

August 17, 2015

Ms. Lisa-Beth Bulford

Lake Simcoe Region Conservation Authority
120 Bayview Parkway, Box 282
Newmarket, Ontario, L3Y 4X1

MGP File: 14 - 2260

Your File:

Dear Ms. Bulford:

**RE: Zoning By-law Amendment and Plan of Subdivision Applications
Highland Gate Developments Inc.
21 Golf Links Drive
Town of Aurora, Regional Municipality of York
IMS File No.: PSDC600C4, POFG156, PZOAS48**

Please accept this letter which has been prepared in consultation with members of the applicant's consulting team, in response to the above noted Lake Simcoe Region Conservation Authority (LSRCA) comment letter received by the Town of Aurora, dated April 10, 2015. This letter also reflects the meetings which were held with the staff of the LSRCA on June 1st, June 3rd, and June 16th. Additional discussions with the Conservation Authority were held as required. This letter is an addendum to the submission made on August 11, 2015.

For your convenience, the original comments have been provided in italics below.

Development Impacts on Natural Heritage and Hydrologic Features

There are four locations within this plan that propose alteration to a watercourse and interference with wetlands to facilitate development: 1) adjacent to High Density Block 224, 2) adjacent to the intersection of Street A and Timberlane Trail, 3) the watercourse crossing adjacent to the connection of Street F with Murray Drive, 4) removal of on-line ponds in Block 207.

High Density Block 224

- 1. Further explanation is required to support the proposed watercourse realignment and floodplain cut/fill analysis of Tannery Creek to accommodate the expansion of an area for residential development in Block 224. Details are required that identify the proposed development, the extent of the works, the impact to the natural heritage and hydrologic features in the area (qualitative and quantitative analysis) and the restoration proposed. Justification is required to demonstrate conformity with Section 3.1 of the Provincial Policy Statement and guidelines associated with the implementation of Ontario Regulation 179/06 of the Conservation Authorities Act. The need for a 2.7 metre retaining wall to accommodate this change must be specifically addressed in the justification provided.*

Please refer to the August 11, 2015 submission. The conceptual channel design will be submitted under separate cover.

2. *LSRCA Stewardship Staff have completed restoration work within this section of Tannery Creek in the past and we have documentation related to the channel re-naturalization and potential weir removal which can be used to tie into the existing conditions.*

Please refer to the August 11, 2015 submission.

Street A and Street F

3. *Street A and Street F are within lands subject to the ORMCP. As such, the EIS must demonstrate conformity with Section 41 (1), (4), (5) and (6) of the ORMCP related to infrastructure in proximity to key natural heritage features and hydrologically sensitive features. Demonstration of how Section 41 (5 a-e) has been addressed must be provided for these two roads. In particular, provide justification for the need for Street A being a permanent through street and not a dead end with emergency only access to Timberline Trail.*

Please refer to the August 11, 2015 submission.

4. *It is recommended that the proposed Street F culvert should be connected to the existing Murray Drive culvert and should match into the existing watercourse. Encroachments are to be minimized. The report, figures and hydraulic model are to be updated accordingly. Figure 2.15 should also show details of the existing Murray Drive culvert.*

Details of the existing culvert have been added to Figure 2.15. Refer to Attachment SCS-6. Refer to Attachment SCS-7 for the updated HEC-RAS model.

5. *An incremental cut/fill analysis will be required for the proposed Street F crossing in order maintain floodplain storage. Please update the report and hydraulic modelling as required. This analysis will also be required for Street A, if grading is proposed in the floodplain just north of Timberline Trail.*

Please refer to the August 11, 2015 submission (Attachment SCS-2) for the cut/fill analysis. Please refer to Attachment SCS-7 for the updated HEC-RAS model.

On-line Pond Removal – Western Creek

6. *The EIS suggests that the three on-line ponds within Block 207 will be removed as part of this development proposal. The following matters should be addressed as part of any online pond removal proposal:*
 - a. *Downstream flows should not increase as a result of the removal of the on-line pond(s). Options to maintain the existing stage discharge should be explored.*

Refer to the August 11, 2015 submission. The conceptual channel design drawings will be submitted under separate cover.

b. Natural channel design methods should be used.

Please refer to the August 11, 2015 submission. The conceptual channel design will be submitted under a separate cover.

- 7. Until such time as it has been confirmed that the on-line ponds will be removed, setbacks to existing natural heritage features (i.e. wetlands etc.) should be shown on the draft plan and development limits should reflect these limitations.*

Please refer to the August 11, 2015 submission.

General

- 8. Proposed watercourse realignments must demonstrate that any upstream or downstream erosion and/or flooding are being addressed appropriately.*

Please refer to the August 11, 2015 submission. The conceptual channel design will be submitted under separate cover.

- 9. A Restoration and Compensation Plan will be required to quantify all unavoidable impacts to natural heritage features, such as wetlands, and watercourse realignments and enclosures. An impact assessment of all applicable Key Natural Heritage Features and the Hydrologically Sensitive Features should be provided. All removed KHNFs/HSFs and associated VPZ must be quantified and provided for in the form of compensation. Compensation should be determined in an overall sense detailing compensation loss, potential locations for enhancement and overall compensation type. Please note that the replacement rates for wetland habitat and their associated VPZ is 3:1.*

Please refer to the August 11, 2015 submission.

- 10. It is recommended that the mitigation/enhancement/compensation plan be provided under a separate cover demonstrating the qualitative and quantitative impacts against the proposed enhancements and restoration.*

Please refer to the August 11, 2015 submission.

- 11. As part of the required restoration strategy we recommend including:*

- a. Removal of instream engineered bed protection as per Section 9.4 of the EIS, where appropriate;*
- b. The installation of habitat enhancements such as rock/wood basking areas in the wetland;*
- c. The use of snags and wood debris in the woodlands; and*

- d. Development setbacks that can be used for corridor connectivity.*

Please refer to the August 11, 2015 submission.

Development Limits

- 12. The proposed development includes modification of natural heritage features and hydrologic features. Apart from the PPS, the natural heritage policies of the ORMCP take precedence on the western portion of the subject lands and the Official Plan of Aurora natural heritage policies take precedence on the eastern portion. To clearly illustrate the existing natural heritage and natural hazard restrictions present on the site, we request that mapping showing all existing natural heritage features and natural hazards with their associated setbacks be provided. Proposed modifications and the associated changes to development setbacks can then be identified separately for consideration.*

Please refer to the August 11, 2015 submission.

