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Your ref: New Operations Depot
Our ref: 12644641

03 November 2025

Obaed Fizeeli, P.Eng.
Municipality of Clarington
Planning and Infrastructure Services
40 Temperance Street
Bowmanville, Ontario L1C 3A6

Estimated Zone of Influence due to Groundwater Dewatering during Proposed Construction Activities at 2656 Concession Road 4, Bowmanville, Ontario

Dear Mr. Fizeeli:

The following letter has been prepared by GHD Limited (GHD), calculating the estimated zone of influence (or “radius of influence”) due to groundwater dewatering during proposed construction activities, at the above noted municipal address (the Site). This letter does not address the potential of groundwater impacts due to the future operational activities at the Site. The Site is illustrated on **Figure 1**. GHD was provided with a sketch showing the proposed excavation areas and the proposed excavation depths. There are multiple excavation areas with expected excavation depths ranging from 0.5 to 3 metres (m). A depiction of the excavation areas is provided on **Figure 2**.

The conceptual hydrogeological model of the Site is generally characterized by a layer of topsoil, underlain by fill (i.e. re-worked native material) followed by a glacial till deposit with shallow seasonal groundwater with a permanent water table beginning around 3 metres below ground surface (mbgs). The shallow groundwater flow direction was toward the south. Dewatering, if required, would be expected to be conducted of groundwater perched within the fill (sitting upon the native till soils) or potentially some sand seams within the shallow till itself as the excavations generally would remain above the groundwater table in most instances. Groundwater from sandy seams within

the shallow till would be minimal. Groundwater perched upon the till is expected to be seasonal, would be greatest in the spring and expected to be minimal during the drier months.

To understand the local water well and groundwater resources, GHD conducted a cursory assessment of the local water well records that are in closest proximity of the Site. The water well records were reviewed from the Ministry of the Environment, Conservation and Parks well records database. A total of thirteen (13) well records were reviewed including nine (9) drilled wells and four (4) dug/bored wells. There appear to be shallow dug/bored wells to the west of the Site as three (3) were noted (the other dug/bored well was to the east of the Site). It is unconfirmed if there are dug wells to the south, and downgradient of the Site. Groundwater was noted to have been encountered at depths of 1.5 to 4.6 mbgs in these wells (average depth to groundwater was 3.6 mbgs). It appears that this area, particularly to the west may tap the shallow water table that supports local dug/bored wells. As indicated above, the permanent water table on the Site appeared to begin around 3 mbgs. Efforts to stay above the water table should be made; however, if encountered, dewatering should be kept to a minimum if possible. Shallow dug/bored wells to the west and east would be cross-gradient based upon shallow groundwater flow direction and not expected to be affected by Site construction dewatering activities.

The drilled wells encountered groundwater at an average depth of 81.6 mbgs. These wells would not be impacted by shallow dewatering as the water bearing formation of the drilled wells will be far below the anticipated excavation depths and should also be avoided as the water bearing formation tapped into by the drilled wells of this area encountered flowing artesian conditions within several of the wells. The well record from south of the Site indicates that the drilled well is 58 m (190 feet) deep.

GHD has also calculated the radius of influence (R_o) that would be anticipated from potential construction dewatering. The calculation of R_o was estimated using an empirical relationship developed by Sichardt and Kryieleis that gives R_o as a function of drawdown and hydraulic conductivity (Powers et al., 2007). The empirical relationship is as follows:

$R_o = 3000(H - h)\sqrt{K}$ (For unconfined source)

The hydraulic conductivity or “K” that was used was a worst-case value of 1.4 x 10^{-6} m/s based upon single well response testing completed at monitoring well MW25-01 and documented within our report[1]. The hydraulic conductivity is relatively low as the well is screened predominantly within the glacial till deposit.

The following table provides the R_o for the various excavation depths, assuming that groundwater is dewatered from ground surface to the full depth of the excavation:

[1] GHD Limited. Supplemental Hydrogeological Investigation. Proposed Operations Depot. 2656 Concession Road 4, Bowmanville, Ontario. Dated May 28, 2025.

