

December 12, 2022

Project No. 19126620

Phil White, Quality Control

Thomas Cavanagh Construction Limited
9094 Cavanagh Road
Ashton, Ontario
K0A 1B0

**MAXIMUM PREDICTED WATER TABLE REPORT
PROPOSED HIGHLAND LINE PIT
TOWNSHIP OF LANARK HIGHLANDS, ONTARIO**

Mr. White:

Thomas Cavanagh Construction Limited (Cavanagh) is applying for a Class 'A' licence for a Pit Below the Groundwater Table under the *Aggregate Resources Act* (ARA) for the proposed Highland Line Pit located on Part Lot 15, Concession 10 in the Township of Lanark Highlands, Lanark County, Ontario (site). The area proposed to be licensed under the ARA is 50.6 hectares (ha) and the proposed extraction area is 35.1 ha. In order to be conservative, the proposed extraction area in this report does not include the 1.3 ha Natural Environment Exclusion Zone identified on the site plans. For the purposes of this report, the proposed extraction area is 36.3 ha. The proposed boundaries of the licensed area and limit of extraction are shown on Figure 1. The proposed pit would be extracted to an elevation of 176 metres above sea level (asl).

There are a number of topographically high areas in the site with bedrock exposed at surface or buried with a thin layer of overburden. Groundwater levels for these bedrock areas were not included within the groundwater monitoring program for the site as the application under the ARA is for a pit, and quarrying bedrock is not anticipated at the site at this time. The groundwater monitoring program focused on the areas of the site where sand would be extracted.

This report summarizes the results of the groundwater level monitoring completed on the site to fulfill the requirements of the Maximum Predicted Water Table Report as described in the Aggregate Resources Ontario: Technical Reports and Information Standards dated August 2020.

1.0 GROUNDWATER ELEVATIONS

Six monitoring wells were installed on April 22, 2020 to measure groundwater levels over the period of one year on the site. Groundwater levels were measured on a monthly basis by Cavanagh staff and provided to Golder. The top of the piezometer at each monitoring well location was surveyed to a Geodetic datum in order to allow for calculation of the groundwater elevation based on the measured depth to groundwater. The locations of the monitoring wells included in the groundwater monitoring program are shown on Figure 1.

The available groundwater elevation data measured as part of the ongoing groundwater level monitoring program for the site are described in Section 1.1 below. Figure 2 shows the groundwater elevations plotted versus time at MW20-1, MW20-2, MW20-3, MW20-4, MW20-5 and MW20-6. The groundwater elevation data used to generate Figure 2 is provided in Table 1. It should be noted that MW20-6 is not located within the proposed pit licensed area, but is located on property, owned by Cavanagh, immediately adjacent to the proposed licensed area.

Table 1: Groundwater Elevations

Date	Groundwater Elevations (metres above sea level)					
	MW20-1	MW20-2	MW20-3	MW20-4	MW20-5	MW20-6
29-Apr-20	188.73	188.17	182.66	188.93	189.21	195.36
13-May-20	188.65	188.12	182.60	188.81	189.00	195.31
27-May-20	188.58	188.05	182.56	188.74	188.90	195.18
15-Jun-20	188.50	187.92	182.51	188.61	188.79	195.01
15-Jul-20	188.33	187.73	182.42	188.49	188.61	194.76
20-Aug-20	188.35	187.69	182.43	188.54	188.59	194.68
18-Sep-20	188.46	187.84	182.48	188.64	188.74	194.74
23-Oct-20	188.51	187.76	182.58	188.71	188.66	194.78
18-Nov-20	188.45	187.79	182.65	188.61	188.71	194.71
14-Dec-20	188.58	187.92	182.59	188.77	188.89	194.91
14-Jan-21	188.59	187.97	182.56	188.72	188.87	195.06
10-Feb-21	188.50	187.84	182.41	188.62	188.75	194.94
12-Mar-21	189.00	187.97	182.84	189.15	189.24	194.96
14-Apr-21	188.73	188.18	182.92	188.86	189.06	195.21
13-May-21	188.65	188.03	182.87	188.79	188.97	195.10
16-Jun-21	188.47	187.83	182.75	188.59	188.73	194.73

1.1 Discussion

Figure 2 presents groundwater elevation data measured at monitoring wells MW20-1, MW20-2, MW20-3, MW20-4, MW20-5 and MW20-6 between April 29, 2020 and June 16, 2021. As shown on Figure 2, the groundwater elevations at all of the monitoring well locations are generally stable and varied over the year of monitoring by less than one metre. Table 2 provides a summary of the groundwater elevations at each monitoring well.

