May 10, 2017 CFN: 57107

BY EMAIL ONLY (gsellars@markham.ca)
Mr. Gary Sellars
City of Markham
101 Town Centre Boulevard
Markham, ON L3R 9W3

Dear Mr. Sellars:

Re: TRCA Technical Review Comments
MESP review in support of Official Plan Amendment and Zoning Bylaw Amendment and Draft Plan of Subdivision for Sixteenth Land Holdings Inc.
4134 16th Avenue, Markham ON
City of Markham Files: OP 16-179225, ZA 16-179225, SU 16-179225 (Parts 1 and 2)
19T-16M10 (east) and 19T-16M11 (west)

Toronto and Region Conservation Authority (TRCA) staff acknowledges the receipt of the Master Environmental Servicing Plan (MESP) in support of the Official Plan and Zoning Bylaw Amendment applications on February 24, 2017. TRCA notes that the MESP are also in support of the draft plan of subdivision (Parts 1 and 2) which have been submitted concurrently, as noted above. As such, TRCA staff completed our review of the supporting plans and reports and provides the Town with the following comments.

Purpose of the Application

It is our understanding that the purpose of the application on the lands submitted by Sixteenth Land Holdings Inc. is to undertake an Official Plan Amendment, Zoning Bylaw Amendment, and supporting subdivision applications to facilitate the creation of two residential draft plans consisting of low and medium residential, commercial and institutional uses. The draft plans (west and east) are divided by Bruce Creek. The western portion of the site is comprised of approximately 76 hectares, and the eastern portion of the site is approximately 93 hectares.

Background

Municipally known as 4134 16th Avenue, the property consists of approximately 168.6 hectares (416.6 acres) of land, and is currently operating as the York Downs Golf Course. The site is bounded by 16th Avenue to the south, Warden Avenue to the west, Kennedy Road to the east, and the Angus Glen Village subdivision to the north.

The site is identified as a 'Future Urban Area' and identifies a number of open space and hazard lands within the 1987 Markham Official Plan. The 2014 Official Plan (which is partially OMB approved) identifies the site as Private Open Space and Greenway. Further, the current zoning on the property is comprised of open space and commercial recreational uses. As such, an

amendment to the official plan and the zoning bylaw is required to permit the proposed low and medium density residential uses.

TRCA's Roles and Responsibilities

TRCA provides our technical review comments through a number of roles. This includes TRCA's commenting role under the Planning Act; the Conservation Authority's delegated responsibility of representing the provincial interest of natural hazards encompassed by Section 3.1 of the Provincial Policy Statement (2014); TRCA's Regulatory Authority under Ontario Regulation 166/06 (as amended), Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses; and our Memorandum of Understanding (MOU) with the Region of York where we advise our municipal partners on matters related to Provincial Policies relevant to TRCA's jurisdiction.

Growth Plan for the Greater Golden Horseshoe and the Provincial Policy Statement (2014)

These provincial policies provide direction on matters related, but not limited to intensification, complete communities, and the preservation of natural and cultural heritage. As documented in section 1.4 of the Growth Plan, the document is to read in conjunction with the Provincial Policy Statement (PPS) and relevant provincial plans. In instances where there is a conflict between policies relating to natural environment or human health, the direction that provides more protection to the natural environment or human health prevails.

Both section 4.2.1 of the Growth Plan and section 2.1 of the PPS advocate the protection of natural features in order to maintain, restore, or improve the biodiversity and connectivity of these features in the landscape for the long term. While the PPS acknowledges that development may occur in some areas, it may only occur if it can be demonstrated there will be 'no negative impacts' on the natural features or their ecological functions.

The documents provided in support of the development identify a number of natural heritage features on the site, but also identifies the removal of some of these features. TRCA recognizes the need for a fundamental balance between providing housing within the GTA and the preservation and conservation of natural heritage systems. While some areas may be suitable for development, TRCA note that further information and discussion is required to determine the extent of the limits of development by delineating the features through technical discussions.

Living City Policies for Planning and Development in the Watersheds of the TRCA (LCP)

The LCP describes a "Natural System" made up of water resources, natural features and areas, natural hazards, potential natural cover and/or buffers. The LCP recommends that development, infrastructure and site alteration not be permitted within the Natural System and that it be conveyed into public ownership for its long term protection and enhancement.

TRCA strives to ensure consistency between our comments under the Planning Act and our comments under the Conservation Authorities Act. In order to obtain a current permit pursuant to our Regulatory Authority under the Conservation Authorities Act, the proposed development must meet the tests of our Regulations at the time of application. As such, TRCA must be satisfied that the form of development can satisfy the tests of Ontario Regulation 166/06 as amended, and demonstrate that there will be 'no negative impacts' in order for TRCA staff to support a permit. Details with respect to TRCA's policies can be found in section 7 and 8 of TRCA's Living City Policies.

