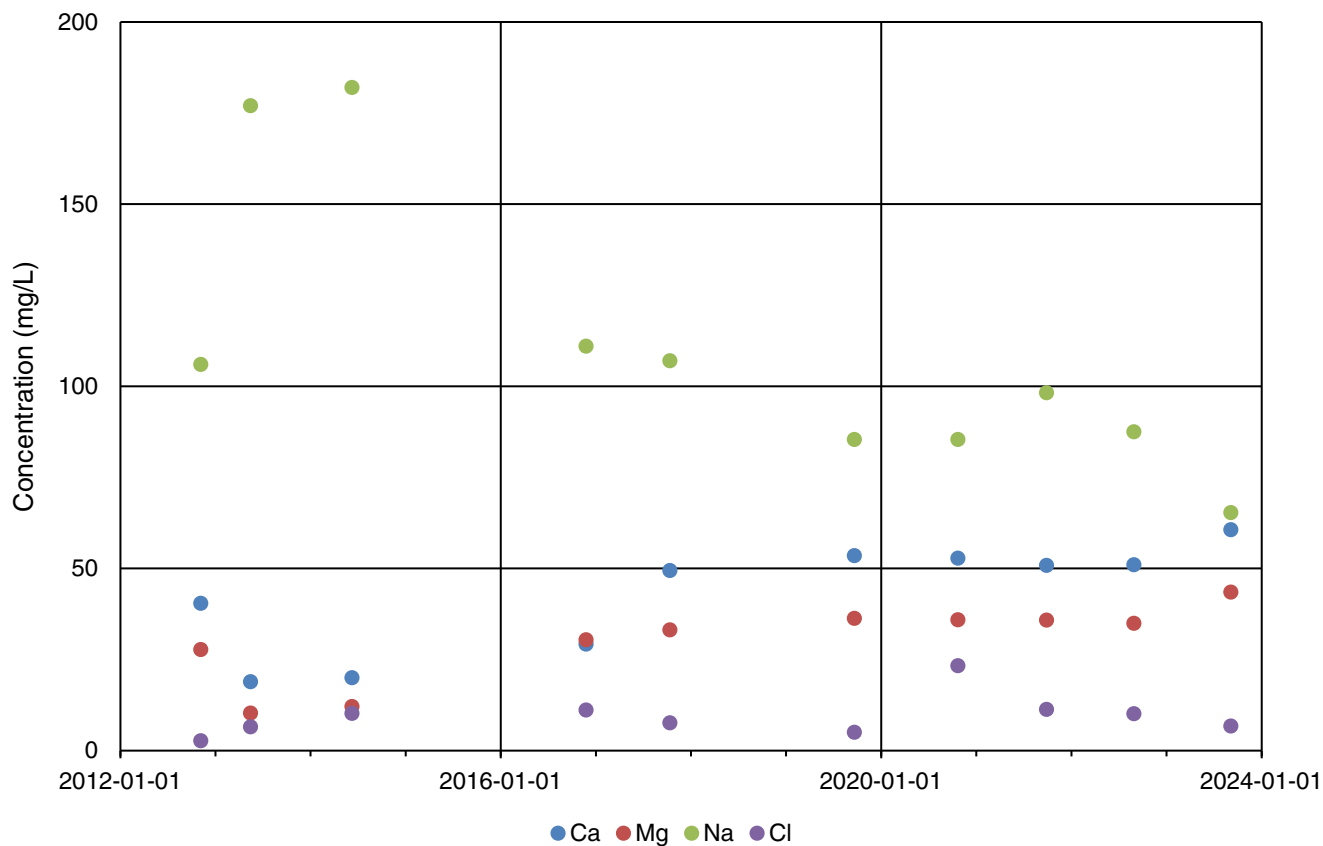


Figure 12. Groundwater Quality - 2004 WSW - Meridian 2

At this time, the water-quality changes in the groundwaters from both Meridian water source wells appear to be displaying trends over time, but the reason for the apparent trends is not known. Further investigation is needed to determine the cause.

5. Conclusions and Recommendations

While all five water wells have exhibited the expected seasonal fluctuations in water levels, an overall declining trend of between 0.5 metres and 2.0 metres has been observed over the monitoring interval. In addition, the water level in Gull Lake has declined by approximately 1.3 metres during this time.

The analysis results indicate that the groundwater quality for the 1992 Gull Lake Golf Course Water Well, the 2001 Wegmann Domestic Water Well, and the 1983 Jeffrey Domestic and Stock Water Well have been consistent over the monitoring interval, with the exception of the 2022 analysis results for the 1992 Gull Lake Golf Course WW. This is an anomalous result and can be disregarded, as the high chloride concentration can be attributed to shock chlorination of the water well prior to groundwater sampling. Both the 2004 Water Source Well – Meridian 1 and the 2004 Water Source Well – Meridian 2 have shown apparent trends in groundwater-quality changes over time.

It is recommended that the annual groundwater monitoring program, consisting of an annual download of the data loggers installed in the water wells and the collection of groundwater samples for routine chemical and physical analysis by an accredited laboratory, be continued. As well, additional monitoring sites should be considered to increase the understanding of local aquifers and their interaction with Gull Lake. As Lake elevations are on a declining trend, it is also recommended that a water sample be collected from Gull Lake annually and submitted to an accredited laboratory for routine chemical and physical analysis.

It is recommended that the cause of the groundwater-quality fluctuations in the 2004 WSW – Meridian 1 and the 2004 WSW – Meridian 2 be investigated.

6. Bibliography

- Alberta Geological Survey. 1999. Geology of Alberta - CD. [G 3501 C5 1999 A333-001; L021341]
- Alberta Lake Management Society. 2016. Lakewatch – Gull Lake 2016. Available at: <https://alms.ca/reports>
- Alberta Lake Management Society. 2021. Lakewatch – Gull Lake 2021. Available at: <https://alms.ca/reports>
- ERCB/AGS. 2011. Edmonton-Calgary Corridor. Groundwater Atlas. September 2011. [L897330]
- Hydrogeological Consultants Ltd. 2003. Regional Groundwater Assessment - FINAL. Part of the North Saskatchewan and South Saskatchewan River Basins. Tp 041 to 044, R 22 to 28, W4M and Tp 041 to 045, R 01 to 05, W5M. Prepared for Ponoka County in conjunction with Agriculture and Agri-Food Canada. (Unpublished Contract Report – September 2003) [83A .P66 2003/09; 02-0191.00]
- Hydrogeological Consultants Ltd. 2012. Groundwater Monitoring. Gull Lake Area. Tp 041 to 043, W4M and Tp 041 to 043, R 01 and 02, W5M. Prepared for Ponoka County. [83A12 .G8L3 2012/06 A012] [MR-0323.12]
- Hydrogeological Consultants Ltd. 2014. 2013 Groundwater Monitoring Report. Gull Lake Area. Tp 041 to 043, W4M and Tp 041 to 043, R 01 and 02, W5M. Prepared for Ponoka County. [83A12 .G8L3 2014/07 T741] [MR-0323.13]
- Hydrogeological Consultants Ltd. 2015a. Groundwater Impact on Gull Lake Water Level. Part of the Red Deer River Watershed. Tp 040 to 043 from R 27, W4M to R 02, W5M. Prepared for the Gull Lake Water Quality Management Society. [83B09 .L32565 2015/11 [992] [14-0219.01]
- Hydrogeological Consultants Ltd. 2015b. 2014 Groundwater Monitoring. Gull Lake Area. Tp 041 to 043 from R 28, W4M to R 02, W5M. Prepared for Ponoka County. [83A12 .G8L3 2015/12 Z971] [MR-0323.14]
- Hydrogeological Consultants Ltd. 2016. 2015 Groundwater Monitoring Report. Tp 041 to 043 from R 28, W4M to R 02, W5M. Prepared for Ponoka County. [83A12 .G8L3 2016/12 W830] [MR-0323.15]
- Hydrogeological Consultants Ltd. 2018. 2016 Groundwater Monitoring Report. Gull Lake Area. Tp 040 to 042, R 27 to 28, W4M, and Tp 040 to 042, R 01, W5M. Prepared for Ponoka County. [83A12 .G8L3 2016/12 K387] [MR-0323.16]
- Hydrogeological Consultants Ltd. 2019a. 2017 to 2019 Groundwater Monitoring Report. Gull Lake Area. Tp 040 to 042, R 28, W4M, and Tp 040 to 042, R 01, W5M. Prepared for Ponoka County. (Unpublished Contract Report – November 2019) [MR-0323.19]
- Hydrogeological Consultants Ltd. 2019b. Runoff Assessment. Gull Lake Area. SE 11-041-28 W4M. Prepared for EnerMerge Inc. (Unpublished Contract Report – December 2019) [83A12 .G8L3 2019/12 K402] [19-0267.01]
- Hydrogeological Consultants Ltd. 2020. 2019 to 2020 Groundwater Monitoring Report. Gull Lake Area. Tp 040 to 042, R 28, W4M, and Tp 040 to 042, R 01, W5M. Prepared for Ponoka County. (Unpublished Contract Report – December 2020) [83B09 .G8L3 2021/01 A014; MR-0323.20]
- Hydrogeological Consultants Ltd. 2021. 2020 to 2021 Groundwater Monitoring Report. Gull Lake Area. Tp 040 to 042, R 28, W4M, and Tp 040 to 042, R 01, W5M. Prepared for Ponoka County. (Unpublished Contract Report – November 2021) [83B09 .G8L3 2021/11 O532; MR-0323.21]
- Hydrogeological Consultants Ltd. 2022. 2021 to 2022 Groundwater Monitoring Report. Gull Lake Area. Tp 040 to 042, R 28, W4M, and Tp 040 to 042, R 01, W5M. Prepared for Ponoka County. (Unpublished Contract Report – September 2022) [83B09 .G8L3 2022/09 E164; MR-0323.22]

- Le Breton, E. G. 1971. Hydrogeology of the Red Deer Area, Alberta. Red Deer Area. [QE 186 P7 no. 71-01; L007659]
- Research Council of Alberta. 1970a. Hydrogeological Map. 1:250000: Red Deer. Red Deer Area. [83A .R4D4 hydro map; L038371]
- Research Council of Alberta. 1970b. Hydrogeological Map. 1:250000: Rocky Mountain House. Rocky Mountain House Area. [83B .R6264M646 hydro map; L064188]
- Tokarsky, O. 1971. Hydrogeology of the Rocky Mountain House Area, Alberta. Rocky Mountain House Area. [QE 186 P7 no. 71-03; L096795]

Appendix A – Water Well Details

TABLE OF CONTENTS

1983 Jeffrey Domestic and Stock Water Well.....	2
Water Well Diagram.....	3
TGWC – Water Well Drilling Report.....	4
AEPA – Water Well Drilling Report [GIC ID: 275201].....	5
Chemical Analysis Results (September 5, 2023).....	7
2022 – 2023 Hydrograph.....	12
1992 Gull Lake Golf Course Water Well.....	13
Water Well Diagram.....	14
TGWC – Water Well Drilling Report.....	15
AEPA – Water Well Drilling Report [GIC ID: 365500].....	16
Chemical Analysis Results (September 5, 2023).....	19
2022 – 2023 Hydrograph.....	24
2001 Wegmann Domestic Water Well.....	25
Water Well Diagram.....	26
TGWC – Water Well Drilling Report.....	27
AEPA – Water Well Drilling Report [GIC ID: 499682].....	28
Chemical Analysis Results (September 5, 2023).....	30
2022 – 2023 Hydrograph.....	35
2004 Water Source Well – Meridian Beach 1.....	36
Water Well Diagram.....	37
TGWC – Water Well Drilling Report.....	38
AEPA – Water Well Drilling Report [GIC ID: 1035048].....	39
Chemical Analysis Results (September 5, 2023).....	41
2022 – 2023 Hydrograph.....	46
2004 Water Source Well – Meridian Beach 2.....	47
Water Well Diagram.....	48
TGWC – Water Well Drilling Report.....	49
AEPA – Water Well Drilling Report [GIC ID: 1035047].....	50
Chemical Analysis Results (September 5, 2023).....	52
2022 – 2023 Hydrograph.....	57

1983 Jeffrey Domestic and Stock Water Well

(1983 Rogers Domestic and Stock Water Well, 1983 Witham Domestic and Stock Water Well)

09-04-042-28 W4M

(M35377.069370)



Photograph taken on August 29, 2023

Well Spatial Location:

Easting: **70,162**

Northing: **5,824,898**

(spatial accuracy HCL GPS — 10TM Resource NAD83)

Ground Elevation AMSL (m): **955**

(elevation accuracy HCL DEM (2016))

Date Completed: **June 14, 1983**

Depth Drilled (m): **63.7**

Completion Interval (m): **42.4 – 63.7 ***

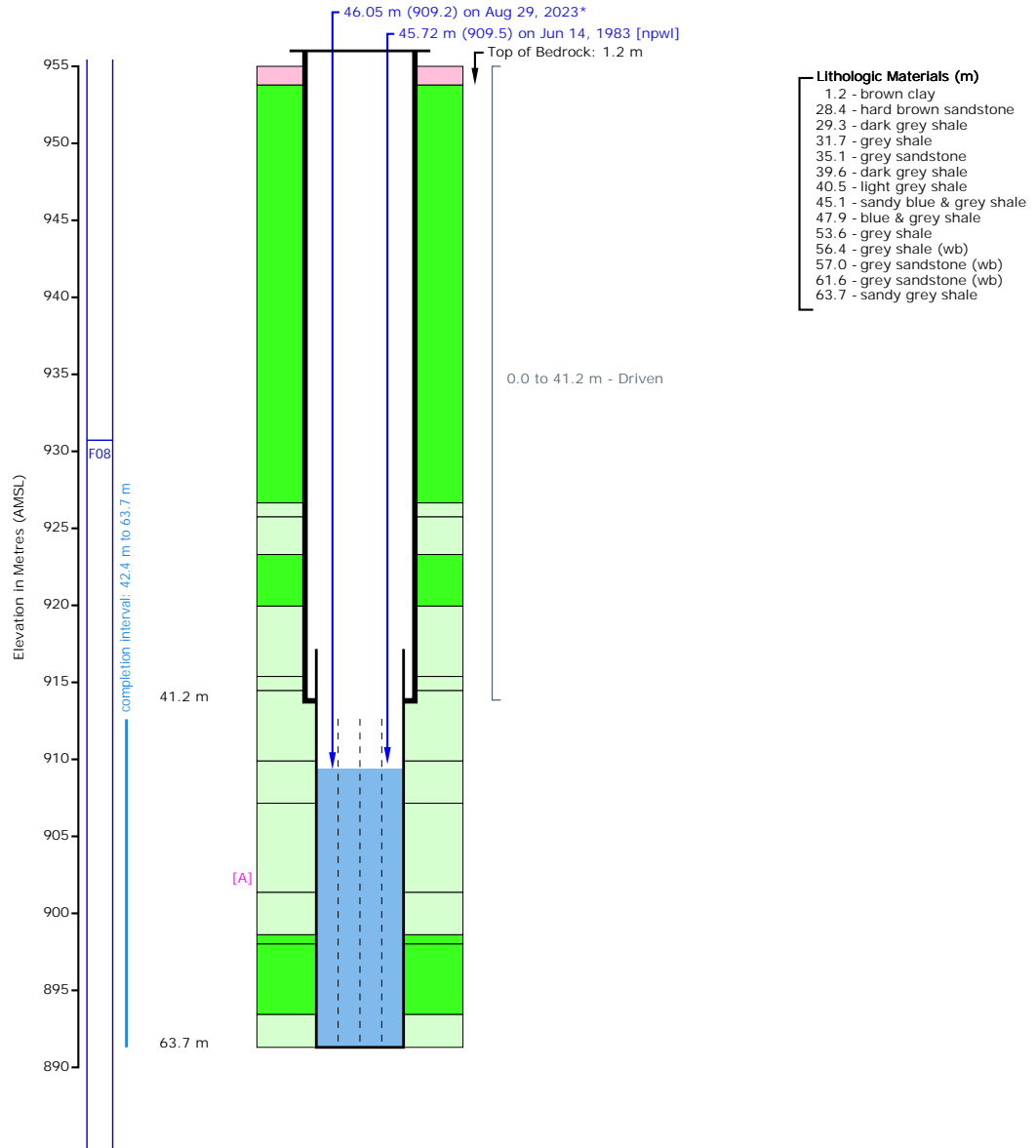
(* TGWC determined value)

Earliest Water Level (m): **45.72 – June 14, 1983**

Most Recent Water Level (m): **46.05 – August 29, 2023 @ 11:48**

GIC ID: **275201**

1983 Jeffrey Domestic and Stock Water Well Water Well Diagram



Lithology Legend			Geologic Unit Legend (Top) - Regional Analysis	
Surficial	Unsorted		F08 - Dalehurst Member	
	Fine Grained			
	Coarse Grained			
Bedrock	Fine Grained			
	Coarse Grained			
		Other		

Summary	
TGWC ID: M35377.069370	
Well Name: 1983 Jeffrey Domestic and Stock Water Well	
Legal Location: 09-04-042-28 W4M	
Casing (OD): 177.8 mm; Steel (7.0")	
Liner (OD): 141.2 mm; Steel (5.6")	
Casing Stick-Up: 0.4 m (not drawn to scale)	
Completion [A]: 42.4 to 63.7 m; Slotted	
Water Level (recent): 46.05 m (909.2 m AMSL) on Aug 29, 2023 @ 11:48 - Reference Point: Top of Casing	
Water Level (oldest): 45.72 m (909.5 m AMSL) on Jun 14, 1983 [npwl]	
<p>* Water-Level Measurements are measured from reference point listed.</p> <p>NOTE: Geologic Unit is a guide based on a regional groundwater assessment completed by Hydrogeological Consultants Ltd. (HCL) (http://www.hcl.ca) on behalf of Ponoka County in conjunction with Prairie Farm Rehabilitation Administration (P.F.R.A.).</p> <p>Drawn: October 05, 2023 @ 10:25 --- https://www.hcl.ca</p>	

do not copy, cite, or distribute without the express written consent of The Groundwater Centre, a division of hydrogeological consultants ltd.