Natural Heritage

- 13. Confirmation of the presence of the following Key Natural Heritage Features (KNHF) and their appropriate vegetation protection areas as per the ORMCP and PPS must be completed and illustrated on the draft plan to confirm the development limits of this site.*

- a. Significant valleylands*

We recommend that a figure is provided identifying the areas that qualify as per the definitions under the ORMCP and Natural Heritage Reference Manual (NHRM). Please note that Figure 4 in the Landform Conservation Assessment identifies the slopes greater than 15% within the study area that may meet the tests to qualify as significant valleyland.

Please refer to the August 11, 2015 submission.

- b. Significant wildlife habitat*

We recommend that a chart be provided identifying the potential for candidate or known significant wildlife habitat (SWH) that exists within the study area. This includes potential Eastern Wood-Pewee habitat and Breeding Amphibian Habitat (as result of the surveys undertaken in 2015). The identified Eastern Wood-Pewee is a Special Concern species, identification of whether SWH exists in the small off-site woodland near the northeast corner of this property as per the Natural Heritage Reference Manual is recommended. Please examine how the species will be impacted and mitigated for by the proposed development and BMPs. The results of the amphibian surveys should be provided as an addendum.

Please refer to the August 11, 2015 submission.

14. *For features within the jurisdiction of the ORMCP, the setbacks provided on the draft plan should be confirmed to address the following minimum vegetation protection zones provided in the Plan and technical guidelines:*

- a. *A minimum 30 metre setback from the meander belt for all Permanent and Intermittent Streams (Table on page 58 of ORMCP)*

Please refer to attachment BEACON-3 for the associated figures which reflects the meander belt width information.

- b. *A minimum 30 m setback from the stable top of the valley wall, as defined by the conservation authority, where Fish Habitat exists within well-defined valley features (ORMCP technical guidelines)*

Please refer to the August 11, 2015 submission.

15. *For the study area outside of the jurisdiction of the ORMCP, we recommend that the following information be considered in determining the appropriate setbacks from natural heritage and hydrologic features:*

- a. *Investigate and confirm the thermal regime of the watercourse in consultation with LSRCA staff*

Please refer to the August 11, 2015 submission.

- b. *If significant wildlife habitat exists as a result of the breeding amphibian surveys, the proposed minimum buffer of 15m wetland habitat should be reassessed.*

Please refer to the August 11, 2015 submission.

16. *For the study area outside of the jurisdiction of the ORMCP, all recommended setbacks to natural heritage features (e.g. watercourses and wetlands) should be applied consistently to appropriately define the limits of development on this site. In particular, the following features and setbacks shown on the eastern portion of the draft plan require further clarification:*

- a. *The drainage feature within Block 219 between Street I and Street J*

Please refer to the August 11, 2015 submission.

17. *For the study area within the jurisdiction of the ORMCP, the following features and setbacks shown on the western portion of the draft plan require further clarification and assessment in conformity with the minimum vegetation protection zone as per the ORMCP:*

- a. *The staked significant woodland adjacent to Lots 29 & 30 (minimum 30 metres)*

Please refer to the August 11, 2015 submission.

- b. *The watercourse adjacent to future development Block 226 (minimum 30 metres from meander belt)*

Please refer to the August 11, 2015 submission.

18. *Prior to finalizing the development limits of the site, all wetland communities and boundaries present must be confirmed through a staking exercise with LSRCA staff during the appropriate seasonal conditions. Please note that based on observations by LSRCA staff during previous site visits, the presence of wetland habitat in areas surrounding all watercourses must be verified.*

Please refer to the August 11, 2015 submission.

Natural Hazards

19. *The Geomorphic Assessment (Beacon 2015) provides erosion hazard assessments for specific reaches of the watercourses present. However, erosion hazard setbacks should be identified for all permanent and intermittent streams. It should be noted that the natural heritage setback for permanent and intermittent streams in the ORMCP is from the edge of the meander belt. As such, if appropriate this information should be translated into the mapping of this setback for all unconfined watercourses.*

Please refer to attachment BEACON-3 for the associated figure which reflects the meander belt width information.

20. *Toe erosion information reported in the Golder Geotechnical Investigation (Feb 2015), Beacon Geomorphic Report (Feb 2015) and in Section 9.0 of the SCS Report is not consistent. For example, only 2 locations of toe erosion are reported in the SCS Report and six are noted in the other two reports. In addition, the Toe Erosion Allowance for Area 2 is 1 metre in one report and 2 metres in another. The Erosion Hazard Limit calculation shown on Figure 9.1 of the SCS Report also appears incorrect. The edge of watercourse and stable top of slope elevations should be identified on Figure 9.1. We recommend that figures similar to Figure 9.1 in the SCS report be provided for each reach identified with a slope hazard. All development limits associated with slope hazards should be identified on the draft plan. In particular, we note that on the current draft plan Lots 128-131 and Block 222 do not have a slope hazard identified even though this is a reach where toe erosion was identified in the reports.*

Please refer to Figure 9.1 in Attachment SCS-8 for the setback distance calculations for Areas 1 and 2 and Figures 9.2, 9.3, and 9.4 for cross-sections in Areas 3, 5 and 6. We note that the slopes in Areas 3, 5 and 6 are all significantly less than 3:1 (range from 6% to 19%) and are therefore considered stable. Therefore, no erosion hazard limit applies in these areas. In addition, the proposed extension of Street A occupies the slope on the west side of the West Tributary, therefore an erosion hazard analysis in this area was not applicable.

21. *On the draft plan, the labelling of Stable Top of Bank should be corrected to Erosion Hazard Limit to represent the fact that a setback to stable top of bank is included in the hazard limit.*

Please refer to the August 11, 2015 submission.

22. The rear of lot 28 is to be removed from the Floodplain. The draft plan should be revised accordingly.

Please refer to the August 11, 2015 submission.

23. A 10 metre development setback to the floodplain is not provided as part of this development application. The statement on page 26 of the Beacon EIS Report (Feb 2015) should be corrected.

