

1 <sup>st</sup> FSR Submission Comment	Response to 1 <sup>st</sup> FSR Submission Comment
<p><b>Planning</b></p> <p>1. Please update all drawings and the draft plan o subdivision to delineate the natural and hazardous features and the appropriate buffer listed below:</p> <ul style="list-style-type: none"> <li>a. The dripline staked in 2011 by CVC staff and 10m buffer</li> <li>b. The Provincially Significant Wetland and 30m buffer</li> <li>c. The Regulatory Floodplain and 10m buffer</li> <li>d. The erosion hazard of the drainage feature and 10m buffer. The meander belt of Lower Monora Creek and 10m buffer</li> </ul>	<p>The Draft Plan and all drawings have been updated based on the amended limits of development shown on Figure 1A and Figure 2 and the features (and their respective setbacks) noted below.</p> <p>Minor encroachments to the NHS buffer were made in order to eliminate transition grades within the private lots and straighten the lots lines. Developable land outside of the buffers has been added to the NHS as compensation, resulting in a net gain in total buffer area. Refer to Figure 1A for the specific location of the modifications to the northern development limit.</p>
<p>2. It is recommended that natural and hazardous areas and their associated buffers in the Natural Heritage System &amp; Buffer Block be zoned environmental protection and dedicated to Town</p>	<p>Acknowledged.</p>

<p><b>Hydrogeology</b></p>	
<p>1. The information from the additional monitoring wells installed across the site in 2013 provides a good understanding of the high seasonal groundwater elevations and groundwater flow mapping. However, the addendum study offered no assessment or review with respect to the preservation of hydro-periods/high seasonal groundwater linkages with terrestrial features and Middle Monora Creek in the post-development phase. Given the creek's significance as a habitat for cold water fisheries, best efforts must be implemented to identify and preserve existing groundwater support (base flow) to the creek, irrespective of the estimated volume contribution to the overall flow. This assessment is outstanding and must be completed through a Feature Based Water Balance (FBWB) assessment.</p>	<p>The Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth includes a feature based water balance. The features, which were agreed upon with the CVC included the WHPA Q1/Q2 area, catchment that flows north towards Middle Monora Creek and the remaining tableland area which has been interpreted to have an easterly ground water flow path.</p>
<p>2. A groundwater/base flow monitoring program is to be implemented prior to, during and for a defined period after the developmental activities have ceased, in order to maintain a current database and to allow for a periodic check on groundwater conditions/base flow contributions to the creek over time. Please provide an outline of the monitoring program.</p>	<p>The Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth includes a proposed monitoring program, which will be implemented spring 2019.</p>
<p><b>Construction</b></p>	
<p>3. Updated high groundwater elevation data across the site is to be compared to: site grading, subsurface infrastructure, retaining wall depths, SWM pond and outlet inverts; basement depths; etc. As such the updated FSR should identify where infrastructure is below the high groundwater level and where trench plugs would be required.</p>	<p>These details will be provided at detailed design as they do not impact the FSR / block sizing. The FSR notes that trench plugs will be required.</p>

<b>Site Level Water Balance</b>	
<p>4. The analysis was completed in an appropriate manner and produced a credible evaluation of the pre- to post- variation of the relevant components of the water cycle (precipitation, evaporation, runoff and recharge). However, there is much concern in that the water balance concludes that there will likely be a post- development drop in infiltration of approximately 46% across the site, when compared to the existing (pre-development) condition. This shortfall is substantive and must be fully mitigated against. Please see comments under Mitigation provided below for additional information.</p>	<p>A revised water balance has been provided in the Revised Hydrogeological Addendum Report (April, 2019). This revised water balance includes a feature based assessment as required by the CVC. This revised water balance also incorporated LID's presented in the Urbantech FSR, which have provided further reduction in the ground water infiltration deficit.</p> <p>Although minor deficits remain, additional contributions such as snow melt, which were not considered in the water balance as their values are difficult to quantify, would provide additional contributions. This would likely bring within a pre and post development ground water infiltration match. As well, the expected change should be considered in terms of its magnitude, not simply the percentages. The expected change in water table is less than a few centimetres, so will not be discernible within the seasonal variations.</p>