HCL

**1983 Jeffrey Domestic and Stock Water Well
AEPA - Water Well Drilling Report**



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 275201
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1983/10/05

GOWN ID

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.

Well Identification and Location										Measurement in Metric	
Owner Name		Address		Town		Province		Country		Postal Code	
STREET, MARTY		P.O. BOX 2167 LACOMBE									
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
	NE	4	42	28	4						
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)						
_____ m from _____					Latitude <u>52.591814</u> Longitude <u>-113.969188</u>					Elevation _____ m	
_____ m from _____					How Location Obtained _____					How Elevation Obtained _____	
					Map _____					Not Obtained	

Drilling Information	
Method of Drilling Cable Tool	Type of Work New Well
Proposed Well Use Domestic & Stock	

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
1.22		Brown Clay	
28.35		Brown Hard Sandstone	
29.26		Dark Gray Shale	
31.70		Gray Shale	
35.05		Gray Sandstone	
39.62		Dark Gray Shale	
40.54		Light Gray Shale	
45.11		Blue Gray Sandy Shale	
47.85		Blue Gray Shale	
53.64		Gray Shale	
56.39	Yes	Gray Water Bearing Shale	
57.00	Yes	Gray Water Bearing Sandstone	
61.57	Yes	Gray Water Bearing Sandstone	
63.70		Gray Sandy 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)	
1983/06/14	45.46	45.72	

Well Completion				Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date	End Date	
63.70 m		1983/06/08	1983/06/14	
Borehole				
Diameter (cm)	From (m)	To (m)		
0.00	0.00	63.70		
Surface Casing (if applicable)		Well Casing/Liner		
Steel	Size OD : 17.78 cm	Steel Size OD : 14.12 cm		
Wall Thickness : 0.691 cm	Wall Thickness : 0.795 cm			
Bottom at : 41.15 m	Top at : 38.10 m			
		Bottom at : 63.70 m		
Perforations				
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval (cm)
42.37	63.70	0.635		15.24
Perforated by Torch				
Annular Seal Driven				
Placed from 0.00 m to 41.15 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 FORRESTER WATER WELL DRILLING (1981) LTD.	Copy of Well report provided to owner Date approval holder signed

Printed on 10/5/2023 10:25:08 AM

Page: 1 / 2



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 275201
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1983/10/05

GOWN ID

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.

Well Identification and Location										Measurement in Metric	
Owner Name		Address		Town		Province		Country		Postal Code	
STREET, MARTY		P.O. BOX 2167 LACOMBE									
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
	NE	4	42	28	4						
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)						
m from					Latitude 52.591814 Longitude -113.969188					Elevation m	
m from					How Location Obtained					How Elevation Obtained	
					Map					Not Obtained	

Additional Information										Measurement in Metric	
Distance From Top of Casing to Ground Level cm											
Is Artesian Flow										Is Flow Control Installed	
Rate L/min										Describe	
Recommended Pump Rate 0.00 L/min										Pump Installed	Depth m
Recommended Pump Intake Depth (From TOC) 0.00 m										Type	Make H.P.
										Model (Output Rating)	
Did you Encounter Saline Water (>4000 ppm TDS)										Depth m	Well Disinfected Upon Completion
Gas										Depth m	Geophysical Log Taken
Remedial Action Taken										Submitted to ESRD	
Additional Comments on Well										Sample Collected for Potability	Submitted to ESRD Yes
DRILLER REPORTS SOFT WATER.											

Yield Test			Taken From Ground Level	Measurement in Metric	
			Depth to water level		
Test Date	Start Time	Static Water Level	Pumping (m)	Elapsed Time	Recovery (m)
1983/06/14	12:00 AM	45.72 m		Minutes:Sec	
Method of Water Removal					
Type Bailer					
Removal Rate 45.46 L/min					
Depth Withdrawn From 57.91 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	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner Date approval holder signed
FORRESTER WATER WELL DRILLING (1981) LTD.	

Printed on 10/5/2023 10:25:08 AM

Page: 2 / 2

**1983 Jeffrey Domestic and Stock Water Well
Chemical Analysis Results (September 5, 2023)**



Element
7217 Roper Road NW
Edmonton, Alberta
T6B 3J4, Canada

T: +1 (780) 438-5522
F: +1 (780) 434-8586
E: info.Edmonton@element.com
W: www.element.com

Page 1 of 5

Analytical Report

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908485
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Reference Number	1675279-3
Sample Date	August 29, 2023
Sample Time	12:10
Sample Location	Rogers Dom ww
Sample Description	M35377.069370 / 1.7°C
Sample Matrix	Water

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Physical and Aggregate Properties						
Colour	Apparent, Potable	Colour units	<5	5	15	Below AO
Turbidity		NTU	1.0	0.1	0.1/0.3/1.0 OG	
Routine Water						
pH			8.96	1	7.0-10.5	Within OG Range
Temperature of observed pH		°C	20.9			
Electrical Conductivity	at 25 °C	µS/cm	896	1		
Calcium	Extractable	mg/L	1.5	0.2		
Magnesium	Extractable	mg/L	0.2	0.2		
Sodium	Extractable	mg/L	232	0.4	200	Above AO
Potassium	Extractable	mg/L	0.4	0.4		
Iron	Extractable	mg/L	0.11	0.01	0.3	Below AO
Manganese	Extractable	mg/L	<0.005	0.005	0.02 AO; 0.12 MAC	Below AO
Chloride	Dissolved	mg/L	1.2	0.4	250	Below AO
Fluoride		mg/L	1.21	0.05	1.5	Below MAC
Nitrate - N		mg/L	<0.01	0.01	10	Below MAC
Nitrite - N		mg/L	<0.005	0.005	1	Below MAC
Nitrate and Nitrite - N		mg/L	<0.01	0.01	10	Below MAC
Sulfate (SO4)	Extractable	mg/L	56.6	0.9	500	Below AO
Hydroxide		mg/L	<5			
Carbonate		mg/L	44			
Bicarbonate		mg/L	477			
P-Alkalinity	as CaCO3	mg/L	37	5		
T-Alkalinity	as CaCO3	mg/L	465	5		
Total Dissolved Solids		mg/L	571	1	500	Above AO
Hardness	as CaCO3	mg/L	4.7			
Ionic Balance		%	97			

Approved by: 
Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908485
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Physical and Aggregate Properties

Blanks		Units	Measured	Lower Limit	Upper Limit	Passed QC
Turbidity		NTU	0.094	-0.1	0.1	yes
Date Acquired:	August 31, 2023					
Turbidity		NTU	0.119	0.0	0.1	yes
Date Acquired:	August 31, 2023					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Turbidity	NTU	1940	1799.3	2005.7	yes	
Date Acquired:	August 31, 2023					
Turbidity	NTU	5580	4441.7	6661.7	yes	
Date Acquired:	August 31, 2023					
Colour	Colour units	10	10	10	yes	
Turbidity	NTU	149	132.1	162.1	yes	
Date Acquired:	August 31, 2023					
Turbidity	NTU	14.3	12.6	15.6	yes	
Date Acquired:	August 31, 2023					
Turbidity	NTU	1.7	1.0	2.2	yes	
Date Acquired:	August 31, 2023					
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Turbidity	NTU	0.2	0.2	10	0.2	yes
Date Acquired:	August 31, 2023					

Routine Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	0.22	-0.4	0.4	yes
Fluoride	mg/L	0	-0.05	0.05	yes
Nitrate - N	mg/L	0.0083299	-0.01	0.01	yes
Nitrite - N	mg/L	0	-0.005	0.005	yes
Calcium	mg/L	0.0761978	-0.1	0.1	yes
Magnesium	mg/L	0.0194014	-0.1	0.1	yes
Sodium	mg/L	0.102083	-0.4	0.3	yes
Sulfur	mg/L	0.104134	-0.3	0.3	yes
Potassium	mg/L	0.233221	-0.4	0.4	yes
Iron	mg/L	0.00345156	-0.02	0.02	yes
Manganese	mg/L	0.000828697	-0.003	0.003	yes
Date Acquired: August 31, 2023					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	2020	1847.4	2256.0	yes
Date Acquired: August 31, 2023					
Electrical Conductivity	dS/m	32.2	27.200	36.800	yes
Date Acquired: August 30, 2023					
pH		9.15	8.90	9.44	yes
Temperature of observed	°C	20.7	15.5	24.5	yes
Electrical Conductivity	dS/m	2.68	2.631	2.829	yes

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908485
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Routine Water - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit		Passed QC
P-Alkalinity	mg/L	530	442	584		yes
T-Alkalinity	mg/L	989	958	1059		yes
Fluoride	mg/L	10.1	9.39	10.59		yes
Nitrate - N	mg/L	10.2	9.03	11.13		yes
Nitrite - N	mg/L	10.0	9.010	10.990		yes
Nitrate and Nitrite - N	mg/L	20.2	19.10	20.90		yes
Calcium	mg/L	253	230.0	260.0		yes
Magnesium	mg/L	98.2	92.4	103.0		yes
Sodium	mg/L	256	231.0	261.0		yes
Sulfur	mg/L	152	141.3	156.9		yes
Potassium	mg/L	258	229.0	259.0		yes
Iron	mg/L	9.94	9.27	10.23		yes
Manganese	mg/L	2.46	2.260	2.560		yes
Date Acquired: August 31, 2023						
pH		6.89	6.79	6.97		yes
Temperature of observed	°C	20.5	15.5	24.5		yes
Electrical Conductivity	dS/m	0.076	0.069	0.085		yes
P-Alkalinity	mg/L	59	28	72		yes
T-Alkalinity	mg/L	125	114	140		yes
Chloride	mg/L	83.1	74.9	86.9		yes
Fluoride	mg/L	4.88	4.56	5.22		yes
Nitrate - N	mg/L	4.85	4.37	5.33		yes
Nitrite - N	mg/L	4.86	4.370	5.330		yes
Nitrate and Nitrite - N	mg/L	9.72	8.80	10.60		yes
Date Acquired: August 31, 2023						
Chloride	mg/L	15.6	13.3	16.5		yes
Fluoride	mg/L	0.49	0.45	0.57		yes
Nitrate - N	mg/L	0.51	0.42	0.57		yes
Nitrite - N	mg/L	0.500	0.455	0.557		yes
Nitrate and Nitrite - N	mg/L	1.01	0.85	1.15		yes
Calcium	mg/L	5.2	4.6	5.7		yes
Magnesium	mg/L	2.1	1.9	2.2		yes
Sodium	mg/L	5.2	4.7	5.7		yes
Sulfur	mg/L	3.1	2.7	3.2		yes
Potassium	mg/L	5.2	4.5	5.5		yes
Iron	mg/L	0.20	0.18	0.24		yes
Manganese	mg/L	0.051	0.046	0.058		yes
Date Acquired: August 31, 2023						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH		5.71	5.64	0	0.10	yes
Electrical Conductivity	dS/m	0.023	0.023	10	0.002	yes
Hydroxide	mg/L	<5	<5	10		yes
Carbonate	mg/L	<6	<6	10	6	yes
Bicarbonate	mg/L	16	15	10	6	yes

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908485
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Routine Water - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
P-Alkalinity	mg/L	<5	<5	10	5	yes
T-Alkalinity	mg/L	13	12	10	5	yes
Chloride	mg/L	<0.4	<0.4	10	0.5	yes
Fluoride	mg/L	0.11	0.12	10	0.05	yes
Nitrate - N	mg/L	<0.01	<0.01	10	0.01	yes
Nitrite - N	mg/L	<0.005	<0.005	10	0.010	yes
Calcium	mg/L	1.5	1.4	10	0.6	yes
Magnesium	mg/L	0.2	0.2	10	0.4	yes
Sodium	mg/L	232	229	10	1.2	yes
Sulfur	mg/L	18.9	18.7	10	0.1	yes
Potassium	mg/L	0.4	0.5	10	1.2	yes
Iron	mg/L	0.11	0.08	10	0.05	yes
Manganese	mg/L	<0.005	<0.005	10	0.010	yes
Date Acquired: August 31, 2023						

Methodology and Notes

Bill To:	Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID:	MR-0323.22	Lot ID:	1675279
Attn:	Accounts Payable	Project Name:	County of Ponoka GW Monitoring	Control Number:	
Sampled By:	Scott Thompson	Project Location:	Gull Lake Area	Date Received:	Aug 29, 2023
Company:	HCL	LSD:	Various Legal Locations	Date Reported:	Sep 5, 2023
		P.O.:	19729	Report Number:	2908485
		Proj. Acct. code:			

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	Aug 30, 2023	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	Aug 30, 2023	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	Aug 30, 2023	Element Edmonton - Roper Road
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Aug 31, 2023	Element Edmonton - Roper Road
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	Sep 1, 2023	Element Edmonton - Roper Road
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl- E	Aug 31, 2023	Element Edmonton - Roper Road
Colour (Apparent) in water	APHA	* Visual Comparison Method, 2120 B	Aug 31, 2023	Element Edmonton - Roper Road
Metals Trace (Extractable) in water	APHA	Hardness by Calculation, 2340 B	Aug 31, 2023	Element Edmonton - Roper Road
Metals Trace (Extractable) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	Aug 31, 2023	Element Edmonton - Roper Road
Turbidity in Water	APHA	* Turbidity - Nephelometric Method, 2130 B	Aug 31, 2023	Element Edmonton - Roper Road

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
------	--

Guidelines

Guideline Description	Health Canada GCDWQ
Guideline Source	Guidelines for Canadian Drinking Water Quality, Health Canada, Sept 2020
Guideline Comments	MAC = Maximum Acceptable Concentration AO = Aesthetic Objective OG = Operational Guideline for Water Treatment Plants (does not apply to private groundwater wells). Refer to Health Canada for complete guidelines at www.hc-sc.gc.ca

Comments:

- Aug 30, 2023 - Sample 1675279-3; 8807137: Sample received at 1.7°C

The comparison of test results to guideline limits is provided for information purposes only. This is not to be taken as a statement of conformance / nonconformance to any guideline, regulation or limit. The data user is responsible for all conclusions drawn with respect to the data and is advised to consult official regulatory references when evaluating compliance.

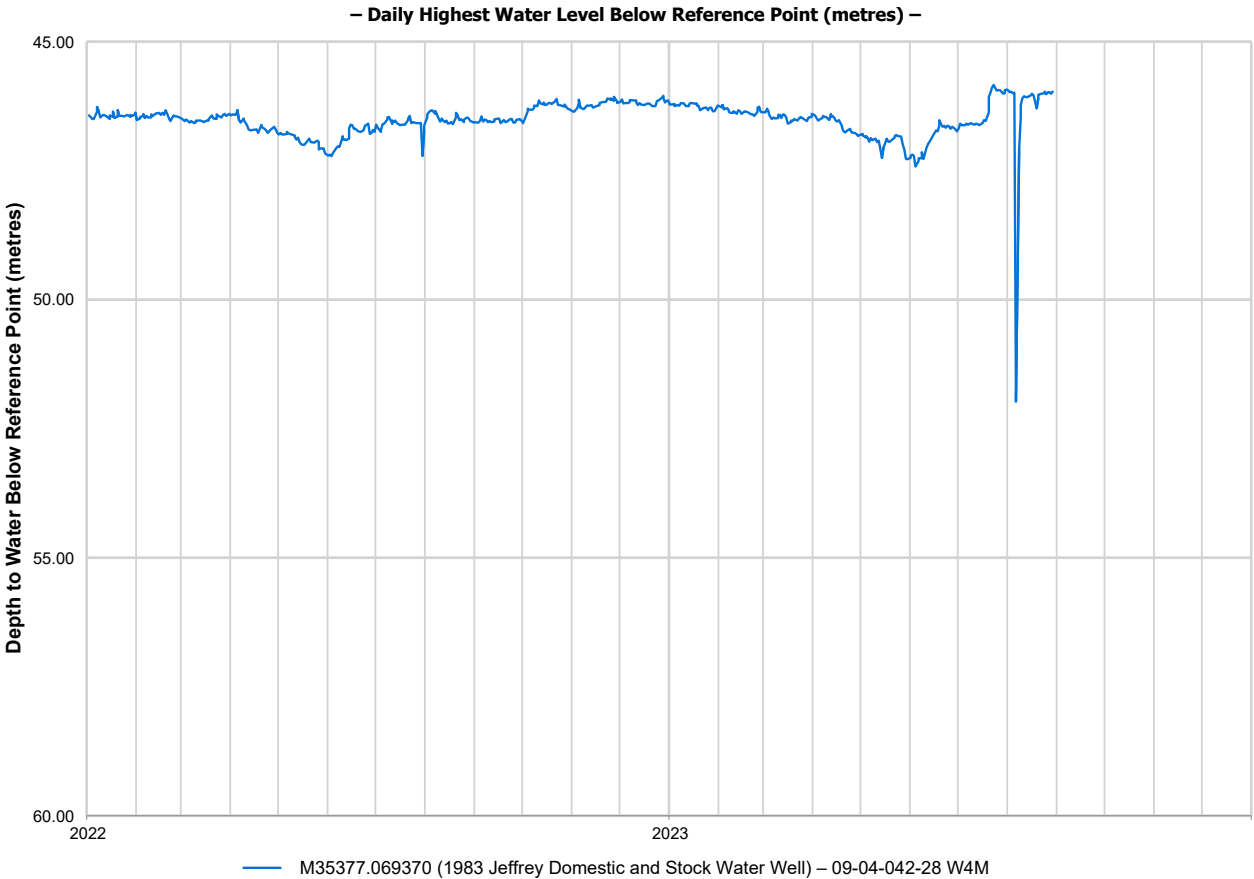
Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