Please refer to the August 11, 2015 submission.

General Natural Heritage

24. A feature based water balance for the wetlands, woodlands and watercourses has not been provided. Catchment changes impacting the features have not been identified and further details are required ensuring that pre- to post- conditions are maintained thereby maintaining ecological function such as amphibian breeding or baseflow for fish habitat.

Three natural heritage features, illustrated on Figure 4 of Beacon Environmental's Natural Heritage Evaluation, are identified in close proximity to the subject property which could be affected by changes in site water balance, including:

- (i) the ORM Woodland to the southwest (located within Catchment D immediately upstream of the site);
- (ii) the ORM Wetland to the north (located below the confluence of Catchments D and E, immediately downstream of the site); and
- (iii) the Non-ORM Woodland to the northeast (located within Catchment A, immediately downstream of the site).

Each of these features is located along tributaries of Tannery Creek, and all are assumed to be sustained with flows from their corresponding catchments (refer to GOLDER-1 in the August 11, 2015 submission). A two-step water balance is developed for each of the three catchments in order to evaluate the change in local water budget that may be expected at each of the natural heritage features.

Step 1: Developing Water Balances for External Contributions

The first step in the water balance is to develop an estimate of contributing flows from the portions of each catchment external to the subject property. The water balances for external contributing catchments is considered identical under pre-development and post-development conditions.

The catchments contributing to each of the six tributaries crossing the site are delineated using OBM contours and are shown on Attachment GOLDER-1 in the August 11, 2015 submission. Of these six catchments, three catchments are assumed to convey flows to the natural heritage features, including:

- (i) Catchment A (feeds the Non-ORM Woodland downstream of the site);
- (ii) Catchment E (feeds the ORM Wetland downstream of the site); and

- (iii) Catchment D (feeds the ORM Woodland upstream of the site and the ORM Wetland downstream of the site). *Note that a small portion of Catchment D is downstream of the ORM Woodland feature and is therefore excluded from the water balance assessment.*

Undeveloped land use designations within these three catchments are assigned based on the areas of forest, woodlots, wetlands and water bodies shown in OBM mapping. Developed land use areas are estimated using the number and locations of residential buildings, commercial buildings, and roads shown on the OBM mapping. The coverage of each land-use designation is presented in Table 1 below.

Table 1: External Areas Contributing to Features

Feature	Area (ha)				Total (ha)
	Forest	Open	Urban Impervious	Water	
ORM Woodland	59.0	76.8	3.3	0.3	139.4
ORM Wetland	115.4	201.4	11.8	3.5	332.2
Non-ORM Woodland	45.4	220.2	36.0	0.5	302.1

Note: Land use assigned as follows:

- *Treed Land Use* areas are taken as the forest areas shown in OBM mapping
- *Open Land Use* areas are taken as any catchment areas not accounted for in Treed, Existing Development (Impervious) and Wetland or Open Water land uses
- *Existing Developed (Impervious) Land Use* areas are estimated including all building areas shown in OBM mapping, a 12 m width multiplied by the length of arterial road shown in the catchment, a width of 9 m multiplied by the length of collector roads, a width of 6 m multiplied by the length of local roads, and a per-unit area of 152 m² (representing 140 m² roof and 12 m² driveway) for every housing unit shown on the OBM mapping
- *Wetland or Open Water Land Use* areas reflect wetland or water polygon areas on OBM mapping

Annual water budget values for external contributing catchments are calculated by applying the water holding capacity (WHC) values previously employed for the subject property water balance (described in the hydrogeology report) to the land use designations presented in Table 1. Specifically, WHCs were assigned as follows:

- 350 mm for the treed land use areas (average annual surplus of 243 mm/yr);
- 75 mm open pervious areas (average annual surplus of 338 mm/yr);
- impervious area runoff was assumed to be 90% of the 865 mm/yr annual precipitation (average annual surplus of 779 mm/yr)
- open water areas were assumed to equate to annual precipitation minus annual potential evapotranspiration (average annual surplus of 239 mm/yr).

The resulting water budget contributions (annual surplus values, infiltration coefficient assumptions, and annual infiltration values) for each land use area are shown in Table 2.

Table 2: Water Budget Contributions

Feature	Land Use			
	Treed Land Use	Open Land Use	Existing Developed (Impervious) Land Use	Wetland or Open Water Land Use
WHC (mm)	350	75	-	-
Impervious (%)	0	0	100	100
Infiltration Coefficient	0.5	0.4	0	0
Annual Surplus (mm/yr)	243	338	779	239
<i>Annual Infiltration (mm/yr)</i>	<i>121.5</i>	<i>135.2</i>	<i>0.0</i>	<i>0.0</i>
<i>Annual Runoff (mm/yr)</i>	<i>121.5</i>	<i>202.8</i>	<i>779</i>	<i>239</i>

The contributing catchment areas (Table 1) and average annual water budget contributions (Table 2) were combined to estimate the annual volumetric contributions from external catchments to each of the three natural heritage features (Table 3).

Table 3: External Catchment Water Budget Results (Not Including Site Contribution)

External Areas	Surplus (m ³ /yr)	Infiltration (m ³ /yr)	Runoff (m ³ /yr)
ORM Woodland	430,000	175,000	254,000
ORM Wetland	1,062,000	413,000	649,000
Non-ORM Woodland	1,136,000	353,000	783,000

Step 2: Adding Water Budget Contributions from Subject Property Contributions to External Water Budget Contributions

The contribution from the subject property areas (as previously reported) is added to the external catchment contributions for each of the three natural heritage features. The surplus, infiltration and runoff results are shown in Table 4, Table 5, and Table 6, respectively. Unlike the external areas, the site areas change (both in terms of land use and drainage boundaries) between pre and post development; the result is a change in contributions between pre and post development, shown in the tables.