<p><b>Mitigation</b></p> <p>5. The water balance calculations show that without mitigation, there will likely be a loss of infiltration of about 46% created from the footprint of the propose development. In respect of this, roof-top runoff is being proposed as an additional source of water to mitigate against this loss of infiltration. However, even with such mitigation, the water balance calculations still conclude that there will be an infiltration shortfall of approximately 38% in the post-development phase. This is not an acceptable solution; the groundwater infiltration post-development must be mitigated for as to preserve the infiltration of the existing condition (pre- development). Please provide an updated water balance with proposed mitigation that demonstrates this.</p>	<p>The Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth includes a revised feature based water balance that has included LID mitigation measures to further reduce the ground water infiltration deficits to approximately 15mm.</p>
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**Ecology**

1. There are concerns with the encroachment (i.e. placement of fill) in the buffer to the provincially significant wetland and the potential negative impacts. It must be demonstrated that there will be no negative impacts on the form and function of the provincially significant wetland due to encroachment (i.e. placement of fill) into the buffer. Please reconfigure the site plan to move all development (i.e. all grading) out of the buffer to the provincially significant wetland.

It is not possible to locate all grading outside of the buffers; however the engineering design has been revised to significantly reduce the amount of grading encroachment required (refer to Figure 1A and Figure 2).

Encroachment into the buffer of the provincially significant wetland has been reduced to only what is required in order to facilitate the proposed development. There are two areas that have been identified where grading may be required into the buffer of the wetland.

a) Encroachment has been proposed in proximity to the existing trail (i.e. Block 27) that connects the property to Brucedale Boulevard to the north. At its closest point, grading will be approximately 24m from the wetland boundary (i.e. encroach 6m into the 30m buffer). The grading is proposed within an area that has been historically disturbed due to the presence of the existing informal trail. The maximum slope within the buffer will be 3:1.

b) Potential encroachment may be required into the wetland buffer to the north of Block 5 and 6. At its closest point, grading may be approximately 29m from the wetland boundary (i.e. encroach 1m into the 30m buffer). The maximum slope within the buffer will be 3:1.

At the locations where encroachment is proposed, an increased buffer (i.e. additions to the Natural Heritage System) is also proposed. The additional buffer at these locations will range from 4m in proximity to the trail to 2m to the north of Block 5 and 6. These areas will also be graded with a maximum 3:1 slope. All lands disturbed through grading activities and all lands within the buffer will be restored post-construction and will be planted with native self-sustaining vegetation. The buffer adjacent to the wetland will function to attenuate nutrients and sediment and screen the wetland from adjacent anthropogenic land use. As per the EIS and MP, it is recommended that fencing is installed adjacent to the Natural Heritage System (i.e. woodland, wetland, watercourse) where residential development is proposed.

<p>2. CVC has concerns that the EIS does not adequately demonstrate that there will be no negative impacts on the form and function of the significant woodland due to encroachment into the buffer and removal of a portion of the significant woodland. Provide an addendum to the EIS that includes the following:</p> <p>a) Reconfigure the site plan to move all development (i.e. all grading) out of the buffer to the significant woodland.</p> <p>b) As discussed on site, mapping of the significant woodland is to follow the 2011 staking completed by eve and the consultant. Please update all mapping accordingly.</p> <p>c) Provide a calculation of the area of significant woodland removed, using the 2011 staking as a reference.</p> <p>d) Clearly identify how the loss of portions of the significant woodland will be mitigated through the restoration plan.</p> <p>e) To mitigate for the loss of significant woodland, the restoration plan should indicate that plant material is to be calculated at a ratio that meet forest targets-shrubs planted 0.75-1.0 on centre and trees 2.7-3.0m.</p> <p>f) It is understood that a detailed landscape plan will be developed at a later stage in the planning process, however the restoration plan in the EIS should indicate that only native species that are common to the watershed will be used. A list of acceptable species is available on the CVC website:  <a href="https://eve.ca/wp-content/uploads/2018/04/Plant-Selection-GuideLine-FINAL-APRIL-24th-2018.pdf">https://eve.ca/wp-content/uploads/2018/04/Plant-Selection-GuideLine-FINAL-APRIL-24th-2018.pdf</a></p>	<p><a href="#">Refer to the Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth and the supporting response letter for this item.</a></p>
<p>3. There are concerns that will be impacts to groundwater flows to the wetland and Middle Monora Creek with the current water balance. The results of the water balance indicate that even with mitigation measures (i.e. roof top runoff), there will be an infiltration shortfall of approximately 38% in the post-development phase. This impact and measures to avoid, minimize or mitigate against the impact should be identified in the EIS. Refer to the hydrogeology and engineering comments for additional information related to site water balance and feature based water balance requirements.</p>	<p><a href="#">A revised water balance has been provided in the Revised Hydrogeological Addendum Report (April, 2019). This revised water balance includes a feature based assessment as required by the CVC. The features, which were agreed upon with the CVC included the WHPA Q1/Q2 area, catchment that flows north towards Middle Monora Creek and the remaining tableland area which has been interpreted to have an easterly ground water flow path.</a></p> <p><a href="#">This revised water balance also incorporated LID's presented in the Urbantech FSR, which have provided further reduction in the ground water infiltration deficit. These revisions have been incorporated into the revised EIS.</a></p>