*1983 Jeffrey Domestic and Stock Water Well
2022 - 2023 Hydrograph*



1992 Gull Lake Golf Course Water Well

04-10-042-01 W5M
(M35379.066969)



Photograph taken on May 17, 2012

Well Spatial Location:

Easting: **62,813**

Northing: **5,825,524**

(spatial accuracy HCL GPS — 10TM Resource NAD83)

Ground Elevation AMSL (m): **934**

(elevation accuracy HCL DEM (2016))

Date Completed: **July 15, 1992**

Depth Drilled (m): **32.0**

Completion Interval (m): **19.8 – 32.0 ***

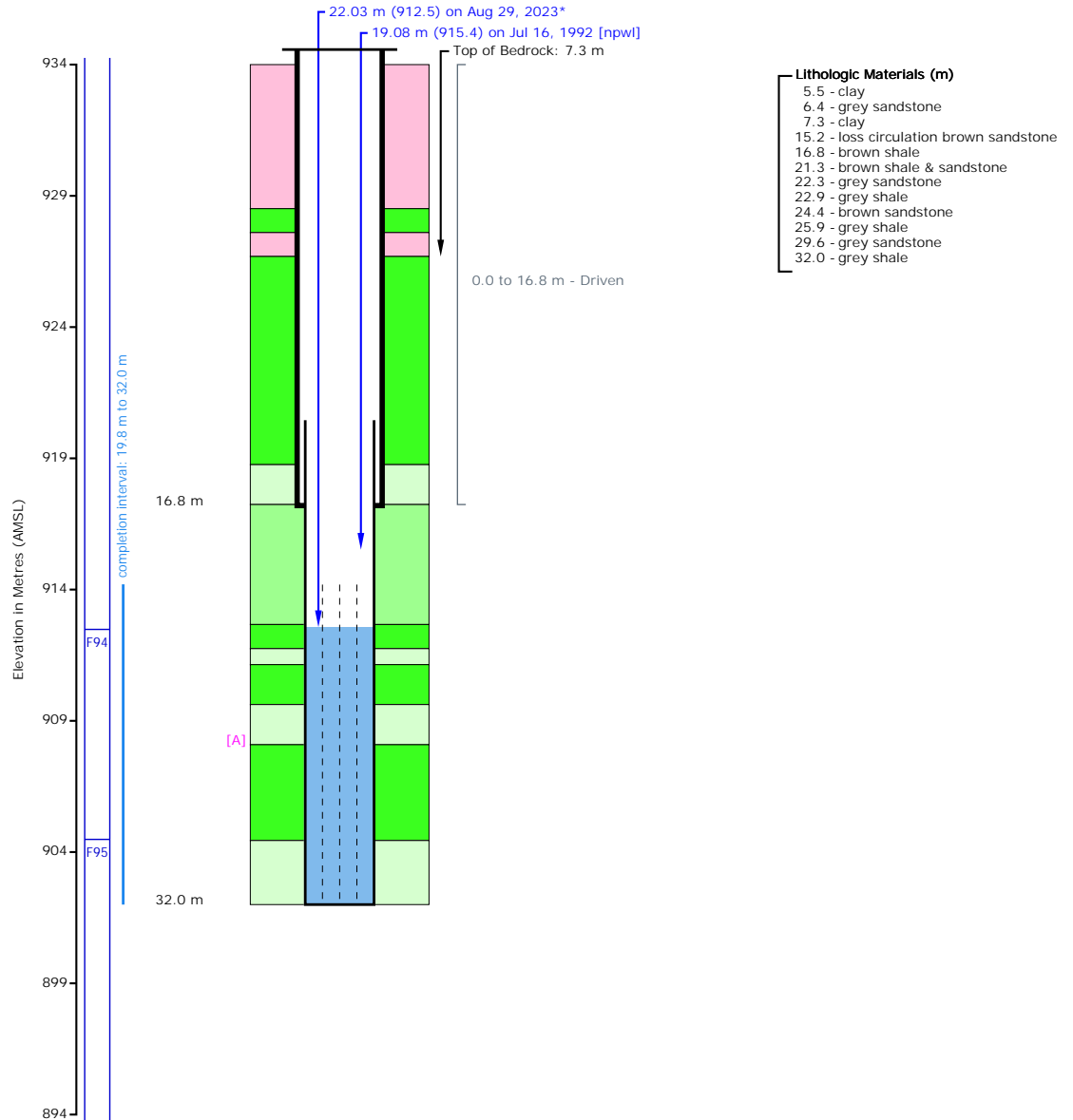
(TGWC determined value)*










Earliest Water Level (m): **19.08 – July 16, 1992**

Most Recent Water Level (m): **22.03 – August 29, 2023 @ 14:23**

GIC ID: **365500**

1992 Gull Lake Golf Course Water Well Water Well Diagram



Lithology Legend			Geologic Unit Legend (Top) - Regional Analysis				
Surficial		Unsorted		Fine Grained		Other	F94 - Sun199 Aquifer
		Fine Grained					F95 - Sun199 Aquifer Base
							
		Coarse Grained				Coarse Grained	

Summary

TGWC ID: M35379.066969
 Well Name: 1992 Gull Lake Golf Course Water Well
 Legal Location: 04-10-042-01 W5M
 Casing (OD): 141.2 mm; Steel (5.6")
 Liner (OD): 114.3 mm; Plastic (4.5")
 Casing Stick-Up: 0.6 m (not drawn to scale)
 Completion [A]: 19.8 to 32.0 m; Slotted
 Water Level (recent): 22.03 m (912.5 m AMSL) on Aug 29, 2023 @ 14:23 - Reference Point: Top of Casing
 Water Level (oldest): 19.08 m (915.4 m AMSL) on Jul 16, 1992 [npwl]

* Water-Level Measurements are measured from reference point listed.
 NOTE: Geologic Unit is a guide based on a regional groundwater assessment completed by Hydrogeological Consultants Ltd. (HCL) (<http://www.hcl.ca>) on behalf of Ponoka County in conjunction with Prairie Farm Rehabilitation Administration (P.F.R.A.).
 Drawn: October 05, 2023 @ 10:25 --- <https://www.hcl.ca>

do not copy, cite, or distribute without the express written consent of The Groundwater Centre, a division of hydrogeological consultants ltd.

Owner: *Gull Lake Golf Course*
RR 2 Site 10 (Box 6), Red Deer, AB T4N 5E2

Contractor: *G & S Water Well Servicing*
Name: *1992 Gull Lake Golf Course Water Well*

Field Action: *Confirmed - Physically, May 18, 2011*
Work Type: *New Well*
Drilling Method: *Rotary*
Proposed Use: *Industrial*
Completion Type: *Casing/Perforated Liner*

Date Started: *July 12, 1992*
Date Completed: *July 15, 1992*
Well Status: *Producing*
Feature Class: *Water Well*

METRIC REPORT

Easting (m): *62,813.00* **
Northing (m): *5,825,524.00* **
Elevation (m): *934* ***
Lot:
Block:
Plan:
Presence of Gas: *No*

04-10-042-01 W5M
M35379.066969
528184; 240218; core
Elog Taken: *No*
Gamma Taken: *No*
Flowing: *No*
Stick Up (m): *0.6*

General Details

Depth Completed (m)*: *32.0*
Depth Drilled (m): *32.0*
Completion Aquifer: *Dalehurst Member **

Most Recent Water Level (m): *22.03 m – August 29, 2023*
Pump Intake BTOC (m): *27.4 on July 16, 1992*

Top of Bedrock (m): *7.31 **
Completion Interval (m): *19.8 – 32.0 **

Completion Details

Surface Casing: *Steel – 141.2 mm (O.D.) x 4.80 mm (thick) x 16.8 m (bottom)*
Liner: *Plastic – 114.3 mm (O.D.) x 6.20 mm (thick); Top: 13.7 (m); Bottom: 32.0 (m)*

Intervals

Slotted: *19.8 to 32.0 m - 0.125 x 12 - Method: Machine*
Driven: *0.0 to 16.8 m*

Lithology Details

Elevation	Depth	Lithology Descriptions
(AMSL)	(BGL)	
928.4	5.5	Clay
927.5	6.4	Grey Sandstone
926.6	7.3	Clay
918.7	15.2	Loss Circulation Brown Sandstone
917.1	16.8	Brown Shale
912.6	21.3	Brown Shale & Sandstone
911.7	22.3	Grey Sandstone
911.0	22.9	Grey Shale
909.5	24.4	Brown Sandstone
908.0	25.9	Grey Shale
904.3	29.6	Grey Sandstone
901.9	32.0	Grey Shale

Chemistry Summary Details (mg/L, except as noted)

Sampling Details: *August 29, 2023 @ 14:40*
Analysis Date: *September 5, 2023 - Element Materials Technology Canada Inc. (1675279-5)*

Constituent	Result	Constituent	Result	Constituent	Result
Conductivity (µS/cm):	<i>1030</i>	Nitrate as N:	<i>1.80</i>	Turbidity (NTU):	<i>0.1</i>
Total Dissolved Solids:	<i>655</i>	Nitrite as N:	<i>< 0.005</i>	Fluoride:	<i>0.07</i>
Hardness (as CaCO3):	<i>285</i>	pH (pH Unit):	<i>7.77</i>	Carbonate:	<i>< 6</i>
T-Alkalinity (as CaCO3):	<i>558</i>	Colour (TCU):	<i>< 5</i>	Bicarbonate:	<i>681</i>
P-Alkalinity (as CaCO3):	<i>< 5</i>	Ion Balance (%):	<i>94</i>	Hydroxide:	<i>< 5</i>
Nitrate + Nitrite as N:	<i>1.80</i>	Total Coliforms:**:		Total Iron:	
Total Suspended Solids:		Fecal Coliforms:**:		Total Mn:	
Temperature (°C):	<i>20.8</i>	Escherichia coli:**:			

Constituent	Extractable	Dissolved	Constituent	Extractable	Dissolved
Calcium:	<i>50.4</i>		Mercury:		
Chloride:		<i>9.9</i>	Molybdenum:		
Iron:	<i>< 0.01</i>		Magnesium:	<i>38.6</i>	
Manganese:	<i>< 0.005</i>		Sodium:	<i>150</i>	
Aluminum:			Potassium:	<i>2.3</i>	
Arsenic:			Vanadium:		
Barium:			Strontium:		
Beryllium:			Nickel:		
Cadmium:			Zinc:		
Chromium:			Copper:		
Cobalt:			Lead:		
Sulfate:	<i>69.1</i>		Uranium:		

Comments: *Sample collected by Hydrogeological Consultants Ltd. personnel.*

Note: Constituents have been compared to the maximum acceptable concentration, Health Canada, 2022.
Guidelines for Canadian Drinking Water Quality – Summary Tables. Water and Air Quality Bureau, Healthy
Environments and Consumer Safety Branch. Health Canada. Ottawa. Ontario.

528184; 1 / 10

Comments & Observations

Aquifer Tests

Date & Time	Testing	Depth of Test	Duration (minutes)		Avg. Rate	NPWL	Drawdown	Pump	Q20 (m³/day)*		Transmissivity (m²/day)*	
	Method / Type	Interval	Pumping	Recovery	(Lpm)	(metres)	(metres)	(metres)	Apparent	Effective	Apparent	Aquifer Effective
1 1992-07-16	<i>Pump</i>	<i>[unknown]</i>	<i>720</i>	<i>120</i>	<i>54.6</i>	<i>19.1</i>	<i>0.1</i>	<i>27.4</i>	<i>477.1</i>		<i>1.725</i>	

Alias IDs

GIC ID: *365500*
GIC (WellReportId): *365500*

* The Groundwater Centre (TGWC) calculated or determined value.
** HCL GPS — 10TM Resource NAD83
*** HCL DEM (2016) — {Ground; AMSL}

1992 Gull Lake Golf Course Water Well AEPA - Water Well Drilling Report



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 365500
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1992/08/04

GOWN ID

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.

Well Identification and Location										Measurement in Metric	
Owner Name		Address			Town		Province		Country	Postal Code	
GULL LAKE GOLF COURSE		P.O. BOX 6 RR2 SITE 10,			RED DEER						
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
	4	10	42	1	5	1	3	9023426			
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)						
_____ m from					Latitude 52.596994 Longitude -114.071579					Elevation _____ m	
_____ m from					How Location Obtained					How Elevation Obtained	
					Map					Not Obtained	

Drilling Information	
Method of Drilling Rotary	Type of Work New Well
Proposed Well Use Industrial	

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
5.49		Clay	
6.40		Gray Sandstone	
7.32		Clay	
15.24		Brown Lost Circulation Sandstone	
16.76		Brown Shale	
21.34		Brown Shale & Sandstone	
22.25		Gray Sandstone	
22.86		Gray Shale	
24.38		Brown Sandstone	
25.91		Gray Shale	
29.57		Gray Sandstone	
32.00		Gray 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)	
1992/07/16	54.55	19.08	

Well Completion				Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date	End Date	
32.00 m		1992/07/12	1992/07/15	
Borehole				
Diameter (cm)	From (m)	To (m)		
0.00	0.00	32.00		
Surface Casing (if applicable)		Well Casing/Liner		
Steel		Plastic		
Size OD :	14.12 cm	Size OD :	11.43 cm	
Wall Thickness :	0.478 cm	Wall Thickness :	0.620 cm	
Bottom at :	16.76 m	Top at :	13.72 m	
		Bottom at :	32.00 m	
Perforations				
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval (cm)
19.81	32.00	0.318		30.48

Perforated by Machine

Annular Seal Driven

Placed from 0.00 m to 16.76 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 G&S WATER WELL SERVICING	Copy of Well report provided to owner Date approval holder signed

Printed on 10/5/2023 10:25:11 AM

Page: 1 / 3



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 365500
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 1992/08/04

GOWN ID

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.

Well Identification and Location										Measurement in Metric	
Owner Name		Address			Town		Province		Country	Postal Code	
GULL LAKE GOLF COURSE		P.O. BOX 6 RR2 SITE 10,			RED DEER						
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
	4	10	42	1	5	1	3	9023426			
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)						
m from					Latitude 52.596994 Longitude -114.071579					Elevation m	
m from					How Location Obtained					How Elevation Obtained	
					Map					Not Obtained	

Additional Information										Measurement in Metric	
Distance From Top of Casing to Ground Level cm											
Is Artesian Flow										Is Flow Control Installed	
Rate L/min										Describe	
Recommended Pump Rate 0.00 L/min										Pump Installed	Depth m
Recommended Pump Intake Depth (From TOC) 0.00 m										Type	Make H.P.
										Model (Output Rating)	
Did you Encounter Saline Water (>4000 ppm TDS)										Depth m	Well Disinfected Upon Completion
Gas										Depth m	Geophysical Log Taken
Remedial Action Taken										Submitted to ESRD	
										Sample Collected for Potability	Submitted to ESRD
Additional Comments on Well											

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner Date approval holder signed
G&S WATER WELL SERVICING	

Printed on 10/5/2023 10:25:11 AM

Page: 2 / 3



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 365500

GoA Well Tag No.