Table 4: Feature Water Budget: Surplus (Including Site Contribution)

Feature	Surplus (m ³ /yr)			Change (%)
	Pre Development	Post Development with LID	Change	
ORM Woodland	435,000	441,000	6,000	1.4%
ORM Wetland	1,147,000	1,174,000	27,000	2.4%
Non-ORM Woodland	1,162,000	1,173,000	11,000	0.9%

Table 5: Feature Water Budget: Infiltration (Including Site Contribution)

Feature	Infiltration (m ³ /yr)			Change (%)
	Pre Development	Post Development with LID	Change	
ORM Woodland	177,000	178,000	1,000	0.6%
ORM Wetland	444,000	441,000	-3,000	-0.7%
Non-ORM Woodland	361,000	360,000	-1,000	-0.3%

Table 6: Feature Water Budget: Runoff (Including Site Contribution)

Feature	Runoff (m ³ /yr)			Change (%)
	Pre Development	Post Development with Low-Impact Development	Change	
ORM Woodland	257,000	262,000	5,000	1.9%
ORM Wetland	703,000	733,000	30,000	4.3%
Non-ORM Woodland	800,000	813,000	13,000	1.6%

Generally, the results for the ORM Wetland and ORM Woodland and the Non-ORM Woodland show an increase in surplus of between 6,000 m³/yr and 27,000 m³/yr (approximately 0.2 L/s and 0.9 L/s average flow over the entire year), and a change in infiltration less than or equal to 3,000 m³/yr (less than 0.1 L/s average flow over the entire year). Given the relatively minor changes in surplus and infiltration, it is unlikely that there will be a resultant change in the ecological function of the ORM Wetland, ORM Woodland and non-ORM Woodland.

In the case of the ORM Woodland, some drainage from the site to the feature has been identified under existing conditions which overflows via a pipe from the existing dug pond to within the woodland. Under the post-development scenario, this drainage will be maintained and additional LID measures could be explored within Blocks 188 and 209, if required.

25. The EIS references the installation of servicing across watercourse WT3-1C and 10 new SWM outlets however limited information is provided. Please provide the locations of all new outfalls on a figure(s), assess the impacts to the features and their associated vegetation protection zone (VPZ) including mitigation & restoration. ORMCP Section 41 (5) must be addressed for all outlets and service crossings within key natural heritage features and their VPZ for the western portion of the site. For locations on the eastern portion of the site the outlets should be located outside of the features, as well as the VPZ, where possible. Justification for all locations should be provided in the EIS.

Please refer to the August 11, 2015 submission. Updated Servicing Figures have been included in an updated Attachment SCS-3.

26. Discussions of stormwater management should be included into the EIS including any potential for hydrological support to the existing features through the installation of LIDs, where applicable. Confirmation is required whether any LID enhancements are proposed to be installed in the VPZ. Section 41 (5) of the ORMCP would apply to any infrastructure proposed in the western portion of the site.

Please refer to the August 11, 2015 submission.

27. The details regarding grading requirements in the study area are limited. A figure should demonstrate where grading may be required outside of the proposed development limit and an impact assessment undertaken. The response should include mitigation measures and restoration. Please note, at the detailed design stage, any additional grading proposed outside of the approved development limit will not be permitted.

Please refer to the August 11, 2015 submission.

28. Enhancement Plans will be required at detailed design as per the requirements of the Town Official Plan (Section 12.6.1. (e) & (f) (ii) and ORCMP (section 23 (d)) to naturalize the vegetation protection zones of the identified natural heritage and hydrologic features on site. The use of bioengineering techniques may be appropriate in some areas where erosion has been identified along the banks of the existing watercourses. Restoration plans should include lands inside and outside of the jurisdiction of the ORMCP to adequately address these policies.

Please refer to the August 11, 2015 submission.

29. A Trails Impact Study will be required as a draft plan condition. Given the urban area, small mammal use should be considered for the foot bridges and open bottom culverts as determined by the EIS wildlife occurrences.

Please refer to the August 11, 2015 submission.

30. Please identify the point locations or the transect line used to complete the breeding bird surveys.

Please refer to the August 11, 2015 submission.

31. During the site reconnaissance a weir was noted at the downstream end of Pond 3, confirmation is required whether this fish barrier is proposed for removal.

Please refer to the August 11, 2015 submission. The conceptual channel design will be submitted under separate cover.

32. The overall tree removal on the property has not been quantified and a restoration/replacement plan should be provided in order to identify the total tree replacement required. The draft Urban Forest Study for the Town of Aurora can be used as a guideline for the overall strategy. Please note that tree removal will only be allowed within the approved draft plan limit.

Please refer to the August 11, 2015 submission.

- 33. A note should be included in the Tree Inventory Assessment Report and on the drawings relating to tree removal being conducted during the appropriate breeding bird window, unless otherwise required, wherein a qualified ecologist will complete a nesting survey prior to any removals.*

Please refer to the August 11, 2015 submission.

- 34. Invasive species or aggressive non-natives should not be included in the list for relocation in the Tree Inventory Assessment Report. Additionally, relocated non-native species will not be accepted as plantings in VPZs to features.*

Please refer to the August 11, 2015 submission.

- 35. A monitoring program (considered a key component of the York Region EIS submission) should be created to study the impacts of the development on the natural heritage area including adaptive management where appropriate. This may include biological inventories, water quality sampling and interim and final report.*

Please refer to the August 11, 2015 submission.

Floodplain Delineation and Modifications

- 36. The existing and proposed 100 year and Regional Floodplain are to be delineated on all Figures in the SCS Report (Feb, 2015) where applicable (i.e. Servicing and Grading Plans, Figure 2.15 and 9.1).*

Please refer to updated Attachment SCS-3 for the updated Figures 2.6-2.10, Attachment SCS-6 for the updated Figure 2.15, Attachment SCS-7 for the updated Figures 2.13 and 2.14, Attachment SCS-8 for the updated Figures 9.1-9.4, and Attachment SCS-9 for the updated Figures 5.1-5.5.

37. Floodplain Mapping Figure 2.14 (SCS, 2015)

- a. The watercourse layer is difficult to identify on the figure. Please provide a more distinct line type to clarify the watercourse location in relation to the cross-sections. As well, please identify that the watercourse name as Tannery Creek on the drawing.*

The watercourse layer has been revised to provide a more distinct line type in order to clearly identify the location of the watercourse. As discussed with the LSRCA staff in a review meeting on June 1, 2015, Tannery Creek (with the corresponding reach number identified in brackets) has been shown on both Figures 2.13 and 2.14. Please refer to Attachment SCS-7 for the updated figures.

