



LSRCA THIRD SUBMISSION HYDROGEOLOGY REVIEW

1291 Shore Acres Dr – Innisfil (APID310354)

December 09, 2020

#	Report/ Drawing	Section	Pg#	LSRCA COMMENT (January 2018)	LSRCA COMMENT (19 November 2019)	LSRCA COMMENT (9 December 2020)	APPLICANT RESPONSE (DATE)	
				<p><b>Documents Reviewed:</b>  Hydrogeological Study, 0 Shore Acre Drive, Innisfil, Ontario; Terraprobe; July 12, 2019  Stormwater Management and Functional Servicing Report; a.m.canadaras; Revised September 14, 2019  Reasonable Use Policy Assessment; Azimuth; June 2019</p> <p><b>Documents Previously Reviewed:</b>  Hydrogeological Study, Gilford Subdivision, Shore Acres Drive, Innisfil, Ontario; Terraprobe, April 2017  Geotechnical Investigation Proposed residential (Gilford) Subdivision Shore Acres Drive, Innisfil, Ontario; Terraprobe, April 2015</p>	<p><b>Hydrogeological Study, 0 Shore Acre Drive, Innisfil, Ontario; Terraprobe; May 27, 2020</b>  <b>Stormwater Management and Functional Servicing Report; a.m.canadaras; Revised May 28, 2020</b>  <b>Mounding Analysis; Azimuth; May 2020</b>  <b>Stormwater Management and Functional Servicing Report; a.m.canadara; revised November 13, 2020.</b></p>			
<p><b>Background:</b>  25 lot residential subdivision, municipal water, individual septic systems and tile fields for each lot. Property is within an SGRA and as such LSPP 4.8 and 6.40 apply.  Current application is Subdivision/Condo, functional.  Revised density is 35 lots with individual septic and tile fields for each lot.</p>								
					<b>Please ensure all reports are signed and sealed by either a P.Geo or P.Eng as appropriate.</b>	Not addressed		
H1				The Table with the summary of 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 facilities.	<b>From Appendix G</b> From the bore hole logs it appears that infiltration is functionally feasible in the region of the following bore holes: BH-7, BH-8, BH-9, BH-13, BH-14, BH4-19, BH6-19, BH7-19, BH8-19, BH9-19.	N/A		
H2		3.5.1.1 and Appendix F		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.	<b>Partially addressed:</b> <b>Appendix F—Water Balance Tables labelled Appendix G</b> Please provide a figure illustrating the location of the west and east catchment areas. The west catchment in the FSR (Figure 3) indicates the entire catchment is “Open Space”. Ensure the catchment areas used in the FSR and the hydrogeological report correspond to each other.  Provide detailed climate information including the climate station the data is sourced from.  The land is described as flat use the MECP infiltration factor for flat land rather than for rolling to hilly and update the water balance as appropriate. The 3 water balance tables in Appendix G require updating.	Not addressed:  Please provided the reference climate information include the climate station from which the climate data is obtained.  MECP infiltration factor for flat land is 0.3 not 0.15 as provided, please update and correct the water balance assessment as necessary.		



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					<p>From the data provided the infiltration deficit for the entire site will be 4310 m<sup>3</sup>. This volume does not match the infiltration deficits provided for the west and east catchment areas of 414 m<sup>3</sup> and 2536 m<sup>3</sup> respectively. Please check and correct.</p> <p>Split the pre-development water balance assessment into east and west catchments, provide a drawing showing the property boundary. Ensure that the area of each catchment is consistent with the area in the post-development scenario.</p> <p>Demonstrate how infiltration occurs in the SWM block; provide pervious area in the SWM block, it is unclear how an infiltration volume of 1,186 m<sup>3</sup> is calculated for this area.</p> <p>Update the water balance tables as necessary.</p>	<p>Pre development infiltration is 30582 m<sup>3</sup> Post-development infiltration is 26505 m<sup>3</sup> Deficit is 4077 m<sup>3</sup></p> <p>Outlet 1 shows an infiltration deficit of <b>13,028 m<sup>3</sup></b> Outlet 2 shows a infiltration deficit of <b>2746 m<sup>3</sup></b> Outlet 3 shows infiltration of <b>11684 m<sup>3</sup></b>, <b>however with the removal of the previously proposed infiltration gallery this may no longer be correct, please update the catchment-based water balance</b></p> <p>Please demonstrate that there will be no negative impact to the woodland area and wetland supported by outlet 1 caused by the reduction of catchment size and the redirection of runoff to outlet 3.</p> <p>Demonstrate that there will be no negative impact to outlet 2 caused by the reduction in catchment size and the change in flow direction of the runoff.</p> <p>From the SWM Report, <i>revised</i> November 2020. The proposed infiltration gallery has been removed; therefore outlet 3 may not infiltrate the volume mentioned above. Soakaway pits have been proposed for each lot, please demonstrate that there is a minimum 1 m separation between the proposed individual infiltration trenches/soakaway pits and the seasonal high groundwater elevation for any infiltration credit to be provided. See comment H8.</p> <p>An updated water balance assessment is required for the site.</p>	
H3				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.	Addressed: Infiltration rates are between 50 and 150 mm/hr. Infiltration is functionally feasible for this development.	N/A	
H4				Please provide maps showing the direction of surface water flow and groundwater	Addressed	N/A	