<p>4. Drainage Feature A and portions of Drainage Feature B are proposed for removal with no evaluation of impacts in the EIS, and no plan to maintain, relocate or enhance their ecological and hydrological function. Following the Evaluation, Classification and Management of Headwater Drainage Feature Guidelines (<a href="https://cvc.ca/wp-content/uploads/2014/02/HDFA-final.pdf">https://cvc.ca/wp-content/uploads/2014/02/HDFA-final.pdf</a>), the management recommendation for Drainage Feature A should be Conservation, and for Drainage Feature B, Protection. Provide an addendum to the EIS that includes the following:</p> <p>a) Provide discussion on the function of the drainage features. Based on knowledge of the site and a review of data provided in the EIS, eve is of the opinion that both features are groundwater fed, provide intermittent (Feature A) or permanent (Feature B) flow, have water storage functions, support wetland vegetation, provide amphibian breeding habitat and contribute to the transport of allochthonous materials to downstream, cold water fish habitat.</p>	<p><a href="#">Refer to the Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth and the supporting response letter for this item.</a></p>
<p>b) Identify how the form and function of the drainage features and their riparian corridors will be replicated or enhanced on site. eve has no objection to the restoration taking place within the buffer to the significant woodland, however the feature should be created a minimum 7-IOm from the dripline of the significant woodland to minimize impacts to the root zone and the width of the buffer should be sized appropriately.</p>	<p><a href="#">Refer to the Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth and the supporting response letter for this item.</a></p>

<p>c) Demonstrate that there will be sufficient water in the restored feature to replicate the ecological and hydrologic function of the drainage features proposed to be removed.</p>	<p><a href="#">Refer to the Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth and the supporting response letter for this item.</a></p>
<p>5. The EIS did not appropriately address the impacts associated with increased use of trails through the Significant Woodland. The Draft Plan of Subdivision identifies a walkway (Block 27) leading into the Significant Woodland, thereby encouraging residents to use the woodland for recreational purposes. CVC recommends either formalizing a trail system to manage usage and minimize impacts to the significant woodland or removing the walkway from the plan. If the trail system is formalized, the EIS should identify trail design measures to minimize impacts to the woodland (e.g. minimize trail width, route the trail through the buffer of the woodland and increase the width of the buffer accordingly, close unsanctioned trails, etc.). CVC recommends further consultation with the Town of Orangeville to ensure conformance with the Town of Orangeville Trails Master Plan.</p>	<p><a href="#">Refer to the Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth and the supporting response letter for this item.</a></p>
<p>6. The addendum to the EIS is to include an analysis of the buffer to the significant woodland and wetland to ensure that it is of an appropriate width to satisfactorily mitigate all impacts associated with the development (e.g. loss of significant woodland, loss of drainage features, impacts associated with the development and occupancy, trail development etc.).</p>	<p><a href="#">Refer to the Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth and the supporting response letter for this item.</a></p>
<p>7. Potential occurrences of Jefferson Salamander, Canada Warbler, Golden-winged Warbler, and Rugulose Grape Fern were noted in Appendix 3; however, these species were not discussed in the report. Please clarify whether habitat for these species is on the property. If habitat is present, identify measures to avoid, minimize or mitigate impacts.</p>	<p><a href="#">Refer to the Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth and the supporting response letter for this item.</a></p>

