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File:	160961321	Date:	December 19, 2019

Reference: Level 1 Hydrogeological Review, Ottawa Airport Lands – Parcel C, Ottawa, Ontario

Stantec Consulting Limited (Stantec) completed a preliminary hydrogeological evaluation in support of the proposed development of aggregate excavation pit on lands owned by the Ottawa Airport (The Site). The Site approximately 38 ha in size and is known as Parcel C, an unaddressed parcel of land located on Albion Road (Ottawa Regional Rd 25) in the City of Ottawa, Ontario (Figure 1, Attachment A). The proposed extraction pit will be above the groundwater level.

Although the project is located on federal crown lands, the following hydrogeological evaluation was completed in consideration of the Ontario Aggregate Resources Act (ARA) standards and anticipated level of effort expected by the City of Ottawa. The ARA requires that for sites with extraction above the groundwater table, a review must be prepared to determine the elevation of the water table within the site and demonstrate that the final depth of extraction is at least 1.5 m above the water table.

In support of the proposed aggregate excavation, Stantec completed a background review of the available geological, hydrogeological, and natural environment data to develop a conceptual understanding of the Site hydrogeology. This memorandum details these findings with figures included in Attachment A.

BACKGROUND

The Site is a semi-rectangular plot of agricultural / pastoral land. The Site is bounded by Albion Road on the east, semi-vegetated former extraction lands to the south, mixed forest and wetland to the west, and a golf course to the north. The Site is bisected northwest to southeast by a hydroelectric right-of-way and includes three high voltage transmission towers.

The Site topography ranges from about 110 m above mean sea level (AMSL) near the western boundary, a central north-south mound extending up to 117 m AMSL, and about 114 m AMSL near the eastern boundary (Gorrell, 2006¹). The ground surface decreases to the west of the Site with the edge of the mapped wetland coinciding to an elevation of about 108 m AMSL.

The Site is primarily located at the eastern boundary of the Lower Rideau River watershed within the Mosquito Creek subwatershed, with about 3 ha of the southeastern portion of the Site in the South Nation Watershed. Surface water flow within the Mosquito Creek subwatershed is to the west to the Rideau River.

¹ Gorrell Resource Investigations, 2006. Aggregate Assessment and Resource Management Plan, Ottawa International Airport Holdings. Report No. 05310.

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LOCAL GEOLOGY

Surficial geology mapping of the Site indicates glaciofluvial deposits consisting of sand and gravel at ground surface across the Site. A linear feature of a beach ridge and near shore bar is mapped along the western boundary of the Site (OGS, 2010²).

Previous investigations at the Site included one test pit excavation / monitoring well installation at TP26-06 (Gorrell, 2006¹), and four test pit excavations at TP14-17 to TP14-20 and three monitoring well installations at BH14-1, BH14-2 and BH14-5 (Houle, 2014³). The investigations were completed to identify the general subsurface conditions and assess the potential quality of the aggregate materials. The precise location of the 2006 investigation is not known, but the 2014 test pits/monitoring wells are shown on Figure 1.

Investigations by Houle (2014) confirmed deposits of sands, and sands and gravels underlain by a silty clay. The top of the silty clay was encountered at a depth of approximately 10 m in the central portion of the Site in borehole BH14-5. The lateral extent of this silty clay is unknown. A lens of sandy silt was encountered on the eastern portion of the Site in borehole BH14-2 at approximately 4 m depth. These deposits represent ice-contact and near-shore sediments of the former Champlain Sea (Gorrell, 2006²).

Ordovician-aged limestone/dolostone bedrock of the Oxford Formation is anticipated to be located at depths ranging between 3 m and 25 m, with thinner overburden cover along the southern boundary (Gorrell, 2006²; Houle, 2014³; OGS, 2011⁴).

GROUNDWATER CONDITIONS

Groundwater monitoring was completed as part of the 2006 and 2014 investigations, with additional monitoring from 2019. Gorrell (2006) reported groundwater at TP26-06 on April 12, 2006 at a depth of 6.7 m below ground surface (BGS) at an elevation of 105.3 m AMSL.

One round of groundwater levels was collected from BH14-1, BH14-2 and BH14-5 on July 31, 2014 (Houle, 2014). Between April 2019 and November 2019, groundwater levels were monitored by Thomas Cavanagh Construction Ltd. (Cavanagh) a minimum of monthly at BH14-1, BH14-2 and BH14-5. The 2019 water level results were provided to Stantec for review. A summary of the data is presented in Table 1. The groundwater elevations for April 24, 2019 are presented on the attached Figure 2.