Drilling Company Well ID

Date Report Received 1992/08/04

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

Well Identification and Location										Measurement in Metric
Owner Name		Address			Town		Province		Country	Postal Code
GULL LAKE GOLF COURSE		P.O. BOX 6 RR2 SITE 10,			RED DEER					
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description	
4		10	42	1	5	1	3	9023426		
Measured from Boundary of				GPS Coordinates in Decimal Degrees (NAD 83)				Elevation _____ m		
_____ m from				Latitude 52.596994 Longitude -114.071579				How Elevation Obtained		
_____ m from				How Location Obtained				Not Obtained		
Map										

Yield Test			Taken From Ground Level	Measurement in Metric	
			Depth to water level		
Test Date	Start Time	Static Water Level	Pumping (m)	Elapsed Time	Recovery (m)
1992/07/16	12:00 AM	19.08 m		Minutes:Sec	
Method of Water Removal			19.08	0:00	19.17
Type Pump			19.15	0:30	19.11
Removal Rate 54.55 L/min			19.15	1:00	19.10
Depth Withdrawn From 27.43 m			19.15	1:30	19.10
			19.15	2:00	19.10
			19.15	3:00	19.10
			19.15	4:00	19.10
			19.16	5:00	19.10
			19.16	6:00	19.10
			19.16	7:00	19.10
			19.16	8:00	19.10
			19.16	9:00	19.10
			19.16	10:00	19.10
			19.16	12:00	19.10
			19.16	14:00	19.10
			19.16	16:00	19.10
			19.16	18:00	19.10
			19.16	20:00	19.10
			19.16	25:00	19.10
			19.16	30:00	19.10
			19.16	35:00	19.10
			19.16	40:00	19.10
			19.16	50:00	19.10
			19.16	60:00	19.10
			19.16	75:00	18.91
			19.16	90:00	19.08
			19.16	105:00	19.08
			19.16	120:00	19.08
			19.16	150:00	
			19.16	180:00	
			19.16	210:00	
			19.16	240:00	
			19.17	300:00	
			19.17	360:00	
			19.17	420:00	
			19.17	480:00	
			19.17	600:00	
			19.17	720:00	

Water Diverted for Drilling		
Water Source	Amount Taken	Diversion Date & Time
	L	

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner
G&S WATER WELL SERVICING	Date approval holder signed

Printed on 10/5/2023 10:25:11 AM

Page: 3 / 3

**1992 Gull Lake Golf Course Water Well
Chemical Analysis Results (September 5, 2023)**



Element
7217 Roper Road NW
Edmonton, Alberta
T6B 3J4, Canada

T: +1 (780) 438-5522
F: +1 (780) 434-8586
E: info.Edmonton@element.com
W: www.element.com

Page 1 of 5

Analytical Report

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908487
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Reference Number 1675279-5
Sample Date August 29, 2023
Sample Time 14:40
Sample Location Gull Lake GCC ww
Sample Description M35379.066969 / 1.7°C
Sample Matrix Water

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Physical and Aggregate Properties						
Colour	Apparent, Potable	Colour units	<5	5	15	Below AO
Turbidity		NTU	0.1	0.1	0.1/0.3/1.0 OG	
Routine Water						
pH			7.77	1	7.0-10.5	Within OG Range
Temperature of observed pH		°C	20.8			
Electrical Conductivity	at 25 °C	µS/cm	1030	1		
Calcium	Extractable	mg/L	50.4	0.2		
Magnesium	Extractable	mg/L	38.6	0.2		
Sodium	Extractable	mg/L	150	0.4	200	Below AO
Potassium	Extractable	mg/L	2.3	0.4		
Iron	Extractable	mg/L	<0.01	0.01	0.3	Below AO
Manganese	Extractable	mg/L	<0.005	0.005	0.02 AO; 0.12 MAC	Below AO
Chloride	Dissolved	mg/L	9.9	0.4	250	Below AO
Fluoride		mg/L	0.07	0.05	1.5	Below MAC
Nitrate - N		mg/L	1.80	0.01	10	Below MAC
Nitrite - N		mg/L	<0.005	0.005	1	Below MAC
Nitrate and Nitrite - N		mg/L	1.80	0.01	10	Below MAC
Sulfate (SO4)	Extractable	mg/L	69.1	0.9	500	Below AO
Hydroxide		mg/L	<5			
Carbonate		mg/L	<6			
Bicarbonate		mg/L	681			
P-Alkalinity	as CaCO3	mg/L	<5	5		
T-Alkalinity	as CaCO3	mg/L	558	5		
Total Dissolved Solids		mg/L	655	1	500	Above AO
Hardness	as CaCO3	mg/L	285			
Ionic Balance		%	94			

Approved by: 
Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22	Lot ID: 1675279
Attn: Accounts Payable	Project Name: County of Ponoka GW Monitoring	Control Number:
Sampled By: Scott Thompson	Project Location: Gull Lake Area	Date Received: Aug 29, 2023
Company: HCL	LSD: Various Legal Locations	Date Reported: Sep 5, 2023
	P.O.: 19729	Report Number: 2908487
	Proj. Acct. code:	

Physical and Aggregate Properties

Blanks		Units	Measured	Lower Limit	Upper Limit	Passed QC
Turbidity		NTU	0.094	-0.1	0.1	yes
Date Acquired:	August 31, 2023					
Turbidity		NTU	0.119	0.0	0.1	yes
Date Acquired:	August 31, 2023					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC	
Turbidity	NTU	1940	1799.3	2005.7	yes	
Date Acquired:	August 31, 2023					
Turbidity	NTU	5580	4441.7	6661.7	yes	
Date Acquired:	August 31, 2023					
Colour	Colour units	10	10	10	yes	
Turbidity	NTU	149	132.1	162.1	yes	
Date Acquired:	August 31, 2023					
Turbidity	NTU	14.3	12.6	15.6	yes	
Date Acquired:	August 31, 2023					
Turbidity	NTU	1.7	1.0	2.2	yes	
Date Acquired:	August 31, 2023					
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
Turbidity	NTU	0.2	0.2	10	0.2	yes
Date Acquired:	August 31, 2023					

Routine Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	0.22	-0.4	0.4	yes
Fluoride	mg/L	0	-0.05	0.05	yes
Nitrate - N	mg/L	0.0083299	-0.01	0.01	yes
Nitrite - N	mg/L	0	-0.005	0.005	yes
Calcium	mg/L	0.0761978	-0.1	0.1	yes
Magnesium	mg/L	0.0194014	-0.1	0.1	yes
Sodium	mg/L	0.102083	-0.4	0.3	yes
Sulfur	mg/L	0.104134	-0.3	0.3	yes
Potassium	mg/L	0.233221	-0.4	0.4	yes
Iron	mg/L	0.00345156	-0.02	0.02	yes
Manganese	mg/L	0.000828697	-0.003	0.003	yes
Date Acquired: August 31, 2023					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	2020	1847.4	2256.0	yes
Date Acquired: August 31, 2023					
Electrical Conductivity	dS/m	32.2	27.200	36.800	yes
Date Acquired: August 30, 2023					
pH		9.15	8.90	9.44	yes
Temperature of observed	°C	20.7	15.5	24.5	yes
Electrical Conductivity	dS/m	2.68	2.631	2.829	yes

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908487
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Routine Water - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit		Passed QC
P-Alkalinity	mg/L	530	442	584		yes
T-Alkalinity	mg/L	989	958	1059		yes
Fluoride	mg/L	10.1	9.39	10.59		yes
Nitrate - N	mg/L	10.2	9.03	11.13		yes
Nitrite - N	mg/L	10.0	9.010	10.990		yes
Nitrate and Nitrite - N	mg/L	20.2	19.10	20.90		yes
Calcium	mg/L	253	230.0	260.0		yes
Magnesium	mg/L	98.2	92.4	103.0		yes
Sodium	mg/L	256	231.0	261.0		yes
Sulfur	mg/L	152	141.3	156.9		yes
Potassium	mg/L	258	229.0	259.0		yes
Iron	mg/L	9.94	9.27	10.23		yes
Manganese	mg/L	2.46	2.260	2.560		yes
Date Acquired: August 31, 2023						
pH		6.89	6.79	6.97		yes
Temperature of observed	°C	20.5	15.5	24.5		yes
Electrical Conductivity	dS/m	0.076	0.069	0.085		yes
P-Alkalinity	mg/L	59	28	72		yes
T-Alkalinity	mg/L	125	114	140		yes
Chloride	mg/L	83.1	74.9	86.9		yes
Fluoride	mg/L	4.88	4.56	5.22		yes
Nitrate - N	mg/L	4.85	4.37	5.33		yes
Nitrite - N	mg/L	4.86	4.370	5.330		yes
Nitrate and Nitrite - N	mg/L	9.72	8.80	10.60		yes
Date Acquired: August 31, 2023						
Chloride	mg/L	15.6	13.3	16.5		yes
Fluoride	mg/L	0.49	0.45	0.57		yes
Nitrate - N	mg/L	0.51	0.42	0.57		yes
Nitrite - N	mg/L	0.500	0.455	0.557		yes
Nitrate and Nitrite - N	mg/L	1.01	0.85	1.15		yes
Calcium	mg/L	5.2	4.6	5.7		yes
Magnesium	mg/L	2.1	1.9	2.2		yes
Sodium	mg/L	5.2	4.7	5.7		yes
Sulfur	mg/L	3.1	2.7	3.2		yes
Potassium	mg/L	5.2	4.5	5.5		yes
Iron	mg/L	0.20	0.18	0.24		yes
Manganese	mg/L	0.051	0.046	0.058		yes
Date Acquired: August 31, 2023						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH		5.71	5.64	0	0.10	yes
Electrical Conductivity	dS/m	0.023	0.023	10	0.002	yes
Hydroxide	mg/L	<5	<5	10		yes
Carbonate	mg/L	<6	<6	10	6	yes
Bicarbonate	mg/L	16	15	10	6	yes

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908487
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Routine Water - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
P-Alkalinity	mg/L	<5	<5	10	5	yes
T-Alkalinity	mg/L	13	12	10	5	yes
Chloride	mg/L	<0.4	<0.4	10	0.5	yes
Fluoride	mg/L	1.21	1.21	10	0.05	yes
Nitrate - N	mg/L	<0.01	<0.01	10	0.01	yes
Nitrite - N	mg/L	<0.005	<0.005	10	0.010	yes
Calcium	mg/L	1.5	1.4	10	0.6	yes
Magnesium	mg/L	0.2	0.2	10	0.4	yes
Sodium	mg/L	232	229	10	1.2	yes
Sulfur	mg/L	18.9	18.7	10	0.1	yes
Potassium	mg/L	0.4	0.5	10	1.2	yes
Iron	mg/L	0.11	0.08	10	0.05	yes
Manganese	mg/L	<0.005	<0.005	10	0.010	yes
Date Acquired: August 31, 2023						

Methodology and Notes

Bill To:	Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID:	MR-0323.22	Lot ID:	1675279
Attn:	Accounts Payable	Project Name:	County of Ponoka GW Monitoring	Control Number:	
Sampled By:	Scott Thompson	Project Location:	Gull Lake Area	Date Received:	Aug 29, 2023
Company:	HCL	LSD:	Various Legal Locations	Date Reported:	Sep 5, 2023
		P.O.:	19729	Report Number:	2908487
		Proj. Acct. code:			

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	Aug 30, 2023	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	Aug 30, 2023	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	Aug 30, 2023	Element Edmonton - Roper Road
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Aug 31, 2023	Element Edmonton - Roper Road
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	Sep 1, 2023	Element Edmonton - Roper Road
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl- E	Aug 31, 2023	Element Edmonton - Roper Road
Colour (Apparent) in water	APHA	* Visual Comparison Method, 2120 B	Aug 31, 2023	Element Edmonton - Roper Road
Metals Trace (Extractable) in water	APHA	Hardness by Calculation, 2340 B	Aug 31, 2023	Element Edmonton - Roper Road
Metals Trace (Extractable) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	Aug 31, 2023	Element Edmonton - Roper Road
Turbidity in Water	APHA	* Turbidity - Nephelometric Method, 2130 B	Aug 31, 2023	Element Edmonton - Roper Road

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
------	--

Guidelines

Guideline Description	Health Canada GCDWQ
Guideline Source	Guidelines for Canadian Drinking Water Quality, Health Canada, Sept 2020
Guideline Comments	MAC = Maximum Acceptable Concentration AO = Aesthetic Objective OG = Operational Guideline for Water Treatment Plants (does not apply to private groundwater wells). Refer to Health Canada for complete guidelines at www.hc-sc.gc.ca

Comments:

- Aug 30, 2023 - Sample 1675279-5; 8807139: Sample received at 1.7°C

The comparison of test results to guideline limits is provided for information purposes only. This is not to be taken as a statement of conformance / nonconformance to any guideline, regulation or limit. The data user is responsible for all conclusions drawn with respect to the data and is advised to consult official regulatory references when evaluating compliance.

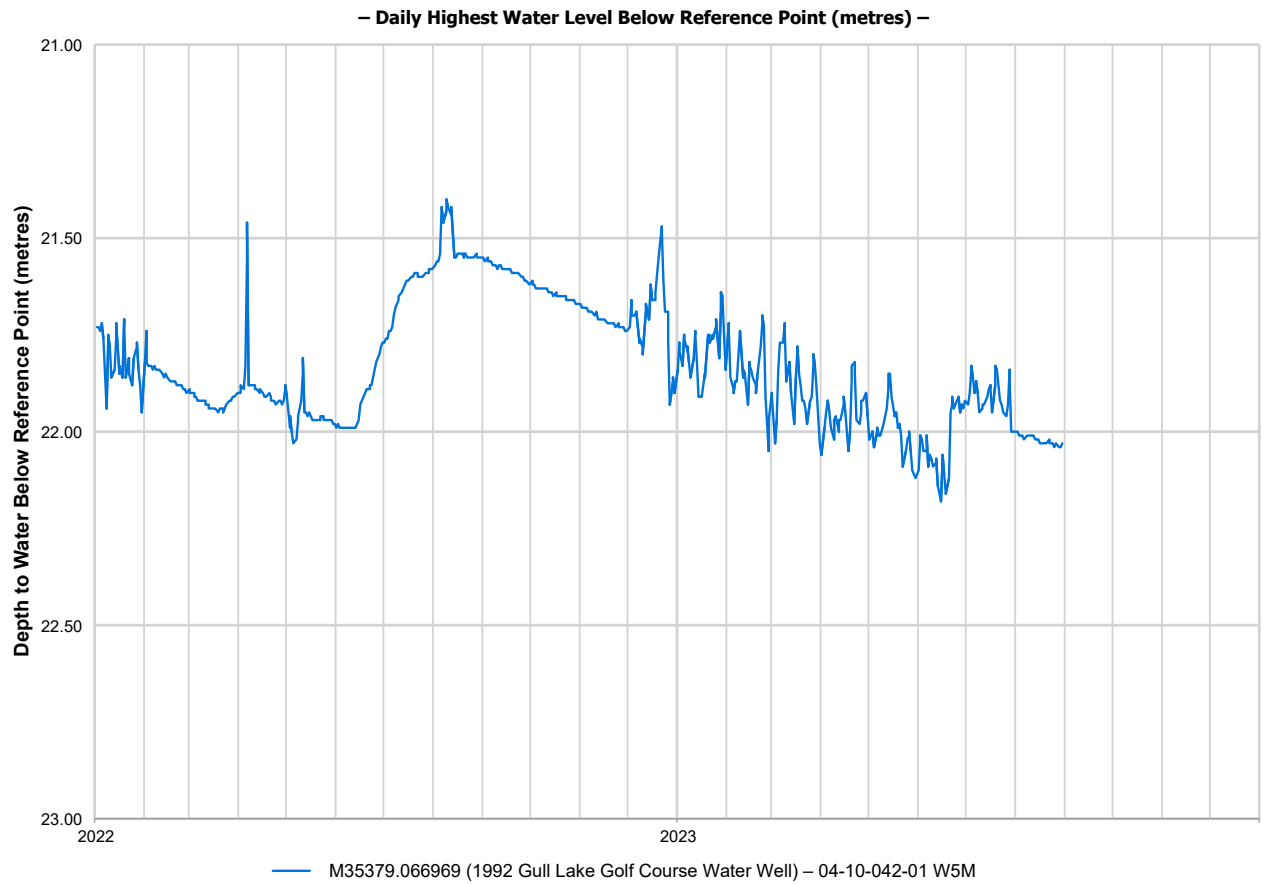
Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

*1992 Gull Lake Golf Course Water Well
2022 - 2023 Hydrograph*



2001 Wegmann Domestic Water Well

16-04-042-01 W5M
(M37490.034988)



Photograph taken on May 17, 2012

Well Spatial Location:

Easting: **62,345**

Northing: **5,825,262**

(spatial accuracy HCL GPS — 10TM Resource NAD83)

Ground Elevation AMSL (m): **936**

(elevation accuracy HCL DEM (2016))

Date Completed: **September 2, 2001**

Depth Drilled (m): **54.9**

Completion Interval (m): **45.7 – 54.9 ***

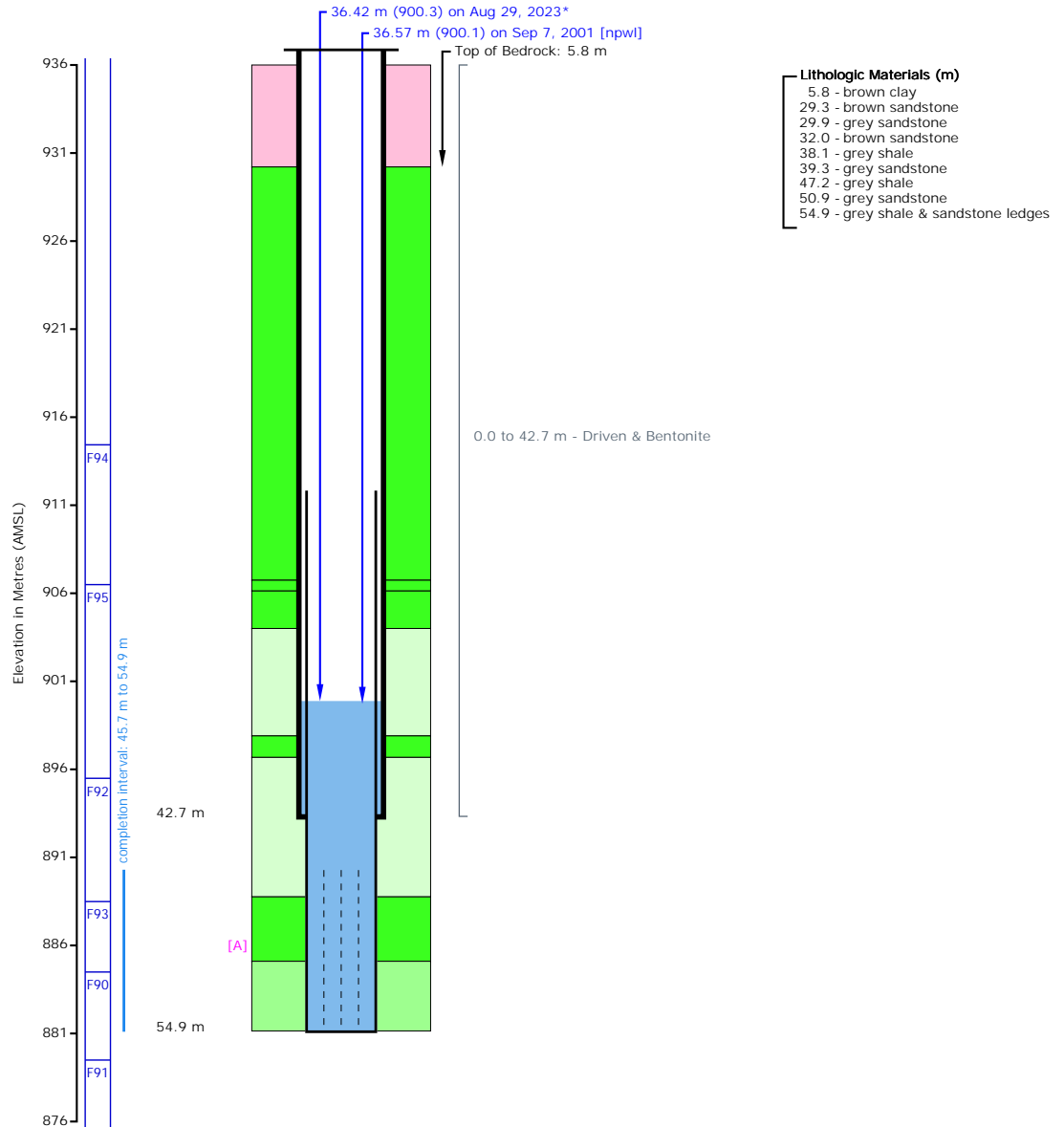
(* TGWC determined value)