Table 1 Expected Radius of Influence for Various Dewatering Depths

Excavation/Dewatering Depth (m)	Radius of Influence (m)
0.5	1.8
1	3.5
2	7.1
3	10.6

Thus, from the edge of future excavations, the zone of influence is expected to range from about 2 m to nearly 11 m depending upon the excavation/dewatering depth and based upon a limited data set of single well response testing. **Figure 3** is provided and depicts an 11 m zone of influence from the edge of the outermost excavation. The zone of influence is illustrated in blue. In most cases, the outermost excavation is not 3 m (i.e. not resulting in a 10.6 m zone of influence). However, to provide a most conservative approach, it is assumed that 11 m will be applied. As shown on **Figure 3**, the 11 m zone of influence does not extend very far based upon the relatively large size of the Site. The zone of influence typically does not extend beyond the adjacent roadways and does not appear to extend on to residential properties.

Lastly, GHD considered the distance of the nearest homes to the future excavation areas at the Site. These distances are estimated as follows:

– Nearest home to the North – approximately 440 m
– Nearest home to the East – approximately 190 m
– Nearest home to the South – approximately 60 m
– Nearest home to the West – approximately 165 m

Based upon the expected radius/zone of influence calculations and the distances of the homes from the proposed excavation and dewatering areas, no impact to the local water wells is anticipated. The depths of the drilled wells are far below the proposed dewatering depths and these wells will not be impacted. Shallow wells to the west and east are cross-gradient based upon the groundwater flow direction at the Site and not expected to be affected by Site construction dewatering activities. The well record to the south of the Site would be downgradient of the Site activities; however, is indicated to be 58 m (190 feet) deep and at this depth is far below where the potential dewatering may occur. No impacts are expected. Based upon the groundwater flow direction, water wells to the north are upgradient and also not anticipated to be impacted by any site dewatering.

Downgradient and neighbouring wells are not expected to be impacted from construction activities as construction activities are expected to be relatively shallow and should generally remain above the permanent water table. When dewatering is required, re-infiltration of pumped groundwater should be directed through a filter system (e.g. filter sock or bag, settling tank etc.) before re-introducing to the environment. No

adverse impact from the construction activities is anticipated from pumping groundwater to the environment provided it is appropriately treated.

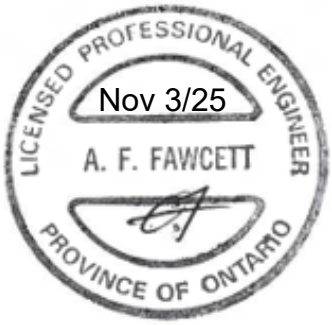
Construction activities that require re-fuelling should be completed in a staging area that prevents the release of spills and leaks into the environment by containing them. Spill response kits should be kept and maintained at the Site in the area of re-fuelling and in close proximity of working equipment that contains hydraulic fluid or fuel to ensure groundwater is not impacted. Washing of construction vehicles should also be completed in an area where wash water can be contained, if possible and conducted in locations that are a minimum of 30 m or greater from adjacent supply wells.

No quantity or quality impacts are anticipated during the construction dewatering; however, it is important to conduct the construction work in a timely manner (i.e. short duration), if possible and during drier periods if possible.

We trust that this letter meets with your immediate requirements. Should you have any additional questions, please contact our office.