Table 2: Groundwater Elevation Summary

	Maximum Groundwater Elevation (metres asl)	Minimum Groundwater Elevation (metres asl)	Variation in Groundwater Elevations (metres)
MW20-1	189.00	188.33	0.67
MW20-2	188.18	187.69	0.49
MW20-3	182.92	182.41	0.51
MW20-4	189.15	188.49	0.66
MW20-5	189.24	188.59	0.65
MW20-6	195.36	194.68	0.68

The changes in groundwater elevations at all of the monitoring locations are considered to represent seasonal variations. Water levels are highest in the spring (March and April) and drop in the summer (July and August).

2.0 HORIZONTAL GROUNDWATER FLOW DIRECTION

Based on the results of the groundwater elevations collected at the site, groundwater flow generally flows from southwest to east within the sand unit. Table 2 provides the available groundwater elevations for all monitoring wells. The highest groundwater elevations are found in monitoring wells installed on the southern corner of the site (i.e., MW20-6) and the lower groundwater elevations are found in the monitoring wells installed along the eastern edge of the extraction area (MW20-3). The topography is variable across the site as there are a number of areas bedrock at or near surface (with locally high topography). It is anticipated that groundwater in the sand unit on the site flows around the bedrock areas where they exist.

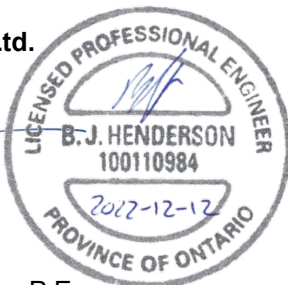
3.0 MAXIMUM PREDICTED WATER TABLE

Based on the available groundwater elevation data, the maximum predicted water table on the site is 195.4 metres asl on the southern corner (as measured at MW20-6). Based on the groundwater elevation data measured at MW20-3 located on the eastern side of the site, the water table slopes down moving from southwest to east, and the maximum predicted water table on the east side of the site is approximately 182.9 metres asl.

4.0 CLOSURE

If you have any questions, please contact the undersigned.

Golder Associates Ltd.



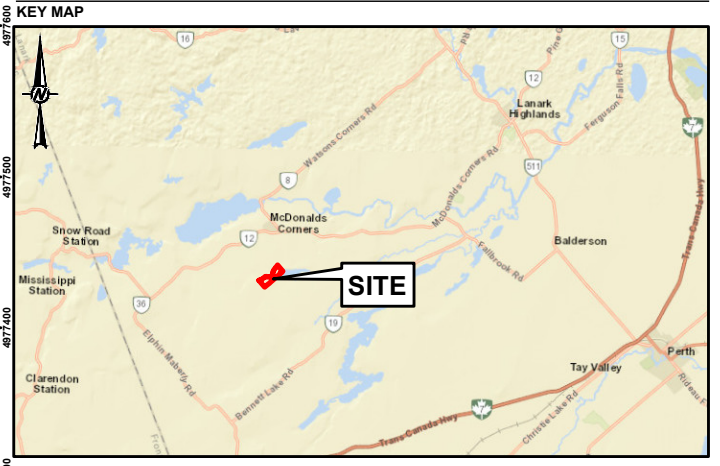
B. Henderson, M.A.Sc., P.Eng.
Environmental Engineer
BH/KAM/rk



K.A. Marentette, M.Sc., P.Geo.
Senior Hydrogeologist/Principal

Attachments: Figures 1 and 2

[https://golderassociates.sharepoint.com/sites/112126/project files/6 deliverables/max water table/19126620-r-rev0-highland max water table_12dec2022.docx](https://golderassociates.sharepoint.com/sites/112126/project%20files/6%20deliverables/max%20water%20table/19126620-r-rev0-highland%20max%20water%20table_12dec2022.docx)

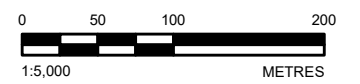


SCALE 1:425,000

- LEGEND**
- BOREHOLE/MONITORING WELL
 - LICENSED BOUNDARY
 - LIMIT OF EXTRACTION
 - MAXIMUM WATER TABLE CONTOURS (0.5 METRES)
 - ROADWAY
 - WATERCOURSE
 - WATERBODY
- WETLAND SIGNIFICANCE**
- UNEVALUATED PROVINCIAL WETLAND