Earliest Water Level (m): **36.57 – September 7, 2001**

Most Recent Water Level (m): **36.42 – August 29, 2023 @ 13:23**

GIC ID: **499682**

2001 Wegmann Domestic Water Well Water Well Diagram



Lithology Legend			Geologic Unit Legend (Top) - Regional Analysis	
Surficial	Unsorted		F94 - Sun199 Aquifer F95 - Sun199 Aquifer Base F92 - Sun180 Aquifer F93 - Sun180 Aquifer Base F90 - Sun169 Aquifer F91 - Sun169 Aquifer Base	
	Fine Grained			
	Coarse Grained			
Bedrock	Fine Grained			
	Coarse Grained			
	Other			

Summary	
TGWC ID: M37490.034988	
Well Name: 2001 Wegmann Domestic Water Well	
Legal Location: 16-04-042-01 W5M	
Casing (OD): 139.7 mm; Steel (5.5")	
Liner (OD): 114.3 mm; Plastic (4.5")	
Casing Stick-Up: 0.3 m (not drawn to scale)	
Completion [A]: 45.7 to 54.9 m; Slotted	
Water Level (recent): 36.42 m (900.3 m AMSL) on Aug 29, 2023 @ 13:23 - Reference Point: Top of Casing	
Water Level (oldest): 36.57 m (900.1 m AMSL) on Sep 7, 2001 [npwl]	
<p>* Water-Level Measurements are measured from reference point listed.</p> <p>NOTE: Geologic Unit is a guide based on a regional groundwater assessment completed by Hydrogeological Consultants Ltd. (HCL) (http://www.hcl.ca) on behalf of Ponoka County in conjunction with Prairie Farm Rehabilitation Administration (P.F.R.A.).</p> <p>Drawn: October 05, 2023 @ 10:25 --- https://www.hcl.ca</p>	

do not copy, cite, or distribute without the express written consent of The Groundwater Centre, a division of hydrogeological consultants ltd.

2001 Wegmann Domestic Water Well AEPA - Water Well Drilling Report



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 499682
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2001/09/27

GOWN ID

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.

Well Identification and Location										Measurement in Metric
Owner Name WEGMAN, HERMAN		Address 538 MADEIRA DR NE, CALGARY		Town		Province		Country	Postal Code T2A 4M8	
Location	1/4 or LSD NE	SEC 4	TWP 42	RGE 1	W of MER 5	Lot 11	Block	Plan	Additional Description	
Measured from Boundary of _____ m from _____ _____ m from _____				GPS Coordinates in Decimal Degrees (NAD 83) Latitude <u>52.592444</u> Longitude <u>-114.079858</u>				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	
5.79		Brown Clay	
29.26		Brown Sandstone	
29.87		Gray Sandstone	
32.00		Brown Sandstone	
38.10		Gray Shale	
39.32		Gray Sandstone	
47.24		Gray Shale	
50.90		Gray Sandstone	
54.86		Gray Shale & Sandstone Ledges	

Yield Test Summary			Measurement in Metric
Recommended Pump Rate			45.46 L/min
Test Date	Water Removal Rate (L/min)	Static Water Level (m)	
2001/09/07	113.65	36.58	

Well Completion				Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date	End Date	
54.86 m		2001/09/02	2001/09/02	
Borehole				
Diameter (cm)	From (m)	To (m)		
0.00	0.00	54.86		
Surface Casing (if applicable)		Well Casing/Liner		
Steel	Size OD : 13.97 cm	Plastic		
Wall Thickness : 0.620 cm	Bottom at : 42.67 m	Size OD : 11.43 cm		
		Wall Thickness : 0.602 cm		
		Top at : 24.38 m		
		Bottom at : 54.86 m		
Perforations				
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval (cm)
45.72	54.86	0.953		0.95
Perforated by Hand Drill				
Annular Seal Driven & Bentonite				
Placed from 0.00 m to 42.67 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 ALKEN BASIN DRILLING LTD.	Copy of Well report provided to owner Date approval holder signed



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 499682
GoA Well Tag No.
Drilling Company Well ID
Date Report Received 2001/09/27

GOWN ID

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.

Well Identification and Location										Measurement in Metric
Owner Name	Address		Town		Province		Country		Postal Code	
WEGMAN, HERMAN	538 MADEIRA DR NE, CALGARY								T2A 4M8	
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description	
NE		4	42	1	5	11				
Measured from Boundary of				GPS Coordinates in Decimal Degrees (NAD 83)				Elevation _____ m		
_____ m from				Latitude 52.592444 Longitude -114.079858				How Elevation Obtained		
_____ m from				How Location Obtained				Not Obtained		
Not Verified										

Additional Information										Measurement in Metric
Distance From Top of Casing to Ground Level _____ cm										
Is Artesian Flow _____										Is Flow Control Installed _____
Rate _____ L/min										Describe _____
Recommended Pump Rate 45.46 L/min										Pump Installed _____ Depth _____ m
Recommended Pump Intake Depth (From TOC) 47.24 m										Type _____ Make _____ H.P. _____
										Model (Output Rating) _____
Did you Encounter Saline Water (>4000 ppm TDS) _____										Depth _____ m Well Disinfected Upon Completion _____
Gas _____										Depth _____ m Geophysical Log Taken _____
Remedial Action Taken _____										Submitted to ESRD _____
										Sample Collected for Potability _____ Submitted to ESRD _____
Additional Comments on Well										
DRILLER REPORTS DISTANCE FROM TOP OF CASING TO GROUND LEVEL: 3'. 5-120 MIN RECOVERY STAYED AT 120'.										

Yield Test			Taken From Ground Level		Measurement in Metric
			Depth to water level		
Test Date	Start Time	Static Water Level			
2001/09/07	12:00 AM	36.58 m			
Method of Water Removal			Pumping (m)	Elapsed Time	Recovery (m)
Type Air				Minutes:Sec	
Removal Rate 113.65 L/min				0:00	54.86
Depth Withdrawn From 54.86 m				1:00	49.07
				2:00	42.67
				3:00	36.88
				4:00	36.58
				120:00	36.58
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	Certification No
UNKNOWN NA DRILLER	1
Company Name	Copy of Well report provided to owner
ALKEN BASIN DRILLING LTD.	Date approval holder signed

Printed on 10/5/2023 10:25:15 AM

Page: 2 / 2

**2001 Wegmann Domestic Water Well
Chemical Analysis Results (September 5, 2023)**



Element
7217 Roper Road NW
Edmonton, Alberta
T6B 3J4, Canada

T: +1 (780) 438-5522
F: +1 (780) 434-8586
E: info.Edmonton@element.com
W: www.element.com

Page 1 of 5

Analytical Report

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908486
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

		Reference Number	1675279-4			
		Sample Date	August 29, 2023			
		Sample Time	13:35			
		Sample Location	Wegmann Dom ww			
		Sample Description	M37490.034988 / 1.7°C			
		Sample Matrix	Water			
				Nominal Detection Limit	Guideline Limit	Guideline Comments
Analyte Units Result						
Physical and Aggregate Properties						
Colour	Apparent, Potable	Colour units	<5	5	15	Below AO
Turbidity		NTU	0.4	0.1	0.1/0.3/1.0 OG	
Routine Water						
pH			8.55	1	7.0-10.5	Within OG Range
Temperature of observed pH		°C	20.8			
Electrical Conductivity	at 25 °C	µS/cm	1080	1		
Calcium	Extractable	mg/L	4.0	0.2		
Magnesium	Extractable	mg/L	0.9	0.2		
Sodium	Extractable	mg/L	277	0.4	200	Above AO
Potassium	Extractable	mg/L	0.8	0.4		
Iron	Extractable	mg/L	0.01	0.01	0.3	Below AO
Manganese	Extractable	mg/L	<0.005	0.005	0.02 AO; 0.12 MAC	Below AO
Chloride	Dissolved	mg/L	0.6	0.4	250	Below AO
Fluoride		mg/L	0.34	0.05	1.5	Below MAC
Nitrate - N		mg/L	<0.01	0.01	10	Below MAC
Nitrite - N		mg/L	<0.005	0.005	1	Below MAC
Nitrate and Nitrite - N		mg/L	<0.01	0.01	10	Below MAC
Sulfate (SO4)	Extractable	mg/L	84.1	0.9	500	Below AO
Hydroxide		mg/L	<5			
Carbonate		mg/L	21			
Bicarbonate		mg/L	597			
P-Alkalinity	as CaCO3	mg/L	18	5		
T-Alkalinity	as CaCO3	mg/L	526	5		
Total Dissolved Solids		mg/L	683	1	500	Above AO
Hardness	as CaCO3	mg/L	14			
Ionic Balance		%	101			

Approved by: 
Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22	Lot ID: 1675279
Attn: Accounts Payable	Project Name: County of Ponoka GW Monitoring	Control Number:
Sampled By: Scott Thompson	Project Location: Gull Lake Area	Date Received: Aug 29, 2023
Company: HCL	LSD: Various Legal Locations	Date Reported: Sep 5, 2023
	P.O.: 19729	Report Number: 2908486
	Proj. Acct. code:	

Physical and Aggregate Properties

Blanks		Units	Measured	Lower Limit	Upper Limit	Passed QC	
Turbidity		NTU	0.094	-0.1	0.1	yes	
Date Acquired:		August 31, 2023					
Turbidity		NTU	0.119	0.0	0.1	yes	
Date Acquired:		August 31, 2023					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC		
Turbidity		NTU	1940	1799.3	2005.7	yes	
Date Acquired:		August 31, 2023					
Turbidity		NTU	5580	4441.7	6661.7	yes	
Date Acquired:		August 31, 2023					
Colour		Colour units	10	10	10	yes	
Turbidity		NTU	149	132.1	162.1	yes	
Date Acquired:		August 31, 2023					
Turbidity		NTU	14.3	12.6	15.6	yes	
Date Acquired:		August 31, 2023					
Turbidity		NTU	1.7	1.0	2.2	yes	
Date Acquired:		August 31, 2023					
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC	
Turbidity		NTU	0.2	0.2	10	0.2	yes
Date Acquired:		August 31, 2023					

Routine Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	0.22	-0.4	0.4	yes
Fluoride	mg/L	0	-0.05	0.05	yes
Nitrate - N	mg/L	0.0083299	-0.01	0.01	yes
Nitrite - N	mg/L	0	-0.005	0.005	yes
Calcium	mg/L	0.0761978	-0.1	0.1	yes
Magnesium	mg/L	0.0194014	-0.1	0.1	yes
Sodium	mg/L	0.102083	-0.4	0.3	yes
Sulfur	mg/L	0.104134	-0.3	0.3	yes
Potassium	mg/L	0.233221	-0.4	0.4	yes
Iron	mg/L	0.00345156	-0.02	0.02	yes
Manganese	mg/L	0.000828697	-0.003	0.003	yes
Date Acquired: August 31, 2023					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	2020	1847.4	2256.0	yes
Date Acquired: August 31, 2023					
Electrical Conductivity	dS/m	32.2	27.200	36.800	yes
Date Acquired: August 30, 2023					
pH		9.15	8.90	9.44	yes
Temperature of observed	°C	20.7	15.5	24.5	yes
Electrical Conductivity	dS/m	2.68	2.631	2.829	yes

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908486
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Routine Water - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit		Passed QC
P-Alkalinity	mg/L	530	442	584		yes
T-Alkalinity	mg/L	989	958	1059		yes
Fluoride	mg/L	10.1	9.39	10.59		yes
Nitrate - N	mg/L	10.2	9.03	11.13		yes
Nitrite - N	mg/L	10.0	9.010	10.990		yes
Nitrate and Nitrite - N	mg/L	20.2	19.10	20.90		yes
Calcium	mg/L	253	230.0	260.0		yes
Magnesium	mg/L	98.2	92.4	103.0		yes
Sodium	mg/L	256	231.0	261.0		yes
Sulfur	mg/L	152	141.3	156.9		yes
Potassium	mg/L	258	229.0	259.0		yes
Iron	mg/L	9.94	9.27	10.23		yes
Manganese	mg/L	2.46	2.260	2.560		yes
Date Acquired: August 31, 2023						
pH		6.89	6.79	6.97		yes
Temperature of observed	°C	20.5	15.5	24.5		yes
Electrical Conductivity	dS/m	0.076	0.069	0.085		yes
P-Alkalinity	mg/L	59	28	72		yes
T-Alkalinity	mg/L	125	114	140		yes
Chloride	mg/L	83.1	74.9	86.9		yes
Fluoride	mg/L	4.88	4.56	5.22		yes
Nitrate - N	mg/L	4.85	4.37	5.33		yes
Nitrite - N	mg/L	4.86	4.370	5.330		yes
Nitrate and Nitrite - N	mg/L	9.72	8.80	10.60		yes
Date Acquired: August 31, 2023						
Chloride	mg/L	15.6	13.3	16.5		yes
Fluoride	mg/L	0.49	0.45	0.57		yes
Nitrate - N	mg/L	0.51	0.42	0.57		yes
Nitrite - N	mg/L	0.500	0.455	0.557		yes
Nitrate and Nitrite - N	mg/L	1.01	0.85	1.15		yes
Calcium	mg/L	5.2	4.6	5.7		yes
Magnesium	mg/L	2.1	1.9	2.2		yes
Sodium	mg/L	5.2	4.7	5.7		yes
Sulfur	mg/L	3.1	2.7	3.2		yes
Potassium	mg/L	5.2	4.5	5.5		yes
Iron	mg/L	0.20	0.18	0.24		yes
Manganese	mg/L	0.051	0.046	0.058		yes
Date Acquired: August 31, 2023						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH		5.71	5.64	0	0.10	yes
Electrical Conductivity	dS/m	0.023	0.023	10	0.002	yes
Hydroxide	mg/L	<5	<5	10		yes
Carbonate	mg/L	<6	<6	10	6	yes
Bicarbonate	mg/L	16	15	10	6	yes

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908486
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Routine Water - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
P-Alkalinity	mg/L	<5	<5	10	5	yes
T-Alkalinity	mg/L	13	12	10	5	yes
Chloride	mg/L	<0.4	<0.4	10	0.5	yes
Fluoride	mg/L	1.21	1.21	10	0.05	yes
Nitrate - N	mg/L	<0.01	<0.01	10	0.01	yes
Nitrite - N	mg/L	<0.005	<0.005	10	0.010	yes
Calcium	mg/L	1.5	1.4	10	0.6	yes
Magnesium	mg/L	0.2	0.2	10	0.4	yes
Sodium	mg/L	232	229	10	1.2	yes
Sulfur	mg/L	18.9	18.7	10	0.1	yes
Potassium	mg/L	0.4	0.5	10	1.2	yes
Iron	mg/L	0.11	0.08	10	0.05	yes
Manganese	mg/L	<0.005	<0.005	10	0.010	yes
Date Acquired: August 31, 2023						

Methodology and Notes

Bill To:	Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID:	MR-0323.22	Lot ID:	1675279
Attn:	Accounts Payable	Project Name:	County of Ponoka GW Monitoring	Control Number:	
Sampled By:	Scott Thompson	Project Location:	Gull Lake Area	Date Received:	Aug 29, 2023
Company:	HCL	LSD:	Various Legal Locations	Date Reported:	Sep 5, 2023
		P.O.:	19729	Report Number:	2908486
		Proj. Acct. code:			

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	Aug 30, 2023	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	Aug 30, 2023	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	Aug 30, 2023	Element Edmonton - Roper Road
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Aug 31, 2023	Element Edmonton - Roper Road
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	Sep 1, 2023	Element Edmonton - Roper Road
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl- E	Aug 31, 2023	Element Edmonton - Roper Road
Colour (Apparent) in water	APHA	* Visual Comparison Method, 2120 B	Aug 31, 2023	Element Edmonton - Roper Road
Metals Trace (Extractable) in water	APHA	Hardness by Calculation, 2340 B	Aug 31, 2023	Element Edmonton - Roper Road
Metals Trace (Extractable) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	Aug 31, 2023	Element Edmonton - Roper Road
Turbidity in Water	APHA	* Turbidity - Nephelometric Method, 2130 B	Aug 31, 2023	Element Edmonton - Roper Road

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
------	--

Guidelines

Guideline Description	Health Canada GCDWQ
Guideline Source	Guidelines for Canadian Drinking Water Quality, Health Canada, Sept 2020
Guideline Comments	MAC = Maximum Acceptable Concentration AO = Aesthetic Objective OG = Operational Guideline for Water Treatment Plants (does not apply to private groundwater wells). Refer to Health Canada for complete guidelines at www.hc-sc.gc.ca

Comments:

- Aug 30, 2023 - Sample 1675279-4; 8807138: Sample received at 1.7°C

The comparison of test results to guideline limits is provided for information purposes only. This is not to be taken as a statement of conformance / nonconformance to any guideline, regulation or limit. The data user is responsible for all conclusions drawn with respect to the data and is advised to consult official regulatory references when evaluating compliance.