² Ontario Geological Survey 2010. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous Release--Data 128-REV

³ Houle Chevrier Engineering Ltd., 2014. Resource Investigation OIAA Lands, 2014. Project 14-195. Draft.

⁴ Ontario Geological Survey. 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release---Data 126-Revision 1. ISBN 978-1- 4435-5704-7 (CD) ISBN 978-1-4435-5705-4.

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Table 1: Groundwater Elevations

Date of Reading	BH14-1		BH14-2		BH14-5	
	Depth	Elevation	Depth	Elevation	Depth	Elevation
(MM/DD/YY)	(m BGS)	(m AMSL)	(m BGS)	(m AMSL)	(m BGS)	(m AMSL)
7/31/2014	4.75	108.60	5.57	107.51	7.63	109.18
4/24/2019	4.09	109.27	5.43	107.65	7.73	109.08
5/30/2019	4.14	109.21	5.60	107.48	7.80	109.01
6/6/2019	4.15	109.20	5.61	107.47	7.81	109.00
6/26/2019	4.29	109.06	5.39	107.69	7.91	108.90
7/29/2019	4.51	108.84	5.60	107.49	8.11	108.70
8/09/2019	4.59	108.76	5.73	107.36	8.18	108.63
8/29/2019	4.73	108.62	5.92	107.17	8.33	108.48
10/09/2019	4.78	108.57	5.94	107.15	8.40	108.41
23/09/2019	4.87	108.48	5.99	107.09	8.50	108.31
08/10/2019	4.96	108.39	6.24	106.85	8.62	108.19
24/10/2019	5.03	108.32	6.29	106.79	8.73	108.08
6/11/2019	5.03	108.32	6.39	106.69	8.81	108.00
Maximum	5.03	109.27	6.39	107.69	8.81	109.18
Minimum	4.09	108.32	5.39	106.69	7.63	108.00

HYDROGEOLOGICAL CONCEPTUAL UNDERSTANDING

The groundwater levels appear to follow a seasonal trend, being higher after spring melt and declining over the summer months. This is typical for shallow groundwater systems. Based on the available data, the groundwater elevation at the Site peaked in April 2019 at 109.3 m AMSL. Based on the 2014 and 2019 data, the shallow groundwater is located within the lower portion of the sand unit.

Surface water and/or groundwater data is not available for the wetland located to the immediate west of the Site; however, based on available ground surface elevation of 108 m AMSL, similar water levels are anticipated to be present within the wetland. The wetland and the shallow groundwater are likely hydraulically connected

Regional mapping indicates surface water within Mosquito Creek flows to the west discharging to the Rideau River, located 7 m west of the Site with a surface water elevation of about 75 m AMSL. Regional mapping was not available for shallow groundwater conditions; however, shallow groundwater may mimic surface water flow and also flow to the west.

Based on ARA standards, the maximum depth of aggregate excavation is 1.5 m above the peak groundwater level. Available data indicates that excavation could extend to 110.8 m AMSL. The maximum

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proposed excavation elevation is presented on Figure 2. The majority of the sand and gravel material is positioned above 110.8 m AMSL. The maximum depth of excavation ranges from about 2 m to 6 m BGS based on topography. This maximum excavation to 110.8 m AMSL is not only above the Site groundwater level but also remains above the ground surface of the adjacent wetland to the west and is therefore not expected to directly impact wetland conditions.

The aerial extent of excavation will be limited by the required set-back near Site boundaries and wetland and set-back and slope requirements for the transmission towers. Preliminary set-backs as provided by Harington McAvan are shown on Figure 1.

CONCLUSIONS

Based on our assessment, the maximum proposed excavation elevation at the Site is 110.8 m AMSL to maintain a 1.5 m buffer above the historical peak groundwater level. Based on topography, this elevation corresponds to depths ranging between 2 m to 6 m BGS across the Site. It is recommended that groundwater monitoring continue through spring 2020 to confirm peak conditions.

LIMITATIONS

This document entitled, "Level 1 Hydrogeological Review, Ottawa Airport Lands – Parcel C, Ottawa, Ontario Level 1 Hydrogeological Review, Ottawa Airport Lands – Parcel C, Ottawa, Ontario" was prepared by Stantec Consulting Ltd. ("Stantec") for the account of Thomas Cavanagh Construction Ltd. (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

We trust that this meets your current requirements. Should you have any questions, please do not hesitate to contact the undersigned.

Regards,

Stantec Consulting Limited



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Attachment A: Figure 1 Site Plan
Figure 2 Cross-Section A-A'



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Design with community in mind

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ATTACHMENT A:
Figure 1 – Site Plan
Figure 2 – Cross-Section A-A'