<p>8. The EIS indicates that Eastern Meadowlark has been confirmed breeding within the cultural meadow community on the property, however a thorough impact assessment was not included in the report. As per O.Reg 242/08, if the habitat for Eastern Meadowlark is proposed to be removed or destroyed, a development plan is required in which new habitat is to be created or enhanced. An addendum is to be submitted that includes details of this plan, including the following:</p> <p>a) Identification of the area of habitat removed and/or destroyed by the development.</p> <p>b) Identification of the size of the habitat to be created or enhanced. As per the regulation, this is to be an area equal to or greater than the size of the habitat that the development activity is likely to damage or destroy.</p> <p>c) Identification of the location of habitat to be created or enhanced. The MNRF requires the location of the new habitat to be within the same ecoregion; Eve strongly recommends the location of the new habitat also be within the eve watershed and within the Town of Orangeville.</p> <p>d) Details on the planting plan. See O.Reg 242/08 (5) for further information on specific requirements of the plan.</p> <p>e) Confirm that all raw data and details of the development plan have been submitted to MNRF Midhurst</p>	<p><a href="#">Refer to the Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth and the supporting response letter for this item.</a></p>
<p>9. Azimuth's October 16, 2018 memo notes one retainable and one non-retainable Butternut to have been assessed on the property. According to the memo the retainable tree is within 10m of the development and is thus proposed to be 'harmed'. As per O.reg. 242/08 up to 10 retainable Butternut trees can be removed provided listed conditions are met. An addendum is to be submitted that includes:</p> <p>a) Confirmation that a notice of butternut impact has been submitted to MNRF.</p> <p>b) Details of the required planting plan for the harm of a category 2 butternut over 15 cm DBH, as per 23.7 (10) of O.Reg. 242/08</p>	<p><a href="#">Refer to the Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth and the supporting response letter for this item.</a></p>
<p>10. Table 2 identifies 10 species identified as rare in the eve watershed (including <i>Physalis heterophylla</i>, which was not recorded as rare in the table). Provide a discussion of these species, and mitigation measures if they are impacted by the proposed development.</p>	
<p>11. It is recommended that opportunities to contribute to the Natural Heritage System by naturalizing portions of Park Block 25 and/or shifting the development 5m to the west in order to increase the width of the buffer of Drainage Feature B be explored.</p>	<p><a href="#">Based on consultation with the Town, they are amenable to the naturalization of a portion of the Park Block. This is reflected on the updated Site Plan. An increased buffer is proposed along a portion of Drainage Feature B.</a></p>

12. The addendum to the EIS is to provide a comprehensive restoration plan that summarizes all restoration/mitigation measures proposed.	Once all areas of restoration/mitigation are agreed upon, the Restoration Plan can be incorporated into an updated EIS & MP.
13. Eve supports the recommendation made in the EIS to install fencing adjacent to the significant woodland where residential development is proposed. In order to reduce potential encroachment, CVC recommends gate-less fencing. This recommendation should be carried through to the detailed design phase of the project.	Comment noted.
14. CVC supports the recommendation made in the EIS to complete all works involving Drainage Features A and B, including stormwater tie-ins and grading, within the coldwater construction timing window. Please note that the dates provided in the EIS are incorrect and should read June 15-Sept 15 (instead of July 1 - Sept 30).	Comment noted.
<b>Engineering</b>	
1. An Environmental Management Plan (EMP) report for Middle Monora Creek was not provided for review. However, it appears that the components of the EMP, as listed in the report's Scope of Work, have been submitted as separate documents. Please provide a letter confirming how the components of the Middle Monora Creek EMP Scope of Work have been provided for in the submitted documents and provide justification for anything not provided.	As agreed with CVC staff at the Dec. 2018 meeting, an EMP is not required provided that the studies completed in support of the Draft Plan application adequately address the CVC's scope of work.
2. The subwatershed 19 Floodplain Maps have been updated and appear to show a more conservative estimate of the Regional Floodplain associated with Middle Monora Creek. Please delineate CVC's Regional Floodplain limits on the drawings based on CVC's Regional Floodplain map (attached). The Regulatory Floodplain elevation at the cross sections are to be used and the floodline interpolated in between the cross sections. The eveRegulatory Flood line is to be used to establish the limits of development.	Figures 1A and 2 illustrate the existing and proposed Regional floodplain based on WatersEdge's interpretation of the CVC model. The post-development increase in regional flows from the subject lands were estimated based on the updated VO5 model and provided to WatersEdge.
3. The meander belt assessment does not refer to CVC's Fluvial Geomorphic Guidelines. Determination of the meander belt is to be in accordance with these guidelines ( <a href="https://cvc.ca/wp-content/uploads/2015/05/CVC-Fluvial%20AD%20G-Guide%20April-2015.pdf">https://cvc.ca/wp-content/uploads/2015/05/CVC-Fluvial%20AD%20G-Guide%20April-2015.pdf</a> ). The Fluvial Geomorphology Report is required to be stamped and signed by a P.Eng. or P.Geo.	
<b>Functional Servicing Report (FSR)</b>	
4. The FSR is to reference the Lower Monora Creek EMP noted in comment 5.	The FSR has been updated to reference the Lower Monora Creek EMP.