- b. It appears that there are several cross-sections that intersect other cross-sections in the hydraulic model and mapping. Please revise the affected cross-sections at West Trib*

Reach 47, cross-section 8217 and 8211; East Tributary Reach 43 cross-section 8311 in the hydraulic model. Please update any affected mapping.

At various cross-sections, the cross-section ID leaders shown in Figures 2.13 and 2.14 were interpreted to be part of the cross-sections with some of the leaders overlapping cross-sections. The thickness of the leaders have been changed to clearly differentiate the cross-sections from the section ID leaders and the leaders have been moved or truncated so as not to cross through other cross-sections. Refer to Attachment SCS-7 for updated Figures 2.13 and 2.14. We note that these revisions have no impact to the resulting flood elevations.

- c. It appears that there are several locations where cross-sections do not contain the floodplain such as East Tributary Reach 43 cross-section 8310 and 8307.75. In addition, a cross-section revision will be required at West Tributary Reach 47 cross-section 8210 and West Tributary Reach 46 cross-section 8222 to fix a discrepancy in the bounding polygon. An option could involve trimming cross-section West tributary reach 47 cross-section 8210 and moving cross-section West Trib Reach 46 cross-section 8222 toward Cranberry Lane. Please revise affected cross-sections in the model and the associated figures.*

Floodplain mapping was completed to the extent of the subject property boundary. Cross-sections 8307.75 and 8308 were extended to contain the floodplain. As discussed in the LSRCA review meeting on June 1, 2015, the length of cross-section 8210 has been trimmed to exclude Tannery Reach 46. Cross-section 8310 was not extended as flows from Reach 41 are already modelled through cross-section 8312. Please refer to Attachment SCS-7 for the updated figures and modelling. We note that these revisions had no impact to the floodlines.

- 38. Please provide an index of the drawings and related crossing information provided on the Data CD in Appendix B specifically used in support of the dimensions and inverts that were revised in the hydraulic model. This information will be used as a reference in the crossing description in the HECRAS model for future users of the updated watershed model.*

Please refer to Attachment SCS-10 for the index of the drawings and related crossing information.

- 39. HECRAS model HRE_rev5e- SCSPRE and POST*

- a. Please document the digital surface or survey data source used to update the hydraulic sections identified.*

The survey data source (Rady-Pentek and Edward Surveying Ltd.) has been included in the HEC-RAS model included in Attachment SCS-7.

- b. It appears that the regional event is overtopping the roadway at Tannery Creek Reach 40 Bridge 8307.5, but this is not indicated in the delineation of Figure 2.14. Please clarify and update as necessary.*

Please refer to the August 11, 2015 submission.

40. HECRAS model HRE_rev5e-SCS-POST

- a. *It appears that non-georeferenced cross-sections were added to the hydraulic model Tannery Creek Reach 26 under proposed conditions. Please update hydraulic model as needed.*

The cross-sections added to the hydraulic model at Tannery Creek Reach 26 have been georeferenced. Please refer to Attachment SCS-7 for the updated model.

- b. *The manning's n selected for the overbank proposed conditions of 0.08 appear too high. Please provide additional information to support the proposed overbank manning's n.*

Please refer to the August 11, 2015 submission.

41. *It appears that the revised flow file rev5e-SCS-Rev may not have been used for the hydraulic modeling. Please clarify and provide details of any flow file changes (i.e. 2-100 year flows) in the report.*

Please refer to the August 11, 2015 submission. The model utilizes the future 2 to 100 year flows (rev5e-SCS-Rev) in the proposed conditions model. Please refer to Attachment SCS-7 for the updated HEC-RAS model. We note there was no change to the floodlines.

42. *It appears that cut/fill information for the cross-sections 8448.5, 8449 and 8449.5 on Tannery Creek Reach 26 (Figure 2.13 Tannery Creek Realignment) was not modified on the affected cross-sections in the hydraulic model post conditions. Please revise cross-sections as necessary.*

The geometry of the cross-sections has been revised to represent the proposed retaining walls. Please refer to Attachment SCS-7 for the updated HEC-RAS model. We note that this had no impact on the floodlines.

43. *Please provide comment in the report and provide tabular analysis in Appendix H on the variation in floodplain elevation and velocity change between the SCS existing and proposed conditions for the channel and overbank for the proposed Tannery Creek re-alignment and Street F crossing. Additional cross-sections will also be required at the extent of the proposed cut between cross-sections 8448.50 & 8448 and 8450 & 8449.5 for the Tannery Creek re-alignment. This analysis will also be required for Street A, if grading is proposed in the floodplain just north of Timberline Trail.*

Please refer to Attachment SCS-7 for the summary table. Additional cross-sections have been added (refer to Attachment SCS-7) for updated Figure 2.13 and the HEC-RAS model. We note that this had a negligible impact (± 0.01 m) on the Regional Storm floodlines.

Concrete Dam Removal – Tannery Creek

44. *Downstream flows cannot increase as a result of the removal of the existing concrete dam structure on Tannery Creek. It is recommended that options to maintain the existing stage discharge of the structure be explored. Please also provide additional details with respect to the existing and proposed conditions and reference the applicable rating tables and information in the Appendix.*

Please refer to the August 11, 2015 submission. The conceptual channel design will be submitted under separate cover. In addition, please refer to Attachment SCS-16 for the existing conditions and originally assumed proposed conditions rating tables for the dam structure that were included in Appendix C of the SCS FSSR (February 2015).

Stormwater Management

Hydrology and Quantity Control

45. *Table 2.2 on Page 9 references Runoff Coefficients in the title and note, however it appears to only tabulate CN values.*

Please refer to Attachment SCS-11 for the updated table. The table will be updated in the report.

46. *The Pre-Development Drainage Plan (Figures 2.1 & 2.2) should also identify the existing minor system and storm outlets.*

Please refer to Attachment SCS-5 for the revised figures that illustrate the minor system drainage arrows for the external areas.

47. *The Post-Development Drainage Plan (Figures 2.3 & 2.4) should also identify minor system, storm outlets, quantity control/super pipes and uncontrolled areas.*

Please refer to the August 11, 2015 submission. Attachment SCS-5 contains the revised figures.