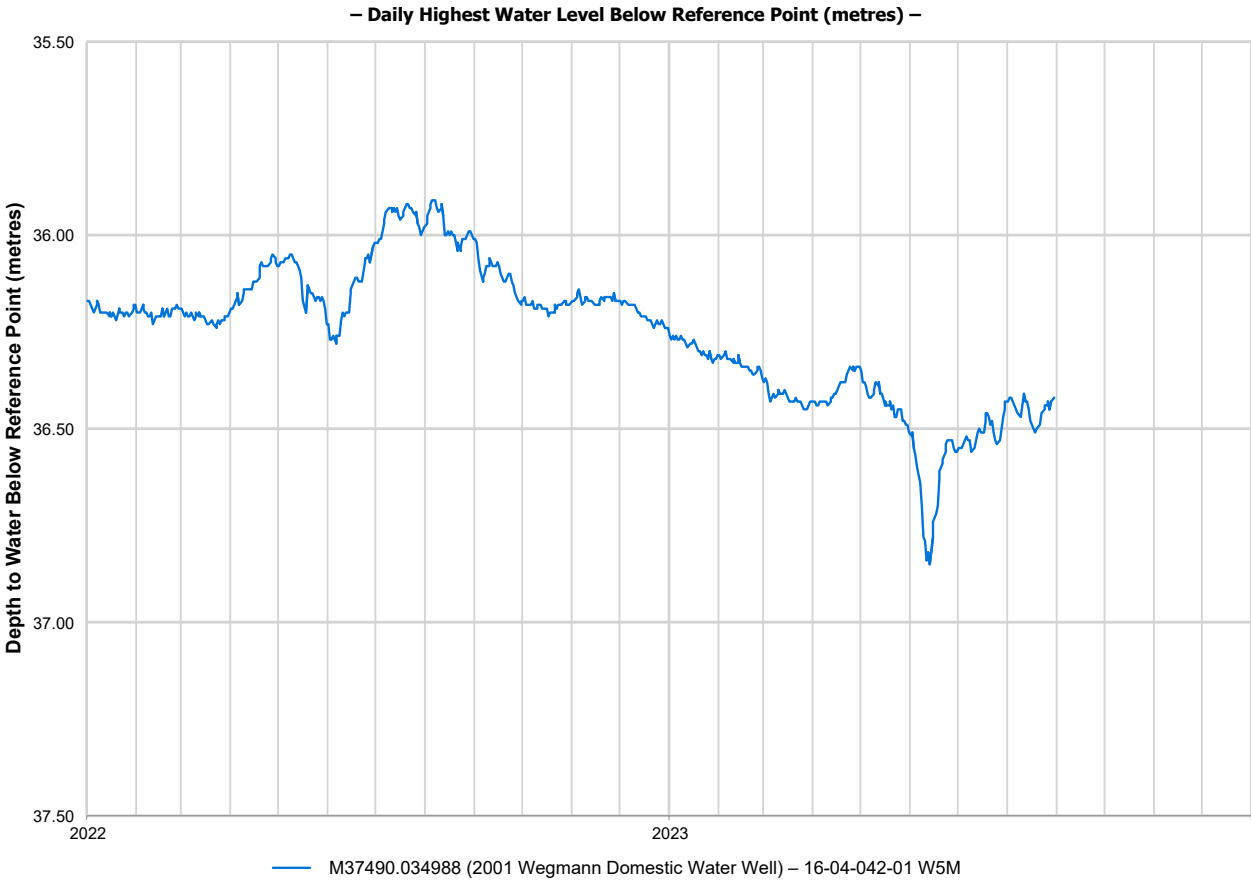
Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

2001 Wegmann Domestic Water Well
2022 - 2023 Hydrograph



2004 Water Source Well – Meridian Beach 1

08-12-042-01 W5M
(M39227.478953)



Well Spatial Location:

Easting: **67,275**

Northing: **5,825,894**

(spatial accuracy HCL GPS — 10TM Resource NAD83)

Ground Elevation AMSL (m): **905.4**

(elevation accuracy Surveyed (other))

Date Completed: **April 22, 2004**

Depth Drilled (m): **30.5**

Completion Interval (m): **18.3 – 24.4 ***

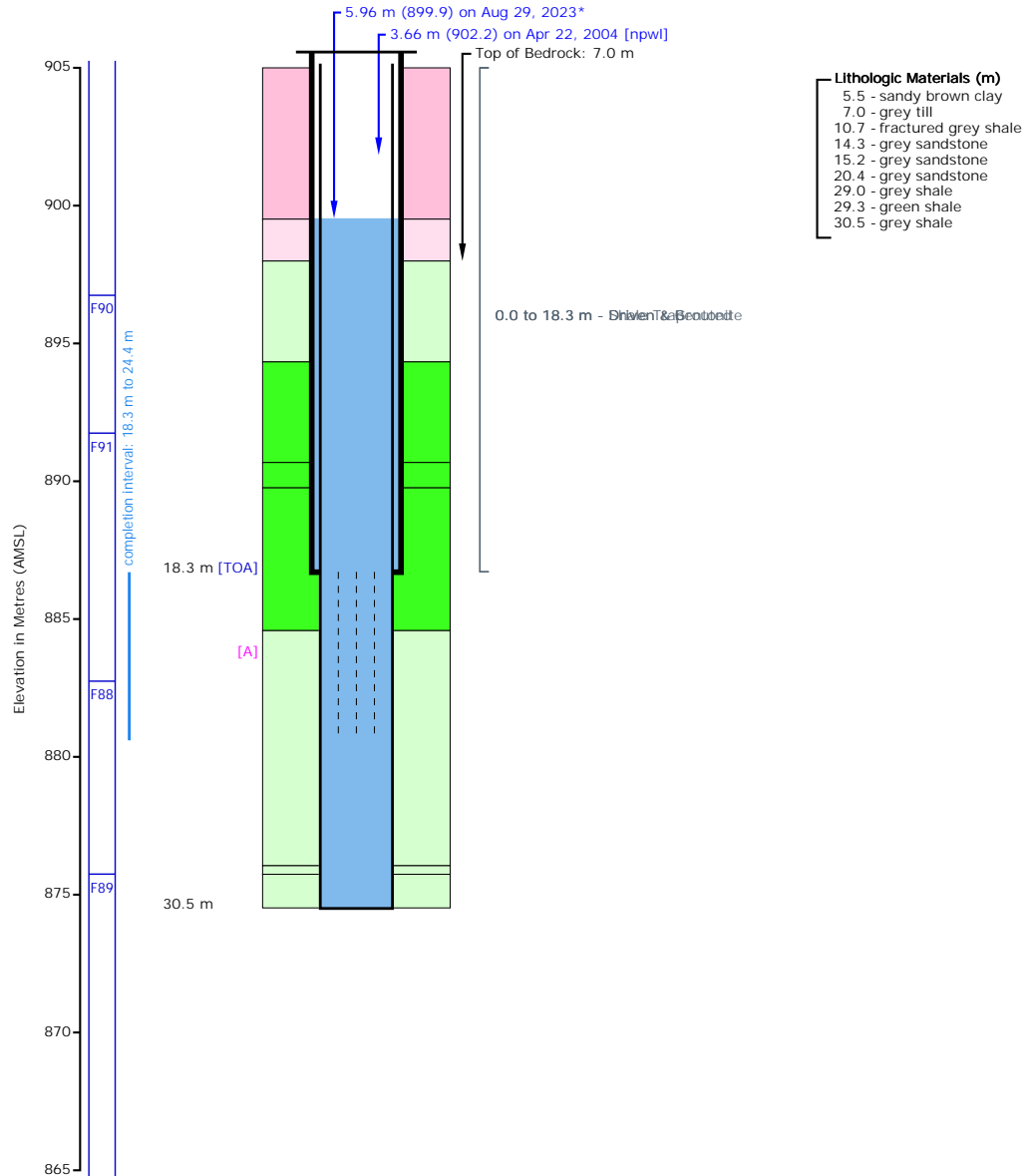
(* TGWC determined value)

Earliest Water Level (m): **3.66 – April 22, 2004**

Most Recent Water Level (m): **5.96 – August 29, 2023 @ 09:51**

GIC ID: **1035048**

2004 Water Source Well – Meridian Beach 1 Water Well Diagram



Lithology Legend			Geologic Unit Legend (Top) - Regional Analysis	
Surficial	Unsorted		F90 - Sun169 Aquifer F91 - Sun169 Aquifer Base F88 - Sun155 Aquifer F89 - Sun155 Aquifer Base	
	Fine Grained			
	Coarse Grained			
Bedrock	Fine Grained			
	Coarse Grained			
	Other			

Summary

TGWC ID: M39227.478953
Well Name: 2004 Water Source Well – Meridian Beach 1
Legal Location: 08-12-042-01 W5M
Casing (OD): 141.3 mm; Steel (5.6")
Liner (OD): 114.3 mm; Plastic (4.5")
Casing Stick-Up: 0.5 m (not drawn to scale)
Completion [A]: 18.3 to 24.4 m; Slotted
Top of Aquifer [TOA]: 18.3 m on June 15, 2015
Water Level (recent): 5.96 m (899.9 m AMSL) on Aug 29, 2023 @ 09:51 - Reference Point: Top of Casing
Water Level (oldest): 3.66 m (902.2 m AMSL) on Apr 22, 2004 [npwl]

* Water-Level Measurements are measured from reference point listed.
NOTE: Geologic Unit is a guide based on a regional groundwater assessment completed by Hydrogeological Consultants Ltd. (HCL) (<http://www.hcl.ca>) on behalf of Ponoka County in conjunction with Prairie Farm Rehabilitation Administration (P.F.R.A.).
Drawn: October 05, 2023 @ 10:26 --- <https://www.hcl.ca>

do not copy, cite, or distribute without the express written consent of The Groundwater Centre, a division of hydrogeological consultants ltd.

2004 Water Source Well - Meridian Beach 1

AEPA - Water Well Drilling Report



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 1035048
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

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

Well Identification and Location										Measurement in Metric	
Owner Name HORNER, NORVAL/INSHORE DEV		Address 209 SCARBORO AVE SW		Town CALGARY		Province ALBERTA		Country CA	Postal Code T3C 2H4		
Location	1/4 or LSD	SEC	TWP	RGE	W of MER	Lot	Block	Plan	Additional Description		
	SE	12	42	1	5				#2 MAIN		
Measured from Boundary of					GPS Coordinates in Decimal Degrees (NAD 83)						
_____ m from _____					Latitude <u>52.599615</u> Longitude <u>-114.007878</u>					Elevation _____ m	
_____ m from _____					How Location Obtained					How Elevation Obtained	
					Not Verified					Not Obtained	

Drilling Information	
Method of Drilling Rotary Proposed Well Use Industrial	Type of Work New Well

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
5.49		Brown Sandy Clay	
7.01		Gray Till	
10.67		Gray Fractured Shale	
14.33		Gray Sandstone	
15.24		Gray Sandstone	
20.42		Gray Sandstone	
28.96		Gray Shale	
29.26		Green Shale	
30.48		Gray Shale	

Yield Test Summary			Measurement in Metric
Recommended Pump Rate <u>272.77 L/min</u>			
Test Date	Water Removal Rate (L/min)	Static Water Level (m)	
2004/04/22	272.77	3.66	

Well Completion				Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date	End Date	
30.48 m		2004/04/22	2004/04/22	
Borehole				
Diameter (cm)	From (m)	To (m)		
12.70	0.00	30.48		
Surface Casing (if applicable)		Well Casing/Liner		
Steel		Plastic		
Size OD :	<u>14.13 cm</u>	Size OD :	<u>11.43 cm</u>	
Wall Thickness :	<u>0.655 cm</u>	Wall Thickness :	<u>0.602 cm</u>	
Bottom at :	<u>18.29 m</u>	Top at :	<u>0.00 m</u>	
		Bottom at :	<u>30.48 m</u>	
Perforations				
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval (cm)
18.29	24.38	0.508		
Perforated by Machine				
Annular Seal Driven & Bentonite				
Placed from <u>0.00 m</u> to <u>18.29 m</u>				
Amount _____				
Other Seals				
Type		At (m)		
Screen Type Slotted PVC				
Size OD : <u>11.43 cm</u>				
From (m)	To (m)	Slot Size (cm)		
18.29	24.38	0.508		
Attachment <u>Unknown</u>				
Top Fittings <u>Unknown</u>		Bottom Fittings <u>Unknown</u>		
Pack				
Type <u>Unknown</u>		Grain Size _____		
Amount <u>Unknown</u>				

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well SHAWN CROWELL Company Name AERO DRILLING & CONSULTING LTD.	Certification No 18687A Copy of Well report provided to owner Date approval holder signed



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 1035048
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

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

Well Identification and Location										Measurement in Metric	
Owner Name HORNER, NORVAL/INSHORE DEV		Address 209 SCARBORO AVE SW		Town CALGARY		Province ALBERTA		Country CA		Postal Code T3C 2H4	
Location	1/4 or LSD SE	SEC 12	TWP 42	RGE 1	W of MER 5	Lot	Block	Plan	Additional Description #2 MAIN		
Measured from Boundary of _____ m from _____ _____ m from _____				GPS Coordinates in Decimal Degrees (NAD 83) Latitude <u>52.599615</u> Longitude <u>-114.007878</u> 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 _____										Is Flow Control Installed _____	
Rate _____ L/min										Describe _____	
Recommended Pump Rate _____ 272.77 L/min										Pump Installed _____	
Recommended Pump Intake Depth (From TOC) _____ 21.34 m										Depth _____ m	
										Type _____	
										Make _____	
										H.P. _____	
										Model (Output Rating) _____	
Did you Encounter Saline Water (>4000 ppm TDS) _____										Depth _____ m	
Well Disinfected Upon Completion _____											
Gas _____										Depth _____ m	
Geophysical Log Taken _____											
Remedial Action Taken: _____										Submitted to ESRD _____	
Sample Collected for Potability _____										Submitted to ESRD _____	
Additional Comments on Well TOP OF LINER +2 NOT 2FT. ALSO SHALE TRAP 4X5 AT 60 FT. PERFS ARE MILLED SLOTS.											

Yield Test			Taken From Ground Level		Measurement in Metric	
			Depth to water level			
Test Date 2004/04/22	Start Time 12:00 AM	Static Water Level 3.66 m				
Method of Water Removal			Pumping (m)	Elapsed Time Minutes:Sec	Recovery (m)	
Type Air				0:00	30.48	
Removal Rate 272.77 L/min				1:00	12.50	
Depth Withdrawn From 30.48 m				2:00	5.79	
				3:00	4.57	
				4:00	3.96	
				5:00	3.66	
				6:00	3.66	
				7:00	3.66	
				10:00	3.66	
			30.48	120:00	3.66	
If water removal period was < 2 hours, explain why						

Water Diverted for Drilling		
Water Source	Amount Taken L	Diversion Date & Time

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well SHAWN CROWELL	Certification No 18687A
Company Name AERO DRILLING & CONSULTING LTD.	Copy of Well report provided to owner Date approval holder signed

Printed on 10/5/2023 10:25:19 AM

Page: 2 / 2

**2004 Water Source Well – Meridian Beach 1
Chemical Analysis Results (September 5, 2023)**



Element
7217 Roper Road NW
Edmonton, Alberta
T6B 3J4, Canada

T: +1 (780) 438-5522
F: +1 (780) 434-8586
E: info.Edmonton@element.com
W: www.element.com

Page 1 of 5

Analytical Report

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908483
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Reference Number 1675279-1
Sample Date August 29, 2023
Sample Time 09:10
Sample Location Meridian Beach #1
Sample Description M39227.478953 / 1.7°C
Sample Matrix Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Physical and Aggregate Properties					
Colour	Apparent, Potable	Colour units	5	15	Below AO
Turbidity		NTU	0.3	0.1/0.3/1.0 OG	
Routine Water					
pH			7.83	1	7.0-10.5 Within OG Range
Temperature of observed pH		°C	20.6		
Electrical Conductivity	at 25 °C	µS/cm	892	1	
Calcium	Extractable	mg/L	37.2	0.2	
Magnesium	Extractable	mg/L	22.7	0.2	
Sodium	Extractable	mg/L	151	0.4	200 Below AO
Potassium	Extractable	mg/L	2.3	0.4	
Iron	Extractable	mg/L	0.21	0.01	0.3 Below AO
Manganese	Extractable	mg/L	0.043	0.005	0.02 AO; 0.12 MAC Above AO
Chloride	Dissolved	mg/L	23.9	0.4	250 Below AO
Fluoride		mg/L	0.10	0.05	1.5 Below MAC
Nitrate - N		mg/L	0.04	0.01	10 Below MAC
Nitrite - N		mg/L	<0.005	0.005	1 Below MAC
Nitrate and Nitrite - N		mg/L	0.04	0.01	10 Below MAC
Sulfate (SO4)	Extractable	mg/L	55.5	0.9	500 Below AO
Hydroxide		mg/L	<5		
Carbonate		mg/L	<6		
Bicarbonate		mg/L	566		
P-Alkalinity	as CaCO3	mg/L	<5	5	
T-Alkalinity	as CaCO3	mg/L	464	5	
Total Dissolved Solids		mg/L	571	1	500 Above AO
Hardness	as CaCO3	mg/L	186.0		
Ionic Balance		%	93		

