



*Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing*

July 12, 2019

File No.1-19-0078-46
Brampton Office

North Town Developments
36 Gordon Mackay Road. Unit 4
North York, Ontario
M9N 2V6

Attention: Mr. Anthony Cirillo

RE: COVER LETTER FOR 0 SHORE ACRES DRIVE, INNISFILL, ONTARIO

Dear Mr. Anthony Cirillo:

Further to the request for covering letter, Terraprobe Inc. (Terraprobe) is pleased to provide the summary of the work program completed as part of Hydrogeological Study to address the Lake Simcoe Region Conservation Authority (LSRCA) comments dated March 27, 2018. Terraprobe's response to the LSRCA's comments is provided in attached "Comments & Response" matrix.

Terraprobe began subsurface investigation and groundwater monitoring at the Property which included drilling fourteen (14) boreholes and the installation of eight (8) monitoring wells in 2015. The information obtained from previous boreholes and monitoring wells was used to establish subsurface soil and ground water conditions at the Site. Four (4) additional boreholes were drilled adjacent to the existing woodlands along the eastern and western portion of the Property in 2019 to install nested wells (one set of 2 nested wells by each woodland). To further support the design of Low Impact Development (LID) facilities, seven (7) additional boreholes with monitoring wells were installed on the proposed LID locations and storm water management pond in 2019 to establish the seasonal high water levels. Ground water levels in the newly installed wells are being monitored and elevations were surveyed to a local benchmark. The ground water monitoring program commenced in March 2019 and will continue for

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duration of approximately six (6) months. Data loggers were installed in eight (8) monitoring wells and programmed to record water levels on an hourly basis. Manual water levels and data logger recordings are obtained on every monthly monitoring event. A Staff Gauge was installed in the creek along the western portion of the Property to monitor the water level in the creek. A data logger was installed with the Staff Gauge and programmed to record water levels on an hourly basis.

Water balance calculation for the entire Site and assessment of infiltration rates for existing (pre-development) and post development conditions was conducted. A feature based water balance was prepared for the catchment area east and west associated with existing features at the Site. The feature based water balance was prepared to determine the infiltration deficit in the catchment area east and west as a result of the proposed development at the Site. Appropriate recommendations for mitigation measures are provided accordingly to support the existing features.

In-situ percolation testing at seven (7) locations across the Property was conducted to establish local infiltration rates at the Site for LID measures. In-situ hydraulic conductivity tests (rising head tests) were conducted in nine (9) monitoring wells to assess hydraulic conductivity of the soils at the Property. Ground water samples were obtained from the monitoring wells, and were submitted for laboratory analysis of general chemistry and biological parameters to establish the baseline groundwater quality at the Site. The groundwater flow direction was established based on groundwater elevation data.

We trust this information is sufficient for your present purposes. Should you have any questions concerning the above, please do not hesitate to contact the undersigned.

Yours truly,
Terraprobe Inc.