York Region Official Plan

The approved Regional Official Plan (modified 2010, consolidated April 2016) contains a number of policies with respect to the future vision of the Region of York. Specific to TRCA's interest, the Regional Official Plan (ROPA) establishes policies and criteria to assess and determine natural

heritage features to be protected (woodlands and wetlands) and their ecological functions. Of note, the document notes that not all features are mapped on the Regions' plans and figures due to the scale of the jurisdiction and the limitations of existing information.

Specific to this development parcel, the ROPA identifies these lands on various maps as 'Urban Area' and Regional Greenlands System (following the stream corridors of Berczy and Bruce Creek). TRCA staff also note that the Plan also identifies patches of woodlots on the property, and is an area of high aquifer vulnerability. With respect to the natural environment, the ROPA identifies the overall objective of Regional Council is to protect and enhance the Greenlands System. Further Regional Council objectives with respect to the natural environment include but are not limited to:

- the protection and enhancement of key natural heritage and hydrologic features and functions;
- the protection of endangered, threatened and special concern species and their habitats;
- ensure no loss of wetland function or area in the Region;
- protection of significant woodlands and their biodiversity and encourage reforestation;
- ensure no loss of wetland function or area; and
- maintain and enhance water system health to ensure water quality and quantity and maintain the natural hydrologic function of water systems.

While the Regional Plan provides upper tier guidance on natural environment policies, TRCA acknowledges that the natural environment policies of the City of Markham New Official Plan are currently under appeal at the Ontario Municipal Board and are in formal mediation. Notwithstanding this, the overall site is within the existing urban area of the City of Markham, and the MESP provided in support of the application provides an overview of the features on the site, and staff has provided our comments on the document in Appendix 'A'.

TRCA Summary of Comments

TRCA staff reviewed the MESP and have identified the following key areas of concern:

1. The delineation of the natural heritage features and their applicable buffers needs to be revisited to comply with the greater of the natural heritage feature or hazard to determine the ultimate limit of development. TRCA is of the position that the limit of development should not include grading into the buffers of the features.
2. The minimum required monitoring information was identified during pre-consultation. The minimum amount of monitoring information was not provided. This information is required for TRCA staff to further assess the features, including feature based water balance requirements for all natural features, and site water balance for the overall development.
3. The groundwater monitoring information identified groundwater discharge conditions on site. TRCA staff requires additional geotechnical and hydrogeological assessments to characterize the groundwater in the area, which may impact feature based water balance requirements.
4. Staff requires further information for the erosion assessment to determine downstream erosion impacts to the receiving watercourse.
5. TRCA staff supports the municipality's conservative approach to stormwater management by locating stormwater management ponds outside of the regional floodplain. Since the upstream impacts of the future development within the FUA of Markham and the potential impacts on the downstream flood vulnerable area of Unionville are unknown at this time, a conservative approach to stormwater management with integrated LID's would be recommended.

In order for TRCA staff to be in a position to provide recommendations and advance the proposed applications, revisions will be required to the plan to adequately reflect the limits of development and all applicable buffers. Further, the attached comments will need to be addressed to TRCA staff's

satisfaction. Please provide a detailed response letter to TRCA's technical review comments attached as Appendix 'A' to this correspondence.

Other applicable Ministerial Approvals Required
TRCA staff advises that MNRF has an interest with respect to Redside Dace under Ontario's *Endangered Species Act*, 2007 as it applies to the subject lands. Please contact MNRF for any review / approvals which may be required from the Province.

Please note that on May 3, 2017, Redside Dace was listed as an endangered species under Canada's Species at Risk Act (SARA). Please advise the consultants to contact the specialists at the Department of Fisheries and Oceans Canada to find out how to comply with the *Species at Risk Act*.

Ontario Regulation 166/06 (as amended):
Please be advised the lands are within the TRCA Regulated Area and as such, the proposed development is subject to permit review and approval pursuant to Ontario Regulation 166/06 (as amended). This includes earthworks, site grading, servicing, etc. TRCA staff will discuss permit fees and requirements with the proponent at such time that the review and approvals have advanced and TRCA permits are required to facilitate the development.

TRCA supports the endeavours of our partner municipality in acquiring the environmental buffers consistent with the applicable environmental policies, which may be over and above the TRCA buffer requirements. In instances in which permits are required by the TRCA, buffer requirements must be (at a minimum) consistent with TRCA policy, and meet the tests of the Regulation.