48. *The Pre-Development flow summary Tables 2.3, 2.4 & 2.5 are to reference the associated drainage areas.*

Please refer to Attachment SCS-11 for the updated tables. The tables will be updated in the report.

49. *The Post-Development flow summary Tables 2.9, 2.10, 2.11, 2.12, 2.13 & 2.14 are to reference the associated drainage areas for Allowable and Post Development flow. Please also include the applicable catchment ID(s) for the required storage columns.*

The drainage areas for allowable flow have been provided on Tables 2.3, 2.4, and 2.5. The associated drainage areas and IDs for post-development have been included in Tables 2.9 to 2.18. Please refer to Attachment SCS-11 for the updated tables.

50. It is noted that different hydrology modelling methods were used for east and west portions of the site. The VO2 hydrology model is to be utilized to provide a consistent modelling approach for the proposed development and external areas. In addition, a post to pre-development peak flow (2-100 year storms) assessment is to be completed for the entire site and external drainage areas at Nodes B1 and C1, (similar to the assessment completed at Node A) to demonstrate that there will be no increase in flows downstream of the development.

Please refer to the August 11, 2015 submission.

51. An additional Target Flow Node is required at the existing Headwall at Golf Links Drive (between existing lots 42 & 43) to demonstrate that there is no increase in flow to the existing 1200mm storm sewer. A Pre-Development and Post-Development conveyance capacity of the swale, inlet headwall and 1200mm storm sewer should also be completed to demonstrate that drainage is contained within the proposed swale and existing storm sewer with no increase in water levels or HGL.

An additional target flow node (Node D) has been added at the existing headwall to the existing 1200 mm diameter culvert at Golf Links Drive (between Lots 42 & 43) – see new Table 2.10 in Attachment SCS-11 for a summary of the existing and unattenuated and attenuated post-development flows that illustrates that there is no increase in flows. Please refer to Attachment SCS-12 for the pre- and post-development swale conveyance capacity analysis. As shown, the proposed 100 year peak flows can be accommodated within the proposed swale.

52. In addition to the provided VO2 modelling schematic, a hard copy of the model output summary is to be provided in the report for both pre-development and post-development conditions.

Please refer to the August 11, 2015 submission.

53. In addition to the 12-hour SCS Type II distribution, please also include hydrologic modelling for the 4 hour Chicago distribution.

Please refer to the August 11, 2015 submission.

54. Rainfall amounts for the VO2 model should be based on the current intensity-duration-frequency (IDF) curves for the Town.

Please refer to the August 11, 2015 submission.

55. Additional clarification and supporting information is required in the report text and Appendix to support the Duhyd, Route Reservoir and rating tables utilized in the Pre-Development VO2 hydrology model.

Please refer to Attachment SCS-5 for further clarification in the text and Appendices to support the VO2 hydrology model.

56. Please reference and include an excerpt of the existing storm sewer design sheet in the Appendix to support the existing/target flow for Node C5.

Please refer to the August 11, 2015 submission.

57. Please demonstrate that the inverts of the proposed storm sewer or superpipe storage is above the adjacent watercourse 100 year water level.

Please refer to the August 11, 2015 submission and the updated Attachment SCS-3.

Quality and Erosion Control

58. The available Biofiltration volume calculation for the cul-de-sac appears incorrect. It appears that the void ratio for the storage media was not utilized in the calculation. Please review and revise the report and calculations accordingly.

Please refer to Attachment SCS-13 for the biofiltration volume calculation for the cul-de-sac. The resulting total biofiltration volume has decreased, however the required water quality and erosion control volumes are still being provided, with the exception of those noted below in our response to Comment #59.

59. Based on a review of the Summary of Biofiltration Volumes in Appendix D, it appears that a few of the proposed available Biofiltration volumes are less than the required. Please identify all catchments that cannot achieve the required quality or erosion control volume in Section 2.5.1 and 2.5.2 and clearly identify constraints/reasons why quality and erosion control should/cannot not be provided (e.g. why can the 0.36ha in Area 2 not drain to an LID?).

Please refer to the August 11, 2015 submission. The following text will be added to the report regarding catchments that cannot achieve the required quality or erosion control volumes:

The required erosion control volume for Catchment 215 cannot be achieved as there is not enough volume within the proposed cul-de-sac biofiltration filter on Street G and there is not an opportunity to provide additional volume via a boulevard biofiltration system as Street G is a double loaded cul-de-sac.

The required erosion control volume for Catchments 222, 523, 524, and 527 cannot be achieved as there is not enough volume within the proposed cul-de-sac biofiltration filter on Street A and there is not an opportunity to provide additional volume via additional boulevard biofiltration systems.

No water quality or erosion control can be provided for Catchments 232 and 223, as the drainage from these areas drains to the existing road (Timberline Trail) and there is therefore no opportunity to add treatment measures.

Similarly, no water quality or erosion control can be provided for Catchment 246, as the drainage from this small area drains to the existing road (Cranberry Lane) and there is therefore no opportunity to add treatment measures.

60. As noted previously, the VO2 hydrology model is to be utilized, therefore the required erosion control (25mm extended detention) volume is to be calculated utilizing the hydrology model 25mm runoff volume (4 hour, Chicago Distribution). Please revise the report and calculations accordingly.

Please refer to the August 11, 2015 submission and the updated Attachment SCS-5.

61. Further to the above, please demonstrate how the 25mm runoff volume will be detained and released over 24 hours within the Biofiltration swale(s).

Please refer to the August 11, 2015 submission.

Phosphorus Budget

62. The Open Water area in Table 2.18 does not appear to match the Pre-Development Phosphorus Loading calculations in Appendix F.

Please refer to the August 11, 2015 submission and Attachment SCS-14 for the updated phosphorous loading calculations and Figures 2.11 and 2.12. There was no impact to the overall phosphorous budget calculations.

63. Please provide additional details and supporting information for the proposed 0.34 ha Stream Buffer in the Post-Development Phosphorus Loading calculations for Block 224 & 225.

Please refer to the August 11, 2015 submission and Attachment SCS-14 for the updated phosphorous loading calculations and Figures 2.11 and 2.12. There is still a net decrease in the overall site phosphorous export of 11% (vs. a 15% decrease previously reported).