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				flow. There is a topographic drainage divide on the property. Please ensure that the water balance is calculated reflecting the appropriate sub-catchment areas.			
H5		Azimuth RUP		<p>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 systems it is important to know the background levels of nitrate loading.</p>	<p>Nitrate levels range up to 16 mg/L (15 April 2019) have been recorded. It has been assumed that these nitrate levels are anthropogenic and due to agricultural practices. Demonstrate through continued testing this is the case. Water quality testing is to continue after agricultural practices have ceased such that a downward trend can be established over at least an annual cycle, longer if necessary. Water quality for privately serviced lots is required to meet ODWQS at property boundary. Should the predevelopment nitrate loads not be seen to diminish over time after cessation of agricultural practices it is recommended that the density of the development be revisited.</p> <p>It appears from the calculations provided that the impervious area has not been accounted for within each lot.</p> <p>Using the post development infiltration volume provided in Terraprobe (July 12, 2019) of 15,545 m<sup>3</sup> for the post development scenario and the following equation:</p> $\text{Projected Nitrate Level (post development)} = \frac{\text{sewage nitrate}}{(\text{on-site dilution} + \text{effluent})}$ $\frac{40 \frac{\text{mg}}{\text{L}} * 35,000 \text{ L/day}}{42589 + 35000 \text{ l/day}}$ <p>= 18.04 mg/L/day</p> <p>This exceeds the ODWQS of 10 mg/L/day.</p> <p>Utilizing a Tertiary Septic system which decreases the nitrate loading by 50% the resulting nitrate loading is:</p> $\frac{20 \frac{\text{mg}}{\text{L}} * 35,000 \text{ L/day}}{42589 + 35000 \text{ l/day}}$ <p>9.02 mg/L/day Which is below the ODWQS of 10 mg/L/day.</p>	<p>Not addressed</p> <p>When considering dilution of the nitrate load please remove all road areas from the equation.</p> <p>Catchment areas 505 and 503 should also not be included in the nitrate loading equation since they are undeveloped.</p> <p>In addition, should the class IV septic systems be located in the front yards of the houses to the south of the cul-de-sac please remove the area of the lot that drains to catchment 502.</p> <p>Please provide a drawing demonstrating the proposed location of the septic systems throughout the proposed development.</p>	



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					<p><b>NOTE:</b> The above calculations are based on the net developable area of the subdivision; it includes permeable areas outside of the proposed 35 lots. It is likely that the nitrate loading is will be higher than proposed in the calculations above. Greater detail with regard to the pervious and impervious areas on each lot is required.</p> <p>Any Tertiary systems to be utilized are to be approved for use by the OBC.</p> <p><b>NOTE: The area of the lots was calculated to be 68320 m<sup>2</sup> based on the minimum sized lot of 1952 m<sup>2</sup> and also an impervious area of 51%. These numbers will be revised as more detail is provided.</b></p>		
H6				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.	Not addressed	Acknowledged	
H7				In section 1.1 the property is described as being serviced by municipal water. In section 3.1 the property is described as being served by individual water supply wells. Please establish which of these is correct.	Addressed	N/A	
H8				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.	<p>Addressed:</p> <p>A rooftop disconnect is proposed and should provide adequate mitigation.</p> <p>Rear yard LID facilities must be discontinuous between properties or are to be on public land outside of each lot.</p>	<p>Drawing C-1: Demonstrate through the provision of cross-sections that include the seasonal high groundwater level that the proposed rear yard infiltration trenches on each lot have a minimum 1 m of clearance between the invert of the facility and the seasonal high groundwater level. Without this separation infiltration credit cannot be provided.</p> <p>Demonstrate that there is a minimum of 1 m separation between the proposed interceptor swale and the seasonal high groundwater elevation. This is required for infiltration credit to be provided. The proposed interceptor swale should either be situated outside of the private lots or are to be discontinuous between lots and registered on tile and subject to maintenance agreements.</p>	