Applicable Fees
In accordance with TRCA's Fee Schedule, the TRCA has provided written correspondence with respect to our review fees applicable to the MESP. This letter (dated December 19, 2016) was provided to the landowners, and payments for the first phase of the MESP review have been received.

However, through this correspondence, TRCA staff advises the landowners that additional review fees are also be applicable to the draft plans of subdivision currently under review. In light of the ongoing review of the of the MESP, TRCA staff note that the TRCA Fee Schedule contemplates additional fees associated with draft plans of subdivision greater than 50 hectares in size. These fees are typically calculated on a 'per unit' ($105/unit) and 'per hectare' ($475/ha) basis. In light of the ongoing concurrent review of the comprehensive MESP, TRCA staff are of the opinion that the fees associated with the Official Plan and Zoning Amendment applications can be waived, and staff will not apply the per hectare and per unit fees in this instance. Accordingly, the following subdivision application fees shall apply as follows:

1. Draft Plan of Subdivision 16-179225 (Part 1) – 25ha or greater (Complex) - $59,900.00
2. Draft Plan of Subdivision 16-179225 (Part 2) – 25ha or greater (Complex) - $59,900.00

For each draft plan, kindly advise the applicant to make arrangements for payment to be forwarded to the TRCA office as soon at their earliest convenience. Should there be any questions with respect to these fees, please have the landowner/consultant contact the undersigned.

Please also note that an additional fee in accordance with the applicable TRCA Fee Schedule will also be required at the time the proponent requests clearance of the conditions of draft approval standing in the name of the TRCA.

Recommendations

In summary, while TRCA is generally does not object to the redevelopment of the site, however TRCA staff have concerns with the proposed draft plans and the information contained within the MESP, including but not limited to the limits and buffers associated with the identified natural heritage system and the potential impacts of the proposed development. Please review this correspondence and the attached technical review comments contained within Appendix 'A' and provide a revised submission which addresses the comments in this correspondence.

To assist staff with review of the next submission, please provide a cover letter detailing how each of the concerns outlined in this letter and the attached Appendix have been addressed. TRCA staff are also available to meet with the City, the consulting team and the applicant in a collaborative effort to advance this project.

I trust these comments are of assistance. Should you have any additional questions or comments, please do not hesitate to contact the undersigned at (416) 661-6600 extension 5306.

Regards,

Doris Cheng, B.L.A., M.Sc.Pl., MCIP, RPP
Senior Planner • Planning and Development
Toronto and Region Conservation Authority
Email: dcheng@trca.on.ca

dc/qh

Email cc: Mr. David Miller, City of Markham (email only)
Mr. Patrick Wong, City of Markham (email only)
Mr. Michael Montgomery, Sixteenth Land Holdings (email only)
Ms. Maria Gatzios, Gatzios Planning (email only)
Region of York, developmentservices@york.ca (email only)

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Appendix 'A'
TRCA MESP Technical Review Comments
For Sixteenth Land Holdings Inc.
4134 16th Avenue, Markham

The following is a summary of our initial comments pertaining to our technical review of the MESP in support of the development applications. Staff requests additional information and clarification for the submitted MESP as outlined below:

Planning Ecology Comments:

6. Beacon Section 3.2.3.3 - As required in Section 4 of the July 2016 Terms of Reference, please present the headwater drainage feature information in Section 3.2.3.3 in the format required in TRCA's guideline. If all relevant data on required dates were not collected in 2016 to satisfy the guideline, please undertake these surveys in 2017. As with all Headwater Drainage Feature Assessments, flow data collection during all required sampling times is of particular interest to TRCA.

7. Beacon Section 3.2.3.3 Surface Drainage Feature C – TRCA staff observed flow under baseflow conditions in summer 2016 with Beacon. Therefore TRCA takes the position that this feature has permanent flow. Please revise.

8. Beacon Section 4 – Please revise this section and Figure 5 to reflect the wetland evaluation and staked limit approved by MNRF.

9. Please provide Figures 5 and 8 in E size with much greater resolution. As presented, the lines are pixelated. It is not possible for TRCA to verify the location of the lines shown.

10. There appear to be significant conflicts between the Ultimate Constraint line in Figure 5 and the development limits shown in Figures 1.3 and 7. Once Figure 5 has been revised to show complete information, please revise Figure 1.3 accordingly.

11. Please revise Section 5 and Figures 6A and 6B to recognize the need to adjust the watercourse "portrayed in the east central area of the property" to reflect the limits of SDF-B. Please also include SDF-C.

12. Beacon Section 5 - TRCA agrees that OP Maps 5 and 6 should be adjusted to show field verified features. Please revise Figure 6A to show all field verified features as several have been omitted from this plan.