Approved by: 
Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908483
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Physical and Aggregate Properties

Blanks		Units	Measured	Lower Limit	Upper Limit	Passed QC	
Turbidity		NTU	0.094	-0.1	0.1	yes	
Date Acquired:	August 31, 2023						
Turbidity		NTU	0.119	0.0	0.1	yes	
Date Acquired:	August 31, 2023						
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC		
Turbidity		NTU	1940	1799.3	2005.7	yes	
Date Acquired:	August 31, 2023						
Turbidity		NTU	5580	4441.7	6661.7	yes	
Date Acquired:	August 31, 2023						
Colour	Colour units	10	10	10	yes		
Turbidity		NTU	149	132.1	162.1	yes	
Date Acquired:	August 31, 2023						
Turbidity		NTU	14.3	12.6	15.6	yes	
Date Acquired:	August 31, 2023						
Turbidity		NTU	1.7	1.0	2.2	yes	
Date Acquired:	August 31, 2023						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC	
Turbidity		NTU	0.2	0.2	10	0.2	yes
Date Acquired:	August 31, 2023						

Routine Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	0.22	-0.4	0.4	yes
Fluoride	mg/L	0	-0.05	0.05	yes
Nitrate - N	mg/L	0.0083299	-0.01	0.01	yes
Nitrite - N	mg/L	0	-0.005	0.005	yes
Calcium	mg/L	0.0761978	-0.1	0.1	yes
Magnesium	mg/L	0.0194014	-0.1	0.1	yes
Sodium	mg/L	0.102083	-0.4	0.3	yes
Sulfur	mg/L	0.104134	-0.3	0.3	yes
Potassium	mg/L	0.233221	-0.4	0.4	yes
Iron	mg/L	0.00345156	-0.02	0.02	yes
Manganese	mg/L	0.000828697	-0.003	0.003	yes
Date Acquired: August 31, 2023					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	2020	1847.4	2256.0	yes
Date Acquired: August 31, 2023					
Electrical Conductivity	dS/m	32.2	27.200	36.800	yes
Date Acquired: August 30, 2023					
pH		9.15	8.90	9.44	yes
Temperature of observed	°C	20.7	15.5	24.5	yes
Electrical Conductivity	dS/m	2.68	2.631	2.829	yes

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908483
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Routine Water - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit		Passed QC
P-Alkalinity	mg/L	530	442	584		yes
T-Alkalinity	mg/L	989	958	1059		yes
Fluoride	mg/L	10.1	9.39	10.59		yes
Nitrate - N	mg/L	10.2	9.03	11.13		yes
Nitrite - N	mg/L	10.0	9.010	10.990		yes
Nitrate and Nitrite - N	mg/L	20.2	19.10	20.90		yes
Calcium	mg/L	253	230.0	260.0		yes
Magnesium	mg/L	98.2	92.4	103.0		yes
Sodium	mg/L	256	231.0	261.0		yes
Sulfur	mg/L	152	141.3	156.9		yes
Potassium	mg/L	258	229.0	259.0		yes
Iron	mg/L	9.94	9.27	10.23		yes
Manganese	mg/L	2.46	2.260	2.560		yes
Date Acquired: August 31, 2023						
pH		6.89	6.79	6.97		yes
Temperature of observed	°C	20.5	15.5	24.5		yes
Electrical Conductivity	dS/m	0.076	0.069	0.085		yes
P-Alkalinity	mg/L	59	28	72		yes
T-Alkalinity	mg/L	125	114	140		yes
Chloride	mg/L	83.1	74.9	86.9		yes
Fluoride	mg/L	4.88	4.56	5.22		yes
Nitrate - N	mg/L	4.85	4.37	5.33		yes
Nitrite - N	mg/L	4.86	4.370	5.330		yes
Nitrate and Nitrite - N	mg/L	9.72	8.80	10.60		yes
Date Acquired: August 31, 2023						
Chloride	mg/L	15.6	13.3	16.5		yes
Fluoride	mg/L	0.49	0.45	0.57		yes
Nitrate - N	mg/L	0.51	0.42	0.57		yes
Nitrite - N	mg/L	0.500	0.455	0.557		yes
Nitrate and Nitrite - N	mg/L	1.01	0.85	1.15		yes
Calcium	mg/L	5.2	4.6	5.7		yes
Magnesium	mg/L	2.1	1.9	2.2		yes
Sodium	mg/L	5.2	4.7	5.7		yes
Sulfur	mg/L	3.1	2.7	3.2		yes
Potassium	mg/L	5.2	4.5	5.5		yes
Iron	mg/L	0.20	0.18	0.24		yes
Manganese	mg/L	0.051	0.046	0.058		yes
Date Acquired: August 31, 2023						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH		5.71	5.64	0	0.10	yes
Electrical Conductivity	dS/m	0.023	0.023	10	0.002	yes
Hydroxide	mg/L	<5	<5	10		yes
Carbonate	mg/L	<6	<6	10	6	yes
Bicarbonate	mg/L	16	15	10	6	yes

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908483
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Routine Water - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
P-Alkalinity	mg/L	<5	<5	10	5	yes
T-Alkalinity	mg/L	13	12	10	5	yes
Chloride	mg/L	<0.4	<0.4	10	0.5	yes
Fluoride	mg/L	0.11	0.12	10	0.05	yes
Nitrate - N	mg/L	<0.01	<0.01	10	0.01	yes
Nitrite - N	mg/L	<0.005	<0.005	10	0.010	yes
Calcium	mg/L	1.5	1.4	10	0.6	yes
Magnesium	mg/L	0.2	0.2	10	0.4	yes
Sodium	mg/L	232	229	10	1.2	yes
Sulfur	mg/L	18.9	18.7	10	0.1	yes
Potassium	mg/L	0.4	0.5	10	1.2	yes
Iron	mg/L	0.11	0.08	10	0.05	yes
Manganese	mg/L	<0.005	<0.005	10	0.010	yes
Date Acquired: August 31, 2023						

Methodology and Notes

Bill To:	Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID:	MR-0323.22	Lot ID:	1675279
Attn:	Accounts Payable	Project Name:	County of Ponoka GW Monitoring	Control Number:	
Sampled By:	Scott Thompson	Project Location:	Gull Lake Area	Date Received:	Aug 29, 2023
Company:	HCL	LSD:	Various Legal Locations	Date Reported:	Sep 5, 2023
		P.O.:	19729	Report Number:	2908483
		Proj. Acct. code:			

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	Aug 30, 2023	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	Aug 30, 2023	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	Aug 30, 2023	Element Edmonton - Roper Road
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Aug 31, 2023	Element Edmonton - Roper Road
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	Sep 1, 2023	Element Edmonton - Roper Road
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl- E	Aug 31, 2023	Element Edmonton - Roper Road
Colour (Apparent) in water	APHA	* Visual Comparison Method, 2120 B	Aug 31, 2023	Element Edmonton - Roper Road
Metals Trace (Extractable) in water	APHA	Hardness by Calculation, 2340 B	Aug 31, 2023	Element Edmonton - Roper Road
Metals Trace (Extractable) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	Aug 31, 2023	Element Edmonton - Roper Road
Turbidity in Water	APHA	* Turbidity - Nephelometric Method, 2130 B	Aug 31, 2023	Element Edmonton - Roper Road

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
------	--

Guidelines

Guideline Description	Health Canada GCDWQ
Guideline Source	Guidelines for Canadian Drinking Water Quality, Health Canada, Sept 2020
Guideline Comments	MAC = Maximum Acceptable Concentration AO = Aesthetic Objective OG = Operational Guideline for Water Treatment Plants (does not apply to private groundwater wells). Refer to Health Canada for complete guidelines at www.hc-sc.gc.ca

Comments:

- Aug 30, 2023 - Sample 1675279-1; 8807135: Sample received at 1.7°C

The comparison of test results to guideline limits is provided for information purposes only. This is not to be taken as a statement of conformance / nonconformance to any guideline, regulation or limit. The data user is responsible for all conclusions drawn with respect to the data and is advised to consult official regulatory references when evaluating compliance.

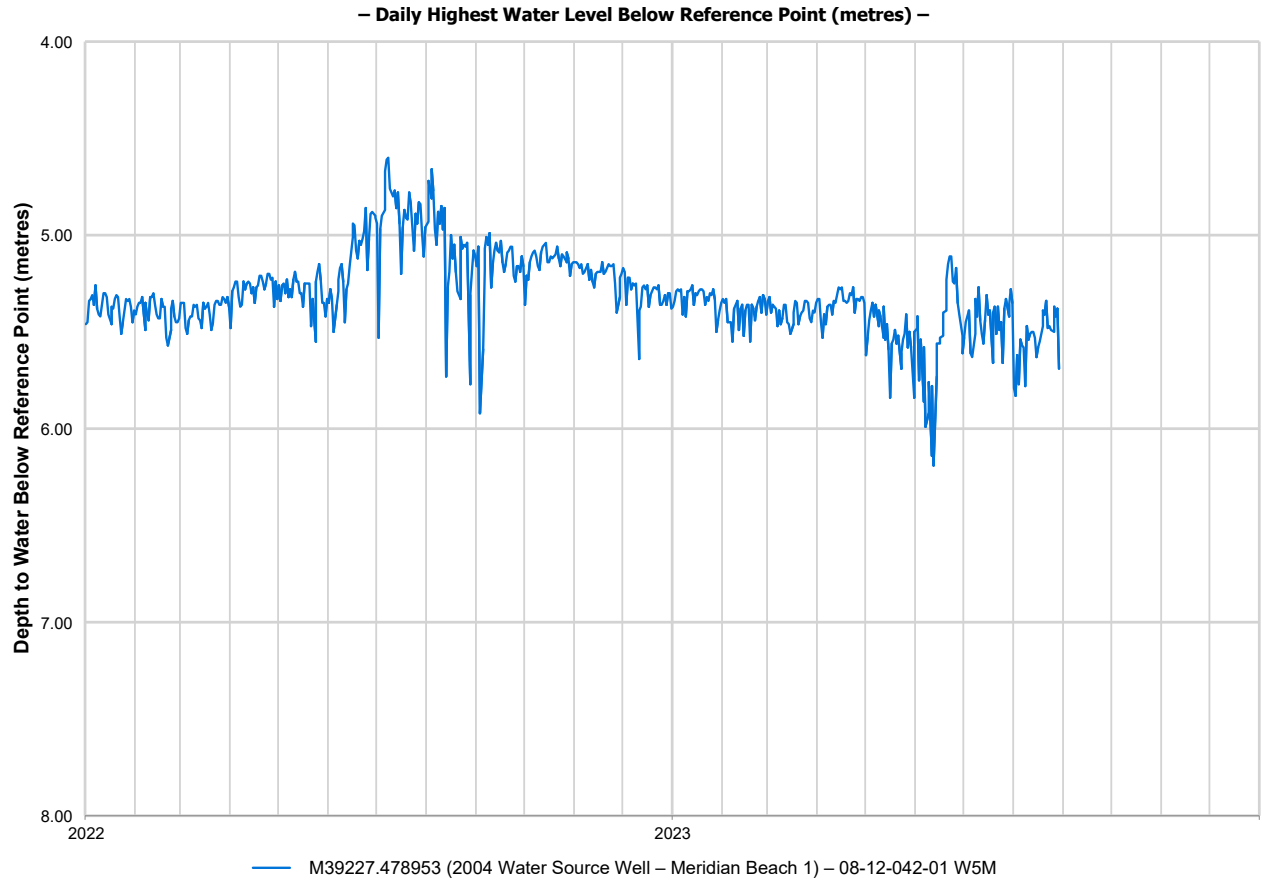
Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

**2004 Water Source Well – Meridian Beach 1
2022 – 2023 Hydrograph**



2004 Water Source Well – Meridian Beach 2

08-12-042-01 W5M
(M39227.478952)



Well Spatial Location:

Easting: **67,302**

Northing: **5,825,900**

(spatial accuracy HCL GPS — 10TM Resource NAD83)

Ground Elevation AMSL (m): 905.3

(elevation accuracy Surveyed (other))

Date Completed: April 21, 2004

Depth Drilled (m): 30.5

Completion Interval (m): 18.3 – 24.4 *

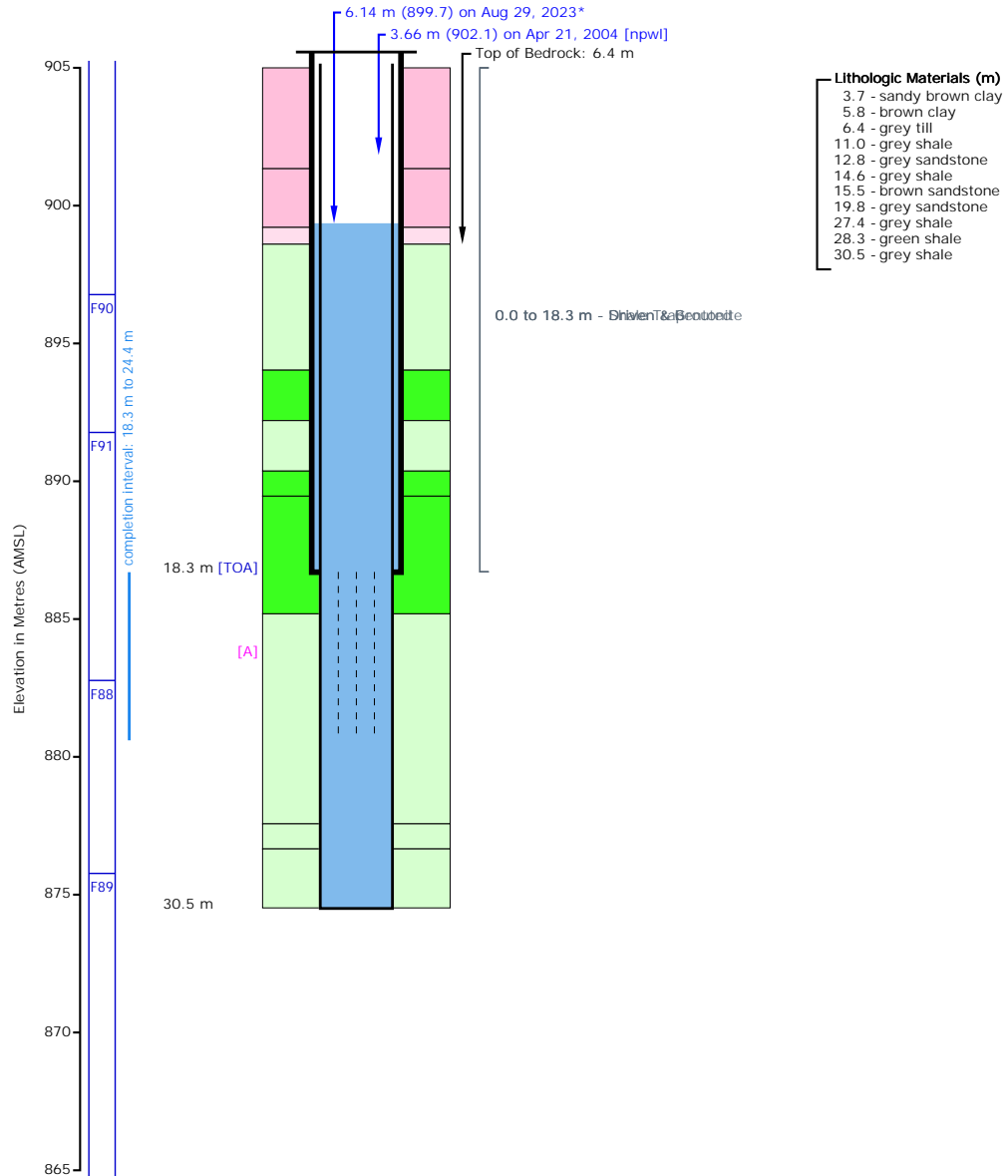
(TGWC determined value)*

Earliest Water Level (m): 3.66 – April 21, 2004

Most Recent Water Level (m): 6.14 – August 29, 2023 @ 10:10

GIC ID: 1035047

2004 Water Source Well – Meridian Beach 2 Water Well Diagram



Lithology Legend			Geologic Unit Legend (Top) - Regional Analysis	
Surficial	Unsorted		F90 - Sun169 Aquifer	
	Fine Grained		F91 - Sun169 Aquifer Base	
	Coarse Grained		F88 - Sun155 Aquifer	
Bedrock	Fine Grained		F89 - Sun155 Aquifer Base	
	Coarse Grained			
	Other			

Summary
<p>TGWC ID: M39227.478952</p> <p>Well Name: 2004 Water Source Well – Meridian Beach 2</p> <p>Legal Location: 08-12-042-01 W5M</p> <p>Casing (OD): 141.3 mm; Steel (5.6")</p> <p>Liner (OD): 114.3 mm; Plastic (4.5")</p> <p>Casing Stick-Up: 0.5 m (not drawn to scale)</p> <p>Completion [A]: 18.3 to 24.4 m; Slotted</p> <p>Top of Aquifer [TOA]: 18.3 m on June 15, 2015</p> <p>Water Level (recent): 6.14 m (899.7 m AMSL) on Aug 29, 2023 @ 10:10 - Reference Point: Top of Casing</p> <p>Water Level (oldest): 3.66 m (902.1 m AMSL) on Apr 21, 2004 [npwl]</p>

* Water-Level Measurements are measured from reference point listed.
 NOTE: Geologic Unit is a guide based on a regional groundwater assessment completed by Hydrogeological Consultants Ltd. (HCL) (<http://www.hcl.ca>) on behalf of Ponoka County in conjunction with Prairie Farm Rehabilitation Administration (P.F.R.A.).
 Drawn: October 05, 2023 @ 10:26 --- <https://www.hcl.ca>

do not copy, cite, or distribute without the express written consent of The Groundwater Centre, a division of hydrogeological consultants ltd.