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H9				<p>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.</p>	<p>Not addressed: The Town of Innisfil requires a 0.50 m separation between the invert of the lowest floor slab and the seasonal high groundwater table. Demonstrate that this can be achieved; include geological cross-sections including current and proposed grading, building profile, and seasonal high groundwater level.</p> <p>A 1 m separation is required between the invert of any LID facility and the seasonal high groundwater level. If this separation is not able to be met an impermeable liner is to be utilized and the LID facilities are to be filtration facilities rather than infiltration facilities.</p>	<p>Not addressed: Please indicate where this is addressed.</p>	
H10				<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"> <li>• Water balance should be on a sub-catchment basis, there is a drainage divide on the property plus lands that will remain undeveloped.</li> <li>• Show calculations for ET,</li> <li>• Infiltration factors did not take into account vegetation</li> <li>• Please ensure that all pervious (lawns, landscaped areas, e.g.) and impervious (roofs, driveways roads and pathways, e.g.) areas are accounted for in the water balance</li> <li>• 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.</li> <li>• The landscaped including interlocked area covered is not accounted for in the water balance.</li> <li>• Annual water balance after building additions: typically 10% evaporation is factored into the water balance</li> </ul>	<p><b>Partially addressed:</b> Water Balance tables are insufficiently detailed, See comment 2 above.</p> <p>Also: ensure that the roadways and other public impervious areas are accounted for separately from pervious areas on each individual lot and ensure that pervious areas are accounted for separately from the pervious areas of each individual lot. This will allow for more accurate nitrate loads to be calculated.</p> <p>The volumes of infiltration deficit in the post-development scenario provided in the FSR and the hydrogeological report do not match, please correct and update the water balance in the hydrogeological report and section 3.5 in the FSR.</p>	<p>Partially addressed: An infiltration factor of 0.65 has been applied however the MECP factor for flat land has not been applied, please address, and update the water balance assessments. <b>Note:</b> If the land is flat the MECP infiltration factor for flat land is 3. Which will significantly increase the infiltration volume.</p> <p>Demonstrate that the wetland will not be negatively impacted by the decrease of inputs through outlet 1.</p> <p>Demonstrate that the base flow to the creek in the catchment area for outlet 2 is maintained and that the inputs to the creek will not be negatively impacted.</p>	



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				<p>from impervious areas. This will reduce the amount of runoff and also reduce the quantity of precipitation available for infiltration. Please include the evaporation factor in the water balance</p> <p>Taking the above comments into consideration please update the water balance.</p>			
						<b>New Comments</b>	
		SWM report Section 3.5:				An updated hydro-geological assessment with appropriate water balance assessments is required since the previously proposed infiltration gallery has been removed. It is uncertain that there will be infiltration surplus.	
	G1					The interceptor swale with subdrain is to be located outside each lot, or are to be discontinuous between lots, registered on title and subject to maintenance agreements if situated on private property.	

**Submission/Resubmission Requirements:**

1. A completed response matrix which includes a detailed response outlining how each of the comments above have been addressed with reference to applicable reports/drawings (i.e. specific sections/pages/details or tab identifiers).
2. The response matrix is to also include a summary of any additional changes to the design (i.e. in addition to those not identified in the detailed response to comments, and includes changes to reports, drawings, details, facility design, etc.).
3. All drawings are to be folded (8.5 x 11).
4. Reports and engineering drawings/details are to be signed and sealed by a Professional Geoscientist or Professional Engineer as appropriate.
5. Reports are to include a digital copy of applicable models on a Data CD or USB Thumb Drive.
6. All submissions/reports are to include applicable technical components which achieve the minimum requirements outlined in the LSRCA Technical Guidelines for Stormwater Management Submissions, September 2016.

**Important Notes and References:**

1. Please contact the LSRCA to scope any required Environmental Impact Study or Natural Heritage Evaluation
2. The stormwater management submission is required to be prepared in accordance with “LSRCA Technical Guidelines for SWM Submissions”  
[https://www.lsrca.on.ca/Shared%20Documents/permits/swm\\_guidelines.pdf](https://www.lsrca.on.ca/Shared%20Documents/permits/swm_guidelines.pdf)
3. Submissions are to be in accordance with the LSRCA Watershed Development Guidelines  
<https://www.lsrca.on.ca/Shared%20Documents/permits/watershed-development-guidelines.pdf?pdf=Watershed-Development-Guidelines>
4. The hydrogeological analysis is required to be prepared in accordance with “Hydrogeological Assessment Submissions: Conservation Authority Guidelines for Development Applications”  
[https://www.lsrca.on.ca/Shared%20Documents/permits/hydrogeological%20\\_guidelines.pdf?pdf=Hydrogeological-Guidelines](https://www.lsrca.on.ca/Shared%20Documents/permits/hydrogeological%20_guidelines.pdf?pdf=Hydrogeological-Guidelines)
5. Where the LSPOP applies, submissions are to be in accordance with the LSPOP found here:  
<https://www.lsrca.on.ca/watershed-health/phosphorus>
6. Low Impact Development Treatment Train Tool can be found here:  
<https://www.lsrca.on.ca/Pages/LIDTTTool.aspx>
7. [LSPP Water Balance Offsetting Policy: applies to all new applications under the planning act received after 1 January 2019, details can be found here:](#)



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8.				<a href="https://www.lsrca.on.ca/Shared%20Documents/lspw-water-budget-policy.pdf">https://www.lsrca.on.ca/Shared%20Documents/lspw-water-budget-policy.pdf</a> LSRCA Review Fees can be found here: <a href="https://www.lsrca.on.ca/permits/permit-fees">https://www.lsrca.on.ca/permits/permit-fees</a>			