13. Beacon Section 6.2.3 and 7.5 – The TRCA starting point for depth of cover for infrastructure beneath watercourses is 2.5m. 1.5m below the creek bed cannot be supported by TRCA due to potential impacts during installation and long term risk of channel incision, pipe exposure and channel hardening. Please revise the design to provide greater cover supported by an erosion analysis using the expected flows due to future development upstream.

14. Beacon Section 6.2.4 – TRCA policy does not support grading in buffers with the exception of infrastructure or restoration. Once the natural features on site have been identified and their management options defined, TRCA will be in a position to further discuss this issue.

15. Beacon Section 7.1 – Please add Provincially Significant Wetlands plus 30m buffer and add the 10m buffer required from the long term stable top of slope.

16. Beacon Sections 7.2 and 7.3 – Please revise this section to include a specific target for site water balance and potential methods to meet that target. This should be consistent with the approach being undertaken by Stantec and Beacon for the adjacent Yorkton Phase 2 development.

17. Beacon Section 7.2.1 and Stantec Section 6.6.2 – Section 4 of the TOR requires consultation with City and TRCA staff regarding pre-development monitoring requirements. Appendix D of the TRCA Stormwater Management Criteria requires consultation with CA staff to establish study requirements for feature based water balance. This was not undertaken.

    The existing conditions work in the MESP and the subsequent determination of protection requirements for features on the landscape need to be completed prior to feature based water balance work. The MESP needs to identify features to be protected, connected and buffered prior to determining how best to ensure hydrology is not impacted.

    TRCA suggests a work plan for feature based water balance be created once the status and management options have been finalized for all natural features within the study area. It appears the only features requiring further clarification and/or study are the wetlands and watercourses outside the valleys.

18. Beacon Section 7.6.1 – Please provide a comprehensive ecological rationale for filling of the irrigation ponds. TRCA could support their removal if it is demonstrated that the works are supported by the fisheries management plan and any direction provided by MNRF. Potential impacts on breeding habitat for amphibians should be discussed here.

19. Beacon Section 7.7.1.1 – TRCA is unaware of any assessment of alternatives for connecting the Yorkton developments and 16th Ave to Street A and Prospectors Dr. TRCA has consistently advocated for connecting Yorkton Blvd to Street B and Prospectors Dr east of Feature 1. This was not considered in any of the options explored in the Transportation Assessment. The status and management options available for Feature 1 and the wetlands and watercourses in the vicinity of Streets R, T, W and V remain outstanding. Once this information has been provided, the connectivity along and between those features will drive TRCA's ability to support a north-south road connection west or east of Feature 1. TRCA would be happy to discuss further with the City, MNRF and the proponents.

20. Beacon Section 7.7.2 – Please include in this section recognition that should existing crossings require upgrading to accommodate earthworks operations, no disturbance to the bed and banks of the watercourse will be permitted.

21. Beacon Section 7.10 – Management options available for wetlands are dependent on the MNRF wetland evaluation process and determination of Redside Dace habitat. TRCA will be in a position to comment on the proposed removals once the status of the features in question has been confirmed.

22. Beacon Section 7.11 - Management options available for headwater drainage features are dependent on the TRCA Headwater Drainage Feature Assessment and the MNRF wetland evaluation process and determination of Redside Dace habitat. TRCA will be in a position to comment on the proposed removals once the status of the features in question has been confirmed.

23. Beacon Section 7.12 – Please ensure any further erosion and sediment control plans or direction is accompanied by an ESC report.

24. Beacon Section 8.1 – Further to the comment on Section 7.6.1 above, please provide a rationale for the creation of the constructed wetland in Area C on Figure 9. Please directly reference the watershed plan, fisheries management plan any direction provided by MNRF to support wetland restoration.

25. Beacon Section 8.1 – Please note that stormwater infrastructure does not represent habitat enhancement. For example, Area D shown on Figure 9 is proposed as an infiltration gallery. This will not be recognized as ecological enhancement.

26. Plantings at the northern end of Street X were approved by TRCA as compensation for golf course renovations. As discussed on site, an alternative location for those plantings, above and beyond any plantings or restoration associated with this development project will be required.

27. Beacon Section 8.1 – Please note that in areas where established, healthy soils exist, the proposed 300mm of topsoil will not be required or permitted along with planting efforts.

28. Beacon Section 9 – The approach to monitoring for this development depends heavily on the status and management of features on site. Significant further discussion on monitoring will be required through MESP and detailed design review.

29. Burnside Section 2.4 - It is understood that the bulk of the monitoring data are for a short duration from the end of March 2016 to early August 2016. TRCA concurs with Burnside that the data are preliminary. Please provide a strategy and timing for collection and analysis of a representative quantity of data that management decisions can be based upon. In the instance of PZ4s/d, data loggers have been installed to confirm groundwater/surface interactions. Please confirm if a similar approach will be taken elsewhere. Of specific interest are PZ5s/d and PZ8s/d.