Field Action: **Confirmed - Physically, May 18, 2011**
Work Type: **New Well**
Drilling Method: **Rotary**
Proposed Use: **Municipal**
Completion Type: **Casing/Perforated Liner**

Date Started: *April 21, 2004*
Date Completed: *April 21, 2004*
Well Status: *Producing*
Feature Class: *Water Well*

2004 Water Source Well - Meridian Beach 2 AEPA - Water Well Drilling Report



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 1035047
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

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

Well Identification and Location										Measurement in Metric
Owner Name HORNER, NORVAL/INSHORE DEV		Address 209 SCARBORO AVE SW		Town CALGARY		Province ALBERTA		Country CA	Postal Code T3C 2H4	
Location	1/4 or LSD SE	SEC 12	TWP 42	RGE 1	W of MER 5	Lot	Block	Plan	Additional Description #1 OBSERVATION	
Measured from Boundary of _____ m from _____ _____ m from _____					GPS Coordinates in Decimal Degrees (NAD 83) Latitude <u>52.599615</u> Longitude <u>-114.007878</u> How Location Obtained Not Verified			Elevation _____ m How Elevation Obtained Not Obtained		

Drilling Information	
Method of Drilling Rotary	Type of Work New Well
Proposed Well Use Industrial	

Formation Log			Measurement in Metric
Depth from ground level (m)	Water Bearing	Lithology Description	
3.66		Brown Sandy Clay	
5.79		Brown Clay	
6.40		Gray Till	
10.97		Gray Shale	
12.80		Gray Sandstone	
14.63		Gray Shale	
15.54		Brown Sandstone	
19.81		Gray Sandstone	
27.43		Gray Shale	
28.35		Green Shale	
30.48		Gray Shale	

Yield Test Summary			Measurement in Metric
Recommended Pump Rate <u>272.77</u> L/min			
Test Date	Water Removal Rate (L/min)	Static Water Level (m)	
2004/04/21	272.77	3.66	

Well Completion				Measurement in Metric
Total Depth Drilled	Finished Well Depth	Start Date	End Date	
30.48 m		2004/04/21	2004/04/21	
Borehole				
Diameter (cm)	From (m)	To (m)		
12.70	0.00	30.48		
Surface Casing (if applicable)		Well Casing/Liner		
Steel	Size OD : <u>14.13</u> cm	Plastic		
Wall Thickness : <u>0.655</u> cm	Bottom at : <u>18.29</u> m	Size OD : <u>11.43</u> cm		
		Wall Thickness : <u>0.602</u> cm		
		Top at : <u>0.00</u> m		
		Bottom at : <u>30.48</u> m		
Perforations				
From (m)	To (m)	Diameter or Slot Width (cm)	Slot Length (cm)	Hole or Slot Interval (cm)
18.29	24.38	0.953		0.95
Perforated by Hand Drill				
Annular Seal Driven & Bentonite				
Placed from <u>0.00</u> m to <u>18.29</u> 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 <u>Unknown</u>		Grain Size _____		
Amount _____		Unknown		

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well SHAWN CROWELL	Certification No 18687A
Company Name AERO DRILLING & CONSULTING LTD.	Copy of Well report provided to owner Date approval holder signed



Water Well Drilling Report

[View in Imperial](#) [Export to Excel](#)

GIC Well ID 1035047
GoA Well Tag No.
Drilling Company Well ID
Date Report Received

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

Well Identification and Location										Measurement in Metric	
Owner Name HORNER, NORVAL/INSHORE DEV		Address 209 SCARBORO AVE SW			Town CALGARY		Province ALBERTA		Country CA	Postal Code T3C 2H4	
Location	1/4 or LSD SE	SEC 12	TWP 42	RGE 1	W of MER 5	Lot	Block	Plan	Additional Description #1 OBSERVATION		
Measured from Boundary of _____ m from _____ _____ m from _____					GPS Coordinates in Decimal Degrees (NAD 83) Latitude <u>52.599615</u> Longitude <u>-114.007878</u> 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 <u>91.44</u> cm											
Is Artesian Flow _____										Is Flow Control Installed _____	
Rate _____ L/min										Describe _____	
Recommended Pump Rate <u>272.77</u> L/min										Pump Installed _____	
Recommended Pump Intake Depth (From TOC) <u>21.34</u> m										Depth _____ m	
										Type _____	
										Make _____	
										H.P. _____	
										Model (Output Rating) _____	
Did you Encounter Saline Water (>4000 ppm TDS) _____										Depth _____ m	
Well Disinfected Upon Completion _____											
Gas _____										Depth _____ m	
Geophysical Log Taken _____											
Remedial Action Taken _____										Submitted to ESRD _____	
Sample Collected for Potability _____										Submitted to ESRD _____	
Additional Comments on Well TOP OF LINER AT +2 NOT 2FT BELOW GROUND LEVEL. GROUTED SHALE TRAP 4X5 AT 60 FT.											

Yield Test			Taken From Ground Level		Measurement in Metric	
			Depth to water level			
Test Date 2004/04/21	Start Time 12:00 AM	Static Water Level 3.66 m				
Method of Water Removal			Pumping (m)	Elapsed Time Minutes:Sec	Recovery (m)	
Type Air				0:00	30.48	
Removal Rate <u>272.77</u> L/min				1:00	13.11	
Depth Withdrawn From <u>30.48</u> m				2:00	4.88	
				3:00	4.27	
				4:00	3.66	
				5:00	3.66	
				6:00	3.66	
				10:00	3.66	
If water removal period was < 2 hours, explain why			30.48	120:00		

Water Diverted for Drilling		
Water Source	Amount Taken L	Diversion Date & Time

Contractor Certification	
Name of Journeyman responsible for drilling/construction of well SHAWN CROWELL	Certification No 18687A
Company Name AERO DRILLING & CONSULTING LTD.	Copy of Well report provided to owner Date approval holder signed

Printed on 10/5/2023 10:25:21 AM

Page: 2 / 2

**2004 Water Source Well – Meridian Beach 2
Chemical Analysis Results (September 5, 2023)**



Element
7217 Roper Road NW
Edmonton, Alberta
T6B 3J4, Canada

T: +1 (780) 438-5522
F: +1 (780) 434-8586
E: info.Edmonton@element.com
W: www.element.com

Page 1 of 5

Analytical Report

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908484
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Reference Number 1675279-2
Sample Date August 29, 2023
Sample Time 09:20
Sample Location Meridian Beach #2
Sample Description M39227.478952 / 1.7°C
Sample Matrix Water

Analyte	Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Physical and Aggregate Properties					
Colour	Apparent, Potable	Colour units	15	5	15
Turbidity		NTU	0.5	0.1	0.1/0.3/1.0 OG
Routine Water					
pH			7.64	1	7.0-10.5
Temperature of observed pH		°C	20.6		Within OG Range
Electrical Conductivity	at 25 °C	µS/cm	797	1	
Calcium	Extractable	mg/L	60.6	0.2	
Magnesium	Extractable	mg/L	43.5	0.2	
Sodium	Extractable	mg/L	65.3	0.4	200
Potassium	Extractable	mg/L	2.7	0.4	
Iron	Extractable	mg/L	0.48	0.01	0.3
Manganese	Extractable	mg/L	0.067	0.005	0.02 AO; 0.12
					MAC
Chloride	Dissolved	mg/L	6.7	0.4	250
Fluoride		mg/L	0.08	0.05	1.5
Nitrate - N		mg/L	<0.01	0.01	10
Nitrite - N		mg/L	<0.005	0.005	1
Nitrate and Nitrite - N		mg/L	<0.01	0.01	10
Sulfate (SO4)	Extractable	mg/L	49.5	0.9	500
Hydroxide		mg/L	<5		
Carbonate		mg/L	<6		
Bicarbonate		mg/L	541		
P-Alkalinity	as CaCO3	mg/L	<5	5	
T-Alkalinity	as CaCO3	mg/L	444	5	
Total Dissolved Solids		mg/L	495	1	500
Hardness	as CaCO3	mg/L	331		
Ionic Balance		%	94		

Approved by:

Anthony Neumann

Anthony Neumann, MSc
General Manager

Data have been validated by Analytical Quality Control and Element's Integrated Data Validation System (IDVS).
Generation and distribution of the report, and approval by the digitized signature above, are performed through a secure and controlled automatic process.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908484
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Physical and Aggregate Properties

Blanks		Units	Measured	Lower Limit	Upper Limit	Passed QC	
Turbidity		NTU	0.094	-0.1	0.1	yes	
Date Acquired:		August 31, 2023					
Turbidity		NTU	0.119	0.0	0.1	yes	
Date Acquired:		August 31, 2023					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC		
Turbidity		NTU	1940	1799.3	2005.7	yes	
Date Acquired:		August 31, 2023					
Turbidity		NTU	5580	4441.7	6661.7	yes	
Date Acquired:		August 31, 2023					
Colour		Colour units	10	10	10	yes	
Turbidity		NTU	149	132.1	162.1	yes	
Date Acquired:		August 31, 2023					
Turbidity		NTU	14.3	12.6	15.6	yes	
Date Acquired:		August 31, 2023					
Turbidity		NTU	1.7	1.0	2.2	yes	
Date Acquired:		August 31, 2023					
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC	
Turbidity		NTU	0.2	0.2	10	0.2	yes
Date Acquired:		August 31, 2023					

Routine Water

Blanks	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	0.22	-0.4	0.4	yes
Fluoride	mg/L	0	-0.05	0.05	yes
Nitrate - N	mg/L	0.0083299	-0.01	0.01	yes
Nitrite - N	mg/L	0	-0.005	0.005	yes
Calcium	mg/L	0.0761978	-0.1	0.1	yes
Magnesium	mg/L	0.0194014	-0.1	0.1	yes
Sodium	mg/L	0.102083	-0.4	0.3	yes
Sulfur	mg/L	0.104134	-0.3	0.3	yes
Potassium	mg/L	0.233221	-0.4	0.4	yes
Iron	mg/L	0.00345156	-0.02	0.02	yes
Manganese	mg/L	0.000828697	-0.003	0.003	yes
Date Acquired: August 31, 2023					
Control Sample	Units	Measured	Lower Limit	Upper Limit	Passed QC
Chloride	mg/L	2020	1847.4	2256.0	yes
Date Acquired: August 31, 2023					
Electrical Conductivity	dS/m	32.2	27.200	36.800	yes
Date Acquired: August 30, 2023					
pH		9.15	8.90	9.44	yes
Temperature of observed	°C	20.7	15.5	24.5	yes
Electrical Conductivity	dS/m	2.68	2.631	2.829	yes

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908484
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Routine Water - Continued

Control Sample	Units	Measured	Lower Limit	Upper Limit		Passed QC
P-Alkalinity	mg/L	530	442	584		yes
T-Alkalinity	mg/L	989	958	1059		yes
Fluoride	mg/L	10.1	9.39	10.59		yes
Nitrate - N	mg/L	10.2	9.03	11.13		yes
Nitrite - N	mg/L	10.0	9.010	10.990		yes
Nitrate and Nitrite - N	mg/L	20.2	19.10	20.90		yes
Calcium	mg/L	253	230.0	260.0		yes
Magnesium	mg/L	98.2	92.4	103.0		yes
Sodium	mg/L	256	231.0	261.0		yes
Sulfur	mg/L	152	141.3	156.9		yes
Potassium	mg/L	258	229.0	259.0		yes
Iron	mg/L	9.94	9.27	10.23		yes
Manganese	mg/L	2.46	2.260	2.560		yes
Date Acquired: August 31, 2023						
pH		6.89	6.79	6.97		yes
Temperature of observed	°C	20.5	15.5	24.5		yes
Electrical Conductivity	dS/m	0.076	0.069	0.085		yes
P-Alkalinity	mg/L	59	28	72		yes
T-Alkalinity	mg/L	125	114	140		yes
Chloride	mg/L	83.1	74.9	86.9		yes
Fluoride	mg/L	4.88	4.56	5.22		yes
Nitrate - N	mg/L	4.85	4.37	5.33		yes
Nitrite - N	mg/L	4.86	4.370	5.330		yes
Nitrate and Nitrite - N	mg/L	9.72	8.80	10.60		yes
Date Acquired: August 31, 2023						
Chloride	mg/L	15.6	13.3	16.5		yes
Fluoride	mg/L	0.49	0.45	0.57		yes
Nitrate - N	mg/L	0.51	0.42	0.57		yes
Nitrite - N	mg/L	0.500	0.455	0.557		yes
Nitrate and Nitrite - N	mg/L	1.01	0.85	1.15		yes
Calcium	mg/L	5.2	4.6	5.7		yes
Magnesium	mg/L	2.1	1.9	2.2		yes
Sodium	mg/L	5.2	4.7	5.7		yes
Sulfur	mg/L	3.1	2.7	3.2		yes
Potassium	mg/L	5.2	4.5	5.5		yes
Iron	mg/L	0.20	0.18	0.24		yes
Manganese	mg/L	0.051	0.046	0.058		yes
Date Acquired: August 31, 2023						
Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
pH		5.71	5.64	0	0.10	yes
Electrical Conductivity	dS/m	0.023	0.023	10	0.002	yes
Hydroxide	mg/L	<5	<5	10		yes
Carbonate	mg/L	<6	<6	10	6	yes
Bicarbonate	mg/L	16	15	10	6	yes

Quality Control

Bill To: Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID: MR-0323.22 Project Name: County of Ponoka GW Monitoring Project Location: Gull Lake Area LSD: Various Legal Locations P.O.: 19729 Proj. Acct. code:	Lot ID: 1675279 Control Number: Date Received: Aug 29, 2023 Date Reported: Sep 5, 2023 Report Number: 2908484
Attn: Accounts Payable Sampled By: Scott Thompson Company: HCL		

Routine Water - Continued

Client Sample Replicates	Units	Replicate 1	Replicate 2	% RSD Criteria	Absolute Criteria	Passed QC
P-Alkalinity	mg/L	<5	<5	10	5	yes
T-Alkalinity	mg/L	13	12	10	5	yes
Chloride	mg/L	<0.4	<0.4	10	0.5	yes
Fluoride	mg/L	0.11	0.12	10	0.05	yes
Nitrate - N	mg/L	<0.01	<0.01	10	0.01	yes
Nitrite - N	mg/L	<0.005	<0.005	10	0.010	yes
Calcium	mg/L	1.5	1.4	10	0.6	yes
Magnesium	mg/L	0.2	0.2	10	0.4	yes
Sodium	mg/L	232	229	10	1.2	yes
Sulfur	mg/L	18.9	18.7	10	0.1	yes
Potassium	mg/L	0.4	0.5	10	1.2	yes
Iron	mg/L	0.11	0.08	10	0.05	yes
Manganese	mg/L	<0.005	<0.005	10	0.010	yes
Date Acquired: August 31, 2023						

Methodology and Notes

Bill To:	Hydrogeological Consultants 17740 - 118 Avenue Edmonton, AB, Canada T5S 2W3	Project ID:	MR-0323.22	Lot ID:	1675279
Attn:	Accounts Payable	Project Name:	County of Ponoka GW Monitoring	Control Number:	
Sampled By:	Scott Thompson	Project Location:	Gull Lake Area	Date Received:	Aug 29, 2023
Company:	HCL	LSD:	Various Legal Locations	Date Reported:	Sep 5, 2023
		P.O.:	19729	Report Number:	2908484
		Proj. Acct. code:			

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	Aug 30, 2023	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510 B	Aug 30, 2023	Element Edmonton - Roper Road
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	Aug 30, 2023	Element Edmonton - Roper Road
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	Aug 31, 2023	Element Edmonton - Roper Road
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	Sep 1, 2023	Element Edmonton - Roper Road
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl- E	Aug 31, 2023	Element Edmonton - Roper Road
Colour (Apparent) in water	APHA	* Visual Comparison Method, 2120 B	Aug 31, 2023	Element Edmonton - Roper Road
Metals Trace (Extractable) in water	APHA	Hardness by Calculation, 2340 B	Aug 31, 2023	Element Edmonton - Roper Road
Metals Trace (Extractable) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	Aug 31, 2023	Element Edmonton - Roper Road
Turbidity in Water	APHA	* Turbidity - Nephelometric Method, 2130 B	Aug 31, 2023	Element Edmonton - Roper Road

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
------	--

Guidelines

Guideline Description	Health Canada GCDWQ
Guideline Source	Guidelines for Canadian Drinking Water Quality, Health Canada, Sept 2020
Guideline Comments	MAC = Maximum Acceptable Concentration AO = Aesthetic Objective OG = Operational Guideline for Water Treatment Plants (does not apply to private groundwater wells). Refer to Health Canada for complete guidelines at www.hc-sc.gc.ca

Comments:

- Aug 30, 2023 - Sample 1675279-2; 8807136: Sample received at 1.7°C

The comparison of test results to guideline limits is provided for information purposes only. This is not to be taken as a statement of conformance / nonconformance to any guideline, regulation or limit. The data user is responsible for all conclusions drawn with respect to the data and is advised to consult official regulatory references when evaluating compliance.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

Terms and Conditions: <https://www.element.com/terms/terms-and-conditions>

**2004 Water Source Well – Meridian Beach 2
2022 – 2023 Hydrograph**