Drainage

64. 100 year capture should be mentioned in Section 2.5.3, 2.6.2 and 2.7 where applicable. It is also recommended that the emergency overland flow routes be provided in the event that the storm sewers are blocked.

Please refer to the August 11, 2015 submission.

Servicing Plans

65. The Servicing Plans are to include a location Key Plan.

Please refer to Attachment SCS-3 for the updated Servicing Plans.

66. Existing Culvert Crossings are to be shown on the Servicing Plans.

Please refer to Attachment SCS-3 for the updated Servicing Plans.

67. Please refer to Natural Heritage Comment 25 above, with regard to all stormwater outlets and service crossings. The storm outlet headwalls should be located outside of the VPZ, where possible.

Please refer to the August 11, 2015 submission.

Grading Plans

68. The Grading Plans are to include a location Key Plan.

Please refer to Attachment SCS-9 for the updated Grading Plans.

69. Existing Culvert Crossings are to be shown on the Grading Plans.

Please refer to Attachment SCS-9 for the updated Grading Plans.

70. Please demonstrate how the outfall swale at Block 188 (Node C3) will drain to the watercourse.

A proposed grassed swale with a 1.0 m bottom width, 3:1 side slopes and a slope of 0.5% is sufficient to convey the proposed peak 100 year flow of 0.25 m³/s with a maximum flow depth of 0.2 m from Block 217 at Street C to the existing pond in Block 188. Flows will outlet from the existing pond in Block 188 as they currently do, via a combination of a piped outlet and overland flow to the woodlot to the south. Additional LID measures could be explored within Blocks 188 and 209, if required. Please refer to Attachment SCS-15 for the conveyance calculations.

71. Please show the proposed retaining wall for Block 224 on Grading Plan 5 (Figure 5.5).

Please refer to Attachment SCS-9 for the updated Grading Plan.

72. Site drainage cannot be directed to existing Lot 1 as proposed on Grading Plan 3. Please review and revise accordingly.

Please refer to Attachment SCS-9 for the updated Grading Plan.

General Hydrogeological Comments

73. The preliminary hydrogeological investigation report indicates that the depth to groundwater was measured in monitoring wells twice, once in December 2014 and once in January 2015. It is unclear what the shallow water table conditions are on the site and how the water levels respond to seasonal influences. Additional groundwater level data need to be obtained from the monitoring wells on site with the focus being on the spring monitoring period. In addition, it is

highly recommended that data loggers be installed where feasible to clearly assess the short and long term changes in the water levels (i.e. the response to seasonal influences).

Please refer to Attachment GOLDER-5 for the monitoring data.

74. The hydrogeological report does not contain a discussion (or figure) on the shallow groundwater flow direction(s) on and around the site; therefore it is unclear if the selection of catchments used within the water balance is appropriate (i.e. shallow groundwater flow is similar to surface drainage patterns on the site). Please provide a figure demonstrating groundwater movement on the site and a discussion on how it relates to the delineated drainage catchments used within the water balance.

Please refer to the August 11, 2015 submission.

75. Figure 2 within the Preliminary Hydrogeological Investigation report indicates a number of boreholes were constructed on or adjacent to the site in support of previous studies. It is unclear if any the borehole logs (or water levels) from these studies may further supplement the information contained with the recent report. Please provide any additional information that is available and comment on the consistency of results obtained between previous studies and the current drilling/monitoring program.

Please refer to the August 11, 2015 submission.

76. There has been limited hydrogeological impact assessment on the streams and wetlands within the reports provided. More information on these features and their functions, including a discussion of surface-groundwater interactions, groundwater discharge areas will need to be provided including how the proposed development may potentially impact these features. Please provide more information and location figure of the wetland and streams on or near the site and determine whether they rely on surface drainage from the site, groundwater discharge or both? In addition, please provide a discussion on how the proposed development will potentially impact the surface drainage, infiltration/recharge, groundwater flow that supports these features?

Please refer to the August 11, 2015 submission.

77. The geotechnical report indicated that groundwater conditions will require management for the design and construction of underground utilities, foundations, basements and any other underground structures. It was further suggested that a PTTW would likely be required during construction due to high groundwater levels and artesian conditions found across the site. Due to several of the monitoring wells near proposed lots and the condo block exhibiting artesian conditions, it is unclear from the data and information provided if there maybe long-term dewatering/depressurization of the aquifer required? Additional information will need to be provided in order to assess any long-term and short-term dewatering requirements, including:

- The location and rate/volume of dewatering required;*
- Proposed monitoring during dewatering; and*

- *Proposed mitigation measures to address the potential effects of aquifer depressurization/dewatering during construction*

Please refer to the August 11, 2015 submission.

Water Balance Comments

78. *The hydrogeological report indicates that the record period of 1960-2006 for the Richmond Hill Environment Canada MET station was used for the water budget analysis. It was further indicated that the Meteorological Service Data Analysis and Archive division of Environment Canada provided the monthly water budget summary, including monthly average precipitation, ET and surplus value for a range of water holding capacities. Please provide the monthly precipitation, ET and surplus values to support the water balance calculations. In addition, more information should be provided on the source of the water budget summaries obtained from Environment Canada. Is this a paid service Environment Canada offers or can the water budgets be obtained directly from their website?*

Please refer to the August 11, 2015 submission.

79. *The recently submitted water balance tables provide calculations on a subcatchment scale along with Figure 1 which identifies the various development areas (i.e. Northeast, Southeast, Northwest, Southwest and Middle). It is unclear if the arrows on the figure indicate surface or groundwater divides and what the exact boundaries of the divides are? In addition, it is unclear which areas on the figure correspond to each subcatchment/development area? Please provide a figure that demonstrates these areas more clearly.*

Please refer to the August 11, 2015 submission.

80. *The water balance does not provide an assessment of tributaries and wetland features on and/or adjacent to the site. Although the water balance has been completed based on subcatchments on the site it is still unclear which catchment support the features on or near the site and if the drainage volumes to these features will be maintained post development. It will be necessary to quantify and the amount of water that will need to be mitigated through surface runoff and/or infiltration to support these features. Please provide:*

- A figure that clearly indicates pre- and post-development drainage areas as shown within the water balance calculations.*
- Quantify the amount of water that will be contributing to each feature pre- and post-development;*
- Demonstrate how pre-development runoff to each feature will be maintained; and*
- Demonstrate how the infiltration deficit is being mitigated throughout the site.*

Please refer to the August 11, 2015 submission.