30. Burnside Section 4 – This section should be revised in accordance with the comment on Beacon Section 7.2.1.

31. Stantec Section 8.2 – Once the status of all natural features in the area has been determined, please demonstrate how road crossings of connections between natural features satisfy the TRCA crossing guideline.

Hydrogeological Comments:

Summary Comments:

Hydrogeology staff supports in principle the proposed amendment to the Official Plan and Zoning to convert the existing York Downs Golf and Country Club into a mixed use residential development on 168.58 ha of land. As part of the site plan application, an assessment of potential impacts and appropriate monitoring and mitigation measures should occur. Additional geotechnical/ hydrogeological assessments should be undertaken at detailed design.

General Comments:

1. Please note basement slab inverts should also be raised above the seasonal high groundwater level. Although there was some discussion in the FSR that a foundation drain collector (FDC) network is needed in areas where the storm sewer is not sufficiently low enough for basement connections, the preliminary geotechnical report recommended “finalized basement floor elevations should be set above the local water table” as underfloor drains and upgraded level of water proofing would be necessary in areas of the site if basements are proposed to be located below the local groundwater table and in potentially in bearing soils.

2. Please provide invert elevations for spine servicing. If deeper excavations require

depressurization for construction, a dewatering plan should be provided for review including but not limited to

- Identified PWQO exceedances and treatment recommendations;
- A copy of any PTTW application;
- A discharge monitoring program; and
- A plan view map showing the ZOI for all dewatering and depressurization in relation to natural heritage features.

3. TRCA notes that while not above the Ontario Drinking Water Standard, some chloride concentrates were above CCME water quality objective for protection of aquatic life of 120 mg/L. Please factor into the dewatering plan.

4. Subject to the appropriate siting of the SWM ponds, please note that as currently proposed, SWM Ponds 1, 2 & 4 will require liners due to the fact that the water table is above the base of the SWM pond.

5. TRCA does not support permanent dewatering and supports the recommendation to construct services in such a way to prevent redirection of groundwater flow (i.e. anti-seepage collars, clay plugs, etc.)

6. It was noted that due to the high water table and the amount of cut proposed in the west-central portion of the East Draft Plan area, infiltration trenches were not proposed as they could intersect the water table. Similarly, it was noted that due to grades exceeding 2%, dry swales were not recommended. Is it not possible to reduce the amount of cut and/or grades to implement more LID measures?

7. Given that the groundwater monitoring has generally been undertaken for less than one year and the discharge conditions observed onsite, could the monitoring period not be extended? And if the groundwater discharge is determined to be moderate or even significant, could not the feature based water balance be revised to include a groundwater component?

Water Resource Engineering Comments:

Please note, although there are a large number of water resources comments TRCA would like to acknowledge that the report was well organized and facilitated a straight forward review.

FSR

1. Water Resources staff has completed a preliminary review of the FSR but expects that some major modifications will be required at the MESP stage due to some of the outstanding issues and consequently the FSR will need to be revised. Once these issues have been resolved TRCA staff will be in a position to review the revised FSR.

Water Balance

2. The pre-development values provided are noted to be an estimate and should be revised to be reflective of the monitoring data. Similarly, the pre-development values appear to be low when compared with the York Tier 3 modelling values and further analysis and justification is required.

3. Section 3.7 of the Water Balance Assessment discusses how LIDs will be implemented in the FSR to minimize the impacts to infiltration. This section should be updated to focus on all components of the water budget including evapotranspiration and runoff.
4. Please provide figures which illustrate the various catchments areas that correspond with tables H-4, H-5a and b, H-7, and H-8a and b and figure 2.16 from Stantec's MESP.

5. Please provide supporting documentation/justification for the assumptions below made in the water balance analysis. They appear to result in inaccurate estimates for pre-development values (as per comment 3 above) and seem to allow for a water balance requiring little mitigation effort.

    a) Using an infiltration factor of 0.15 for pre-development 'hilly land' vs 0.2 for post-development 'graded land
    b) Changing the infiltration factor of the soil from 0.2 to 0.25 when it is considered amended topsoil
    c) Assuming 15% ET from impervious areas
    d) Assuming 25% of water that reaches the grass from the roof tops will be infiltrated
    e) Assuming that trenches sized to collect the 25 mm storm will infiltrate 93% of annual precipitation

    Note, for point e. above TRCA recognizes that this is from the City of Toronto's Wet Weather flow guide, however supporting documentation is required to support this assumption to demonstrate that the galleries will be empty within 24-48 hours and groundwater and soil conditions are appropriate.