<p>5. The FSR is to describe existing and proposed drainage conditions. It should be noted that a portion of the subject site currently drains to Lower Monora Creek. Based on findings and recommendations of the <i>Lower Monora Creek Environmental Management Plan Part A</i>, dated June 3, 1999, the subject site is a high recharge area. As such, pre-development drainage conditions are to be maintained post-development to Lower Monora and Middle Monora Creeks. The FSR and accompanying figures are to be revised appropriately.</p> <p>a. It appears that a sizable portion of the development drains towards Lower Monora Creek via roadside ditched and storm sewers along Hansen Boulevard in the predevelopment condition. Review the existing drainage plan and delineate this area. Pre-development flows from the site to Middle Monora Creek may need to be recalculated. Maintain pre-development drainage to Middle Monora Creek and Lower Monora Creek. Provide justification if this is not possible. If maintaining the drainage divide is not possible, then conduct a risk assessment as described in Comment 22.</p>	<p>The FSR includes Figures 1B and 1B which illustrate the existing and proposed drainage, respectively. As described in the FSR, the pre-development drainage / surface water flows to Feature A and the NHS can be maintained.</p> <p>Please refer to the Azimuth study for a detailed water balance assessment including groundwater recharge estimates.</p> <p>a. Acknowledged; the existing drainage plan has been revised to indicate the drainage towards Hansen Boulevard. The proposed SWM facility has been designed to ensure pre-development flows to Middle Monora Creek are not exceeded.</p>
<p>6. Grading within the dripline buffer and floodplain buffer include 2:1 reinforced slopes which will need to be maintained by the Town. The slopes in these areas should be designed as to not require maintenance to remain in a stable condition</p>	<p>2:1 slopes are no longer proposed.</p>
<p>7. It is CVC's preference that LIDs (i.e. soakaway pits, etc.) be located on public property so that maintenance can be provided by the Town of Orangeville. If the LIDs are to remain on private property, a 50% loss factor should be incorporated into the overall design at this stage, and an Operations and Maintenance Plan would be required for review at the detailed design stage. General sizing calculations are required at this stage and detailed calculations are required at the detailed design stage.</p>	<p>As discussed with CVC staff at the previous meeting, LIDs within the public ROW are not practical from a water quality and Town maintenance perspective. We note that a 50% loss factor was not required for the design of the Orangeville Highlands Phase I soakaway pits, and given that many of the proposed LIDs are in the front yards, modifications over time are not anticipated.</p> <p>An O&amp;M manual can be provided during detailed design.</p>

8. Since the site is considered an (ecologically) significant or high recharge area in CVC's Stormwater Management Criteria document and the Lower Monora Creek EMP, the on-site recharge is noted as an environmental protection target in the Credit River Watershed Subwatershed 19 study, a site water balance is required to ensure pre-development infiltration matches post-development infiltration.

Post-development infiltration rates will be affected by the presence of impervious surfaces (i.e., building rooftops and asphalt roads/driveways), which based on the proposed development plan will comprise approximately 64% of the development area of the property or 44% of the entire property. Upon completion of the site development, it is estimated that there will be a loss of approximately 44% in ground water infiltration between the pre-development and post-development conditions, assuming no mitigation strategies are employed.

As a 44% deficit is not acceptable, LID features will be incorporated into the site design (as shown on **Figure 5B**) to reduce the deficit. The proposed LID practices include front and rear yard soakaway pits for the freehold townhouses, a detail of which is available on **Figure 5B**. Within the site plan blocks, LIDs have been shown conceptually, but the exact type and details will be confirmed at detailed design. LID sizing is based on maximizing the storage volume from the proposed surface to 1m above the groundwater elevation. The available storage was used to back-calculate the total precipitation volume that could be accommodated in each feature. The results in Appendix B indicated that the LIDs can capture between 3mm to 109mm. This correlates to a significant amount of annual rainfall / runoff capture, sufficient to meet the recharge deficit.