Sincerely,

GHD



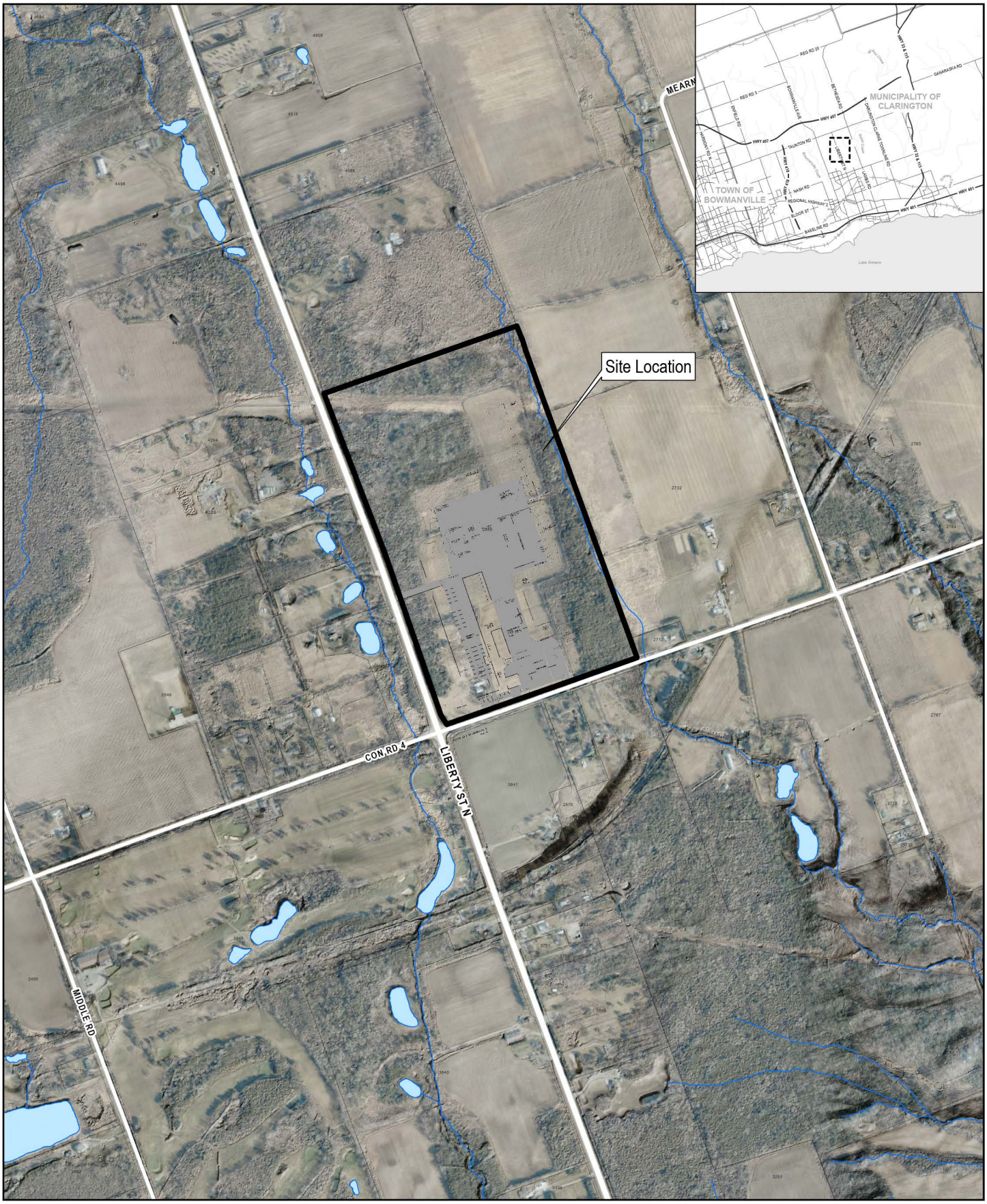
Robert Neck, P.Geo.(Limited)

Senior Geoscientist

Andy Fawcett, P.Eng.

Senior Engineer

Figures



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0 100 200 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

N

GHD

Municipality of Clarington
Proposed Operations Depot, 2656 Concession Road 4, Bowmanville, Ontario
Municipality of Clarington