6. Please clarify why "Area E" is an enhancement area that is receiving water from 73 lots.

7. TRCA appreciates the level of effort and detail that was put forth in developing the proposed mitigation plan for water balance, shown on Figure 2.16 in the Stantec MESP. However, please provide the targets used to determine the LID requirements within the body of the MESP report in order to be able to more easily implement this plan at the detailed design stage, especially if the site layout changes.

8. Please provide confirmation that an appropriate property allocation has been provided to accommodate the proposed LIDs. I.e. are the infiltration enclaves large enough to provide the required storage volumes?

Feature Based Water Balance

9. It has been noted by TRCA Planning Ecology that further investigation is needed to determine which features require a feature based water balance. Moreover, the FBWB that was provided does not incorporate the monitoring data, the seasonal impacts, or the impacts from the change in timing of the runoff to the wetland from the development. This will need further exploration.

10. Please clarify Figure 2.14 as it shows a number of lots which indicate both "full roof to woodlot" as well as "half roof to amended soil". Figure 2.16 within the MESP has similar discrepancies, please clarify.

11. The report notes that the wetland is surface water fed, however TRCA feels that there has not been enough monitoring data gathered and analyzed to make this conclusion. Further documentation to support this position is required.

Fluvial Geomorphology

12. As per TRCA's 2015 Crossing Guideline, please include in section 6.3 of the fluvial geomorphic report that a proposed crossing "must not increase flood risk for design storm events up to, and including, the Regulatory storm".

13. The fluvial geomorphic report states that the proposed road crossing should be located on a relatively straight reach of the channel however, the bridge is proposed immediately upstream of

an ‘s’ curve in the creek. TRCA strongly encourages that the crossing be moved to a more straight section of the creek.

14. It was noted in section 6.3.1 of the fluvial report that the abutments should be set outside of the 100 yr channel migration limits for the creek. Please confirm where the 100 yr channel migration limit is located and that the bridge abutments are located outside of this limit.

15. Section 6.3.1 also speaks to the 40 m span bridge being appropriate for the meander amplitude with an 8.25 m safety factor on either side of the creek. The east bridge abutment however appears to be located almost adjacent to the creek and not appropriately set back to allow for channel migration and to reduce the need for armouring and maintenance. Please explore all opportunities to revise the bridge location, alignment and/or skew to provide the appropriate setback from the creek from a fluvial geomorphic perspective.

16. Section 6.3.2 should be revised to clearly state that if the existing cart path crossings are replaced, a 25 yr channel migration assessment will be required and the new trail bridge abutments will be required to be set outside these limits.

17. The report states that the proposed sanitary crossing will be located 1.5 m below the invert of the creek. TRCA typically requires this clearance depth be increased to 2 m to prevent the potential exposure of the pipe due to ‘down cutting’ of the creek. If this is not possible, a firm commitment must be made to provide further detailed studies at future design stages. Please revise the depth or the text of the report to provide this commitment i.e. page 36 of the fluvial report states ‘it is *recommended* that, at subsequent design stages a scour analysis will be undertaken’.

18. Please ensure the final version of the fluvial report is signed and stamped by a professional geoscientist.

Erosion Assessment

19. Please provide a digital version of the hydrologic modelling completed for the erosion analysis.

20. On page 28 of the fluvial report it states a match will be considered if the hours of exceedance are within 5% of the existing condition. Please revise this statement to also include a comparison of the cumulative effective velocity, discharge and work/shear stress to ensure all factors are considered as were examined in Tables 9 to 12.

21. TRCA recognizes that preliminary discussions were had with regards to the approach taken for the erosion analysis and would like to further discuss the methodology as it appears the analysis is demonstrating the impacts during small events but does not examine the exceedance impacts during larger storm events i.e. 2 - 100 yr storms. Further, TRCA needs to see how the different retention time options during the 25 mm, 30 mm and 35 mm storms are effective at mitigating erosion impacts during a variety of sized storm events. Please contact TRCA to arrange a time to discuss this with technical staff.

Hydrology

22. The post-development modelling incorporates modelling from a number of sources outside the scope of this project and Water Resources staff cannot confirm the accuracy of this modelling. Please revise the post-development modelling to be based on TRCA’s approved hydrologic model with the modifications proposed for this site (and external lands draining to this site) incorporated. This will also facilitate a better comparison with pre-development conditions. Please also note the hydrologic modelling for the Markham FUA upstream of here has recently been approved and can be used in this study if preferred.

23. Please provide a post-development drainage area plan that corresponds with the catchments illustrated in the VO2 schematic. It is difficult to confirm if the drainage areas are correct when the catchments are divided differently on Figure 2.2 and the modelling schematic.