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Project Manager



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Senior Project Manager



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Comment No.	Comment to Address	Terraprobe Response
Lake Simcoe Region & Conservation Authority (LSRCA) Comments		
1	The Table with the summary of the groundwater elevations indicates that ground water levels were only captured once (March 30, 2015), more detailed monitoring is required to establish the seasonal high (spring) water levels. This will aid in design of any necessary LID facility.	Terraprobe conducted monthly monitoring starting from March 2019 to assess seasonal fluctuations. Additional monitoring wells were installed within wet lands. Groundwater monitoring results (March 2019 to June 2019) are provided in the report.
2	Please supply a feature based water balance (water balance on a sub-catchment scale) and indicate how the wetlands to the east and to the north will be maintained.	Terraprobe conducted feature based water balance for the site and the results are provided in the Hydrogeological Study report.
3	In-Situ percolation testing is required to establish the local infiltration factors for the property. This will aid in the design of any required infiltration facilities.	Terraprobe conducted insitu percolation tests (i.e. Guelph Permeameter Tests) at selected locations and depths w.r.t. the proposed infiltration facilities. Results are provided in the Hydrogeological report.
4	Please provide maps showing the direction of surface water flow and groundwater flow. There is a topographic drainage divide on the property. Please ensure that the water balance is calculated reflecting the appropriate sub-catchment areas.	The water balance calculation was based on sub-catchment areas. The groundwater flow contour map is provided in the report.
5	It is noted that the nitrates load increases to the west and is above ODWS in MW13 in the northeast corner of the property, to establish whether or not this is due to agricultural practices testing should be ongoing for a period after agricultural practices have ceased. Since the development will be utilizing private onsite sewer system it is important to know the background levels of nitrate loading.	Terraprobe conducted groundwater quality analysis. The groundwater quality results are provided in the Hydrogeological report. The nitrate loading calculation was provided in a separate report titled "Preliminary Nitrate Loading Calculations, 0 Shore Acres Drive, Innisfil, Ontario" Dated May 15, 2019.
6	With the use of private septic systems there will be nitrate leaching, please recognize that the wetland may not be used as a nitrate attenuation facility.	Addressed in the report titled "Preliminary Nitrate Loading Calculations, 0 Shore Acres Drive, Innisfil, Ontario" Dated May 15, 2019.
7	In Section 1.1 the property is described as being serviced by municipal water. In section 3.1 the property is described as being serviced by individual water supply wells. Please establish which of these is correct	Addressed in the Hydrogeological report. The property will be serviced by Municipal water.
8	Mitigation features: grading, directing roof leaders to overland flow, bio-retention swales, permeable pavers, please explain how these will be utilized and how the wetlands to the north and east will be maintained	Addressed in Section 4 of the Hydrogeological report.
9	Water Table Elevation section states: "the base of all drainage ditches and "dry" storm water management ponds should be maintained at least 500 mm above the water table". Please note that a 1 m separation is required between the seasonal (spring) high groundwater level and the invert of any storm water management or LID facility.	Addressed in Section 4.6 of the Hydrogeological Report.

Comment No.	Comment to Address	Terraprobe Response
10	<p>Please provide climate data from a reputable source such as Environment Canada within close proximity to the proposed development or from the LSRCA website.</p> <ul style="list-style-type: none"> ● Water balance should be on a sub-catchment basis, there is a drainage divide on the property plus lands that will remain undeveloped. ● Show calculations for ET, ● Infiltration factors did not take into account vegetation ● Please ensure that all pervious (lawns, landscaped areas, e.g.) and impervious (roofs, driveways, road and pathways, e.g.) areas are accounted for in the water balance ● An infiltration factor of 0.5 has been applied. This suggests that 50% of the precipitation is infiltrated and 50% will be runoff. Please explain why the 2 values are different in the pre-development scenario. ● The landscaped including interlocking area covered is not accounted for in the water balance. ● Annual water balance after building additions: typically 10% evaporation is factored into the water balance from impervious areas. This will reduce the amount of runoff and also reduce the quantity of precipitation available for infiltration. Please include evaporation factor in the water balance. ● Taking the above comments into consideration please update the water balance 	<p>The water balance is updated and the Hydrogeology report is revised to address this.</p>
11	<p>Please ensure that post-development runoff to wetlands matches the pre-development runoff to the wetlands.</p>	<p>Addressed in Section 3.5 of the Hydrogeological Report.</p>
12	<p>Please ensure that post-development infiltration to wetlands matches the pre-development runoff to the wetlands.</p>	<p>Addressed in Section 3.5 of the Hydrogeological Report.</p>
13	<p>Please provide drawings and sections of all LID facilities with dimensions, materials and groundwater levels indicated on the drawings.</p>	<p>This will be addressed in Functional Servicing report as it is beyond Terraprobe's scope of services.</p>
14	<p>Show all calculations demonstrating infiltration facility footprint is adequate to allow infiltration within 24-48 hours</p>	<p>This will be addressed in Functional Servicing report as it is beyond Terraprobe's scope of services.</p>
15	<p>Please provide calculations demonstrating the volume of the infiltration facility will meet the annual water balance deficit.</p>	<p>This will be addressed in Functional Servicing report as it is beyond Terraprobe's scope of services.</p>