Hydrogeological Memo

Site Location Plan

Project No. 12644641
Revision No.
Date Oct 9, 2025

Figure 1

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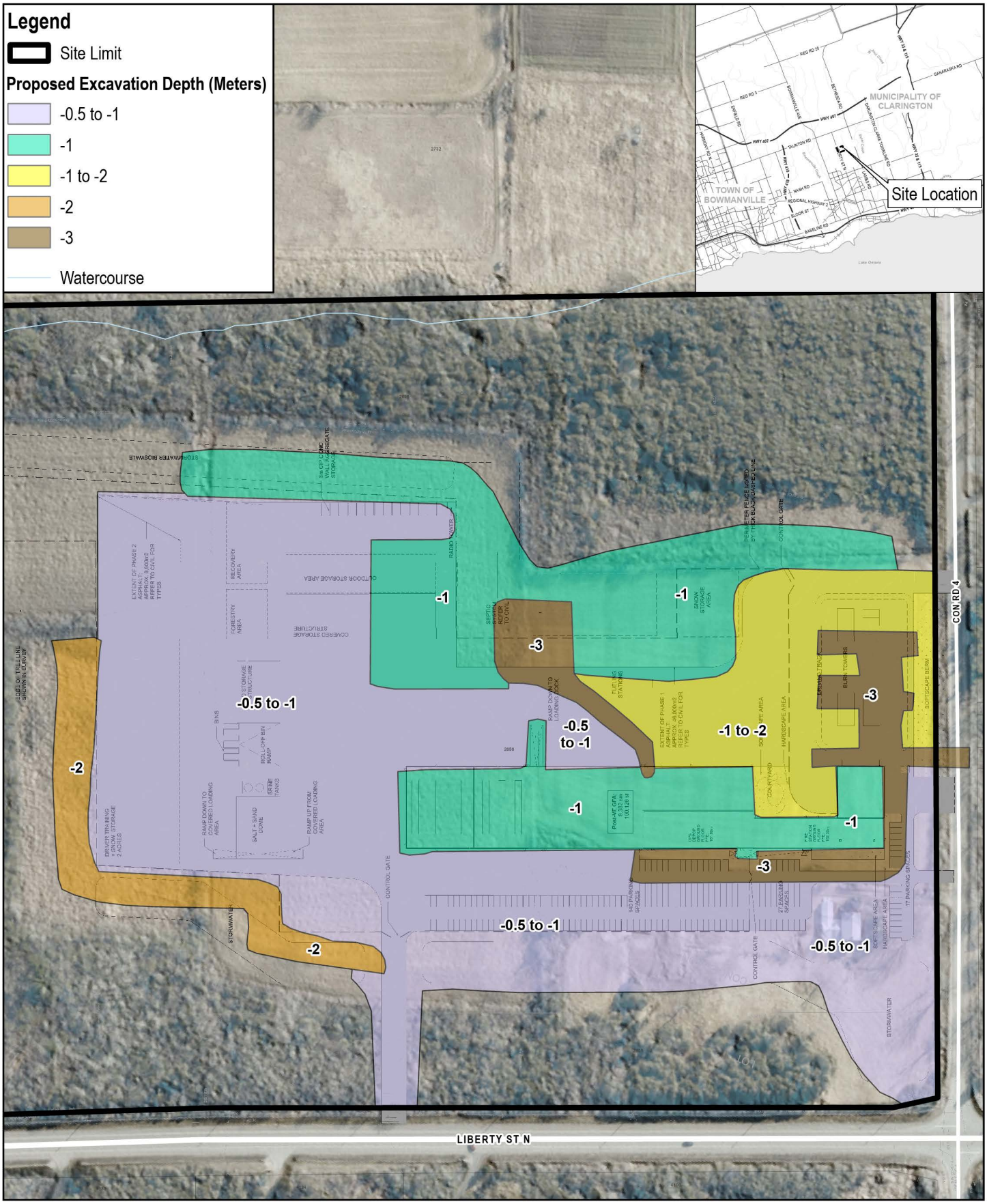

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Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Municipality of Clarington
Proposed Operations Depot, 2656 Concession Road 4, Bowmanville, Ontario
Municipality of Clarington