24. Page 2.18 of the MESP report states that updates to the Rouge River hydrologic and hydraulic modelling are currently underway. Please provide additional text, here or in another section, which discusses that not only the Regional assessment will need to be verified but also that discussions with TRCA will be required regarding any updates to the Rouge River SWM criteria (once available).

25. The level of imperviousness used in the Regional hydrology run seems low for both catchment 201 and 210. The table in Appendix D has the development at 44% for the Berczy Creek catchment at 45% for the Bruce Creek catchment. The hydrologic modelling for the 2-100 yr events has total imperviousness values around 65% which appear to be more reflective of the type of development proposed. Please clarify and revise this discrepancy.

26. Further to the above comment, in the Berczy Creek catchment the table (Appendix D) says the proposed development area is 28.8 ha but Figure 2.2 illustrates it at 31.7 ha. Similarly, it is not clear what is included in the drainage area of 139.5 ha for Bruce Creek as the areas being collected by Ponds 1,2 and 3, add up to well over 150 ha. Please clarify and revise as necessary.

Stormwater Management Ponds: General Comments

27. TRCA has been directed by the City of Markham that all wet SWM facilities be changed to dry facilities with pre-treatment due to the Pickering Airport impact zone. TRCA supports Markham on this change and requests revised SWM facility details be provided.

28. TRCA also supports the City of Markham requiring that all SWM facilities be located outside of the Regional flood plain given the flood risk areas located downstream. Please revise the plans and corresponding modelling/calculations to remove SWM ponds 1 and 3 from the Regional flood plain.

29. If approval from both TRCA and Markham is received for locating SWM ponds within the Regional flood plain then modifications to the provided cut fill balance are required. The incremental cut fill calculations include increments above the regional flood plain as Table 7.6 goes up to 182.40 and the majority of the cut and fill area is occurring where the flood plain is 180.43 or lower. If a cut fill balance is to be entertained, further efforts will be required to match at each increment and the calculations revised such that they do not include cutting or filling above the regional flood plain elevation.

30. Please provide calculations to demonstrate how Tp was calculated for the NasHYD command used to set the unitary flow targets.

31. Please provide unitary flow targets for the 10 and 50 yr storms in addition to those already provided. Further, please include the unitary flow targets for the Bruce Creek ponds within the body of the report. This will help with the implementation of these rates at future design stages if the drainage areas to the ponds change.

32. It is noted on Page 2.15 that at detailed design the storage volumes within the LIDs can be incorporated into the modelling to potentially reduce pond volume requirements. At this time TRCA needs confirmation from the municipality that they agree to this approach and that they will maintain the LIDs in perpetuity. Please provide this documentation or revise the text of the report.

33. It has been noted that 7.72 ha of drainage will flow to the watercourse uncontrolled and will be accounted for by over controlling pond 3. Please provide alternatives to direct more of this 7.72 ha to a SWM facility and reducing the amount of uncontrolled flow to the watercourse. Options to explore could include revised grading, an additional SWM facility (an area this large could support its own wet pond) or capture within 100 yr storm sewers.

34. It is noted that outfall locations will be located above the 100 yr flood elevation. The Beacon Fluvial Geomorphology Report states that the outfalls for ponds 1, 3 and 4 will be located outside of the meander belt limit and pond 2 will utilize an existing outfall. Please include this detail in the SWM section of the Stantec report.

35. It was noted that during the Regional event there were increases in flows at catchments 210 and 201 as a result of the proposed development, however increases were not found at the downstream nodes. Given the sensitivity of the lands downstream please provide further details to demonstrate the extent of the increases between the site and the downstream nodes.

Stormwater Management Pond 1

36. Please consider whether additional berming is required for pond 1 in order to achieve the MOE guideline for flow path within the pond. Please provide additional details if deemed necessary.

37. The storage volume calculations for pond 1 use a drainage area of 148.35 ha whereas the modelling uses 144.167 ha. Please clarify and resolve this discrepancy.

Stormwater Management Pond 2

38. Please consider whether additional berming is required for pond 2 in order to achieve the MOE guideline for flow path within the pond. Please provide additional details if deemed necessary.

Stormwater Management Pond 3

39. Please consider whether additional berming is required for pond 3 in order to achieve the MOE guideline for flow path within the pond. Please provide additional details if deemed necessary.

40. Please explore opportunities to have all pond inlets directed into the forebay of the pond, provide an additional forebay or provide justification why it is not necessary.

Stormwater Management Pond 4

41. The storage volume calculations for pond 4 use a drainage area of 29.3 ha whereas the modelling uses 31.7 ha. Please clarify and resolve this discrepancy.