As indicated by Azimuth, if the proposed LID mitigation measures are employed, an overall recovery in ground water infiltration of approximately 19,461 m<sup>3</sup>/year would be expected, for a net loss of approximately 5%. The deficit is redirected to Middle Monora Creek so that it remains within the same watershed. As the deficit mainly occurs during spring and fall (periods of high water), the net effect is minimized. Finally, this deficit equates to only approximately 15 mm/year/m<sup>2</sup>, which is insignificant relative to pre-development infiltration rate of 275 mm. A reduction of infiltration by this amount will theoretically reduce the on-site water table elevation by 0.005 to 0.015 metre, which is within the existing seasonal fluctuations, which have been shown at some monitoring wells to vary between 1.5 to 2m, therefore is not considered to be significant.

<p>9. The FSR is to note CVC's SWM criteria for Quantity, Quality, Erosion and Water Balance, and make reference to CVC's SWM Criteria document (<a href="https://cvc.ca/wp-content/uploads/2014/09/cvc-swm-criteria-appendices-Aug12-D-july14.pdf">https://cvc.ca/wp-content/uploads/2014/09/cvc-swm-criteria-appendices-Aug12-D-july14.pdf</a>).</p> <p>The applicable criteria are:</p> <p>11. Quantity: post to pre control for all storms (i.e. 2, 5, 10, 25, 50, 100 yr).</p> <p>b. Quality: Enhanced Level of Protection (80% TSS removal)</p> <p>c. Erosion: 25mm-48 hr detention or a site appropriate erosion threshold as determined by a geomorphological assessment.</p> <p>d. Water balance: site specific water balance and maintenance of recharge is required.</p>	<p>The CVC criteria have been noted in the FSR.</p>
<p>10. The proposed development is to provide safe conveyance of the Regulatory storm event (i.e. to be included in the hydrologic modelling and preliminary pond calculations). In addition, the Regional Flood elevation and limits are to be shown on SWM Pond Figure 4 in plan and cross-section.</p>	<p>The proposed ROWs and SWM facility emergency spillway can convey the proposed Regional peak flow of approximately 1.6m<sup>3</sup>/s. Refer to the calculations in Appendix B.</p>
<p>11. The need for pond liner is to be identified at this stage. In addition, the SWM Pond Figure 4 is to show the impermeable liner designed per geotechnical recommendations as well as the seasonally high groundwater level on the cross-sections.</p>	<p>The pond liner has been shown schematically on Figure 4. Additional details will follow at detailed design. The groundwater elevation varies across the width of the pond, but is generally close to the existing ground, which is plotted on the sections. We acknowledge that the groundwater elevation is above the pond bottom; the liner will be designed accordingly at detailed design.</p>
<p>12. Provide a model schematic for the hydrologic model with the Visual OTTHYMO output report.</p>	<p>Refer to Appendix B.</p>
<p>13. Clarify drainage of any external lands through the development. Existing and proposed drainage plans are to show drainage areas which include the rear yards from Lisa Marie Dr. which drain to the subject property.</p>	<p>The external drainage is clearly indicated on the Figures 1B, 1C and 5A.</p>
<p>14. The consultant should review and reference <i>Technical Document: Environmental Planning for the Credit River Headwaters, Subwatershed No. 19</i> (January 1997) available at: <a href="http://www.creditvalleyca.ca/wp-content/uploads/2011/09/SUBNO19.pdf">http://www.creditvalleyca.ca/wp-content/uploads/2011/09/SUBNO19.pdf</a></p>	
<p><b>Floodplain Alteration</b></p>	