81. *It appears an infiltration factor of 0.4 was selected for landscaped areas (including golf course, landscaped, and urban lawns) and 0.5 was selected for treed areas. The MOE Hydrogeological*

Information Requirement for Land Development Applications (1995) requires infiltration factors be selected based on topography, soils and vegetation. There has been no discussion on the selection of infiltration factors based on these criteria. Please provide more information on the selection of infiltration factors based on the average slope, soil conditions, and vegetation for each catchment in the pre-development water balance. In addition, please indicate how the post-development calculations accounted for changes in imperviousness, vegetation, soil conditions, grading and site design and using adjusted infiltration factors based on these changes.

Please refer to the August 11, 2015 submission.

82. The recently provided Figure 1 indicates the post-development land uses; however it isn't clear on how these land uses correspond to the water budget tables? In addition, a figure demonstrating pre-development land uses has not been provided. Please provide figures demonstrating both pre- and post-development land uses that correspond to the water balance calculations.

Please refer to the August 11, 2015 submission.

83. The recently provided Figure 1 indicates that the existing parking and condo block on the western portion of the site is "existing developed (to be retained/redeveloped)" and "existing developed (no Lots)". It is unclear how these areas are represented within the water balance? Please provide more detail on what is to occur within these areas and how they are being represented within the water balance.

Please refer to the August 11, 2015 submission.

84. The type of land uses indicated within the pre- and post-development water balance tables is unclear. For example, what type of land use is 'developable – no lots proposed', 'developable-existing permeable'? Does this mean the area labelled 'golf course – open' is not developable? In addition, it is unclear which areas refer to roofs, roads and driveway in the post-development water balance. Please include a brief description of each land use type (pre- and post-development) used within the water balance and relating it back to the selected infiltration factor.

Please refer to the August 11, 2015 submission.

Water Balance Mitigation Comments

85. The hydrogeological report provides several suggestions for passive LIDs, including estimates on their potential to reduce runoff from the site. Further information is needed to confirm if these mitigation methods will be sufficient to maintain pre-development infiltration volumes. Currently the water balance does not explicitly identify which areas are roadways, driveways or roof tops; therefore it is difficult to ascertain which areas the proposed mitigation measures refer too. In addition, it is unclear if infiltration/runoff is being mitigated on a catchment basis. Please provide

a post-development water balance that incorporates all mitigation measures that will identify if infiltration and runoff to surface water features are being maintained post-development.

Please refer to the August 11, 2015 submission.

86. Currently the LIDs proposed within the Hydrogeological Investigation report are suggestions and it appears they have not been explicitly identified within the SWM report. All LIDs and their specifications need to be indicated on the appropriate engineering drawing and documented within the SWM report. Although some particulars on the design and specifications can be completed at the Detailed Design stage it is essential that the feasibility (i.e. location and physical suitability) along with the constraints for each LID be identified at this stage.

Please refer to Attachment GOLDER-5 for the monitoring data from the observations wells.

87. Vegetated Filter strips have been proposed for 50% of roadways. It is unclear where these will be located? Are they the 'swales' being proposed within the SWM report (i.e. drawing 2.5)? If so, all information needs to be consistent with that contained within the FSR/SWM report (i.e. it appears that the SWM report currently suggests that they will be swales and used for filtration/quality control not infiltration).

Please refer to the August 11, 2015 submission. Refer to Attachment SCS-13 for the updated figure which reflects the lined vs. unlined bioretention feature lengths.

88. Vegetation filter strips should only be considered as a water balance mitigation method if:

- The location is confirmed per the previous comment. All information is consistent with that contained within the FSR/SWM report (i.e. SWM report confirms that they will be used for infiltration not filtration).*
- Additional water level data is obtain within at these locations to confirm the water table is low enough for infiltration to occur (i.e. >1 meter below the surface)*
- Infiltration rates of the underlying material confirmed through testing*
- Confirm these locations meet the physical suitability (per TRCA & CVC 2010) – depth to water table > 1 meter below the surface, slope is between 1 to 5% and the maximum flow path over the impermeable surface with less than 25 meters.*

Please refer to Attachment GOLDER-5 for the monitoring data from the observations wells.

89. For the downspout disconnect the hydrogeological report assumes that there will be a runoff reduction of 25%, with a total infiltration volume of 11,300 m³ being achieved across the site. Assuming the roof runoff is subject to ET occurring on the grassed swales it is being directed to and an infiltration factor of 0.4 being applied this maybe an over estimate on the infiltration occurring from the downspout disconnection? These calculations should be introduced within the water balance table (previous comment) to confirm appropriate assumptions and realistic infiltration volumes to be achieved through this practice. In addition to the water balance table, the following information will need to be provided on the downspout disconnection to vegetated areas:

- a. *Please confirm the average flow path length and slope that conveys runoff away from the buildings.*
- b. *Please confirm if the downspout disconnection will be to vegetated areas or grassed areas?*

Please refer to the August 11, 2015 submission.

90. The hydrogeological report suggests that driveway runoff should be directed via grading to the adjacent lawns rather than to the street, thereby allowing an estimated 50% of incident precipitation to drain towards adjacent landscaped areas. It is unclear which driveways are being referred to and how they will be graded to drain towards landscaped areas (typically driveways drain towards roadways). Please provide drawings or details to demonstrate the feasibility of this LID.

Please refer to the August 11, 2015 submission.

91. According to the hydrogeological report, presently only passive LID techniques have been identified on the site to mitigate the post-development infiltration deficit. With the current LID implementation it is estimated that 95% of infiltration can be maintained post-development. It is recommended that additional opportunities to implement LIDs on the site should be explored in order to meet pre-development infiltration targets as demonstrated within the water balance.

Please refer to the August 11, 2015 submission.

Please contact the undersigned if you have any questions or require any additional information.

Sincerely,

Malone Given Parsons Ltd
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