Hydrogeological Memo

Proposed Excavation Depths

Project No. 12644641
Revision No.
Date Nov 3, 2025

Figure 2

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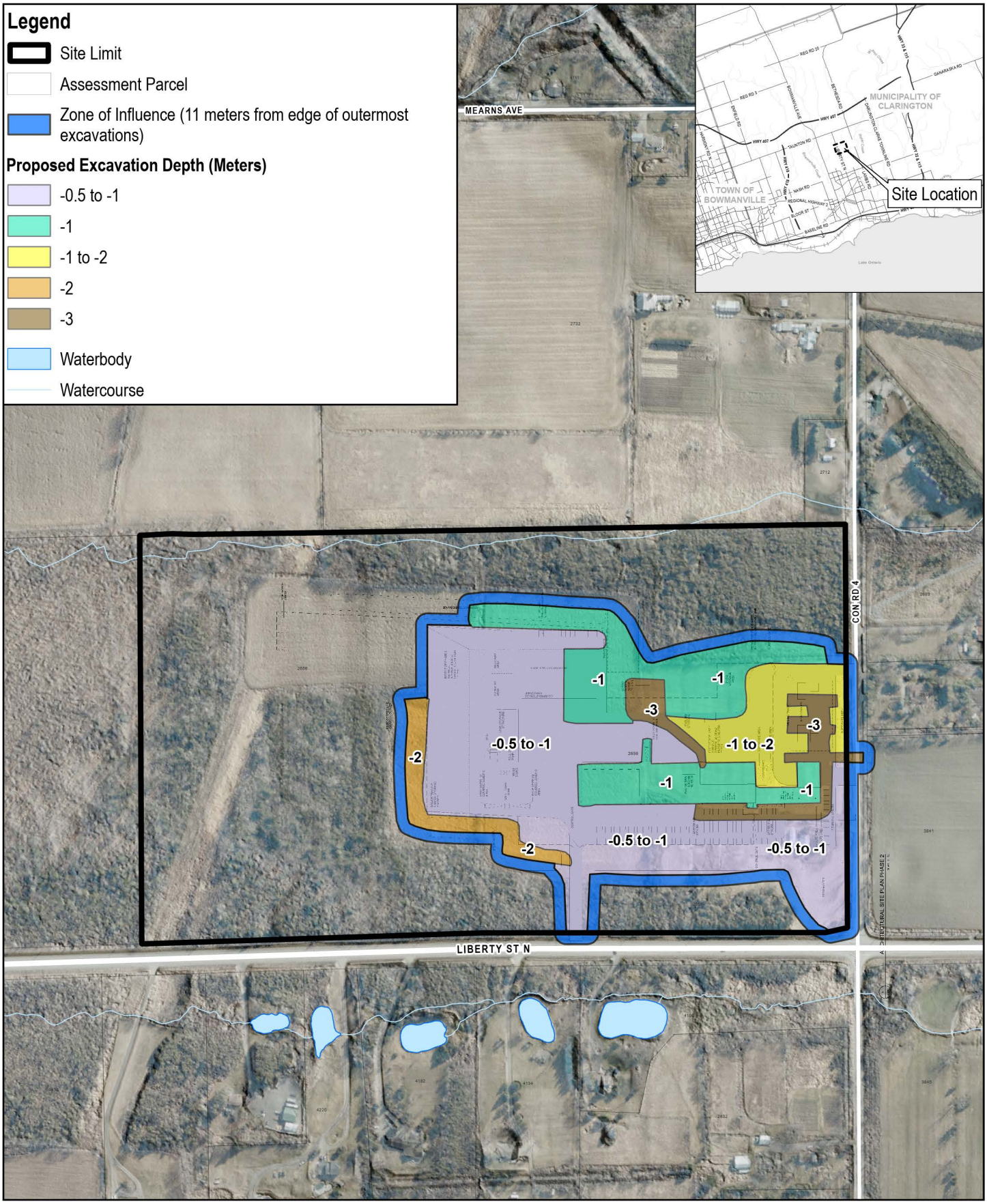

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Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

Municipality of Clarington
Proposed Operations Depot, 2656 Concession Road 4, Bowmanville, Ontario
Municipality of Clarington

Hydrogeological Memo

Zone of Influence

Project No. 12644641
Revision No.
Date Nov 3, 2025

Figure 3

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