42. Please consider whether additional berming is required for pond 4 in order to achieve the MOE guideline for flow path within the pond. Please provide additional details if deemed necessary.

43. Please explore opportunities to have all pond inlets directed into the forebay of the pond, provide an additional forebay or provide justification why it is not necessary.

Hydraulics

44. Please revise the HecRAS to model the culverts at 16th Ave. as culverts and not coded in the road deck as per TRCA's original model.

45. Please provide a digital version of the flood plain mapping such that the downstream reach lengths can be easily verified as well as that the floodline has been accurately plotted.

46. Please illustrate cross-section 7216.06 on Figures 7.1 and 7.2 as the extents of the section cannot be clearly identified.

47. Please provide further details discussing the crossing proposed at the downstream end of the wetland. Sizing with regards to hydraulics (figure illustrating drainage area and flow rates) and ecological considerations should be provided.

Berczy Creek (Revised Existing Conditions)

48. Please clarify why the manning's 'n' coefficient for the overbank areas at sections 7201.11 to 7201.13 are 0.05 and not 0.08 as was noted in the text of the report. Please revise as necessary.

49. Please explore the modelling of sections 72.011 and 7201.125 and clarify whether a levee is required as there is an error at both these sections referring to divided flow. Please revise the modelling as required.

50. Please examine the bank stations at cross-section 7201.13 to determine if they are appropriately located. If not, please revise.

51. Please explore whether additional sections are necessary as the difference in WSEL between 7201.105, 7201.11 and 7201.12 is greater than 0.5 m.

Bruce Creek (Revised Existing Model)

52. Please clarify why the manning's 'n' coefficient for the overbank areas at sections 7216.07 to 8212.01 (and LOB at 7216.1) are 0.05 and not 0.08 as was noted in the text of the report. Please revise as necessary.

53. Please clarify why the expansion and contraction coefficients are 0.3 and 0.5 at cross-sections 7216.07 and 7216.08. Please revise if appropriate.

54. Please examine the bank stations at cross-section 8212.01 to determine if they are appropriately located. If not, please revise.

55. Please clarify why the ineffective flow areas are not located adjacent to the opening at the culvert under 16th Ave. Similarly for the bridge at cross-section 7216.145, however this bridge is less of a concern as it is not a major structure. Please revise as applicable.

56. Please provide bridge details for the crossing at cross-section 7216.145 as it has been significantly modified from TRCA's existing model and the structure needs to be confirmed in order to accept the new model as baseline conditions.

57. Please explore whether additional sections are necessary as the difference in WSEL between 7216.10 through 7216.13 and 7216.18 through 8212.01 is greater than 0.5 m.

58. Please explore the modelling of sections 7212.07, 7212.08 and 7212.12 and clarify whether a levee is required as there is an error at these sections referring to divided flow. Please revise the modelling as required.

59. Please add all cross-sections from the future conditions model to the existing conditions model to enable an accurate comparison between existing and future WSELs.

Bruce Creek (Future Conditions Model)

60. Please clarify why the expansion and contraction coefficients are 0.3 and 0.5 at cross-sections 7216.07 and 7216.08. Please revise if appropriate.

61. Please clarify why the manning's 'n' coefficient for the overbank areas at sections 7216.07 to 8212.01 (and LOB at 7216.1) are 0.05 and not 0.08 as was noted in the text of the report. Please revise as necessary.

62. Please provide a digital version of the flood plain mapping, including the proposed SWM ponds such that the cross-section geometry can be confirmed. For example, it is difficult to determine if at section 7216.08 both SWM ponds have been included and sections 7216.13 and 7216.16 where the SWM pond may not have been accurately coded.

63. Please clarify if the existing golf club bridge between sections 7216.16 and 7216.13 is being removed as it has been removed from the model but remains illustrated on the figures. Please revise the figures and/or modelling such that they are consistent.

64. Please examine the bank stations at cross-section 8212.01 to determine if they are appropriately located. If not, please revise.

65. Please clarify why the ineffective flow areas are not located adjacent to the opening at the proposed crossing (cross-section 7216.169). Please revise as applicable.

66. Please explore whether additional sections are necessary as the difference in WSEL between 7216.07and 7216.08, 7216.1 through 7216.16, and 7216.18 through 8212.01 is greater than 0.5 m.

67. Please explore the modelling of sections 7212.07, 7212.16 and 7212.165 and clarify whether a levee is required (or revision to the modelled levee) as there is an error at these sections referring to divided flow. Please revise the modelling as required.

68. TRCA acknowledges that although the development results in increases to water surface elevations of 0.52 m and 0.27 m, these increases are contained within the subject lands and do not have off site impacts. However, please note that all development and limits must be based upon and set back from the updated flood plain elevations.