NOTE(S)
1. ALL LOCATIONS ARE APPROXIMATE

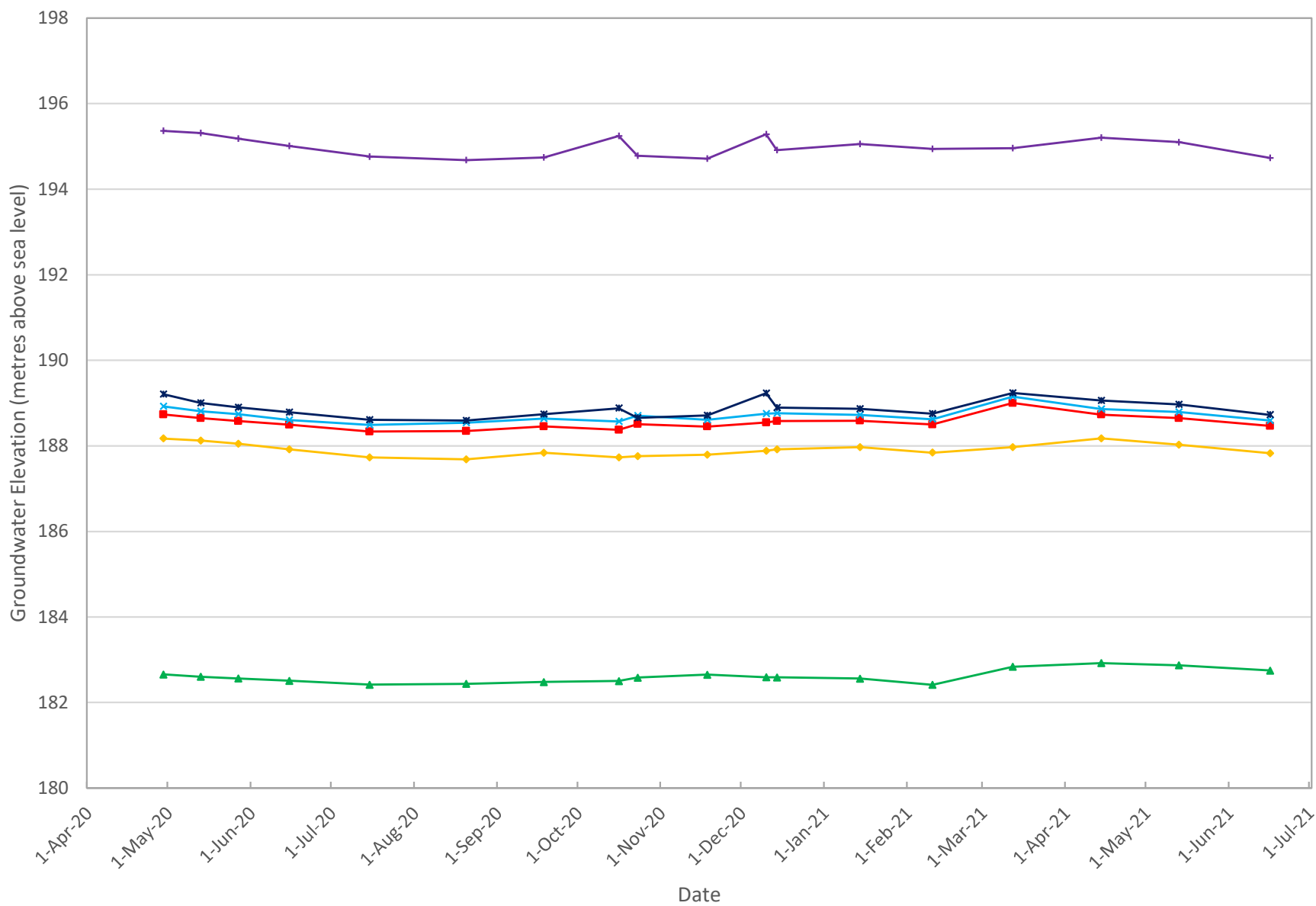
REFERENCE(S)
1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2020
2. SERVICE LAYER CREDITS: SOURCES: ESRI, HERE, GARMIN, USGS, INTERMAP, INCREMENT P, NRCAN, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), ESRI KOREA, ESRI (THAILAND), NGCC, (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
3. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28



CLIENT		
THOMAS CAVANAGH CONSTRUCTION LIMITED		
PROJECT		
HIGHLAND LINE PIT PROPERTY, PART OF LOTS 4 & 5, CONCESSION 10, DALHOUSIE TOWNSHIP, LANARK COUNTY, ONTARIO		
TITLE		
SITE PLAN		
CONSULTANT	YYYY-MM-DD	2022-12-06
	DESIGNED	BH
	PREPARED	BR/MG
	REVIEWED	BH
	APPROVED	KAM
PROJECT NO.	CONTROL	REV.
19126620	0019	0
		FIGURE
		1

Path: S:\Clients\Thomas_Cavanagh_Construction\Construction\19126620\0019_CH4001.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 28mm



■ MW20-1
 ◆ MW20-2
 ▲ MW20-3
 ✦ MW20-4
 ✱ MW20-5
 ✦ MW20-6

CLIENT
 THOMAS CAVANAGH CONSTRUCTION LIMITED

PROJECT
 HIGHLAND LINE PIT

CONSULTANT YYYY-MM-DD 2022-02-24

TITLE
 GROUNDWATER ELEVATIONS AT MONITORING WELLS MW20-1, MW20-2, MW20-3,
 MW20-4, MW20-5 AND MW20-6



PREPARED BH
 DESIGN BH
 REVIEW KAM
 APPROVED KAM

PROJECT No. Rev.
 19126620

FIGURE 2