<p>15. Is any loss of floodplain storage expected at the west and east drainage feature as a result of the proposed grading plan? Will loss of floodplain storage have an effect on the Regional Floodplain limits on neighbouring properties? Please provide a hydraulic model for review. Please contact eve to request the updated modelling information associated with the updated eve Regulatory Floodplain mapping of Subwatershed 19.</p>	<p>The proposed re-grading of Feature B will not impact the Regional floodplain limits on neighboring properties. This feature area was not included in the CVC hydraulic model cross-sections and therefore no theoretical changes will occur to the model results. This is a backwater area with minimal velocities and it does not contribute to flow conveyance through the main channel. Furthermore, the proposed SWM facility provides over 2500m<sup>3</sup> of excess storage, which can route the Regional storm from the contributing drainage area. This would make up for any minor losses in storage the Feature B related to grading.</p>
<p><b>General</b></p>	
<p>16. Why is the proposed development area of 11.83 ha, mentioned in the Executive Summary and Introduction, different from the pre-development drainage area of 12.18 mentioned in Section 4?</p>	<p>The development area has been clarified in the FSR.</p>
<p>17. Where is the uncontrolled area, recommended being treated with a treatment train approach, mentioned in Section 4.4 Quality Control? Is this the right-of-way area between storm manholes 9 and 10?</p>	<p>Rear yards and roof tops are considered to be clean drainage and do not require quality control. The proposed uncontrolled areas include the park block which drains to the NHS, rear yards and roof tops draining to Feature A, and rear yards and rooftops draining to Feature B. Drainage to Feature B can be intercepted by an LID prior to discharge in to the feature to provide some measure of erosion control as shown on Figure 5B. Drainage to Feature A will be directed to a wetland area, which would mitigate erosive flows.</p>
<p>18. The drainage area to the wetland at the north end of Block 20 on the Storm Servicing Plan doesn't match the proposed Grading Plan.</p>	<p>The storm servicing plan and grading plan are now consistent with respect to drainage areas.</p>
<p>19. Storm Servicing Plan tributary area runoff coefficients are to be conservative and based on a weighted average (i.e. Blocks 18 and 19 can be assumed to be mainly impervious surface). Also, the impervious pond block is to be included in the tributary are of the SWM pond.</p>	<p>The overall drainage area has an average imperviousness of 70%. The future site plan areas were assumed to be 90% impervious, and the SWM block was assumed to be 100% impervious.</p>

<b>Site Grading</b>	
20. CVC generally recommends new slopes to be constructed at a minimum inclination of 3:1. It is recommended that the proposed grades be modified in order to eliminate the 2:1 reinforced slopes.	The preliminary grading design has been updated so that all proposed slopes are 3:1 or less. Minimal transition grading is required within the buffers as shown on Figure 2.
21. Are there any maintenance requirements associated with the 2:1 engineered slopes? What is their expected lifecycle? A geotechnical engineer is to confirm that the proposed 2:1 engineered slopes will remain stable without being maintained. Refer to CVC's Slope Stability Definition and Determination Guidelines: <a href="https://cvc.ca/wp-content/uploads/2012/02/Slope-Stability%20AD%20Determination-Guidelines.pdf">https://cvc.ca/wp-content/uploads/2012/02/Slope-Stability%20AD%20Determination-Guidelines.pdf</a> %20Floodplain	3:1 slopes are no proposed. Refer to Figure 2.
22. As a result of the proposed storm drainage plan directing an increased tributary area to Middle Monora Creek, identify the post-development change in flood hazard downstream of the site based on uncontrolled flows, for the 100-year and Regional storm events, in order to gain an understanding of the potential downstream flooding impacts. Downstream floodplain impacts/increases for the post-development-controlled flows scenario are not acceptable. Please provide a hydraulic model for review. Please contact CVC to request the updated modelling information associated with the updated CVC Regulatory Floodplain mapping of Subwatershed 19.	Refer to updated modeling prepared by Water's Edge which have been updated to reflect to the post-development conditions. The proposed floodline is illustrated on Figure 2.
<b>Erosion Hazard</b>	
23. Delineate the Meander Belt erosion hazard and 10m setback on the subdivision drawings for the Middle Monora Creek tributary	The Meander Belt has been included on Figure 1A and Figure 2.
24. Confirm whether there is an erosion hazard limit associated with the eastern drainage feature based on post-development conditions. Please delineate this hazard on the drawings if there is one.	The limit of development has been set back 10m from the proposed top of bank.
<b>SWM Pond</b>	
25. SWM pond inlet pipe does not meet minimum slope of 1% per MECP SWM Planning and Design Manual.	The storm inlet is designed in accordance with the Town of Orangeville criteria and good engineering practice. A 1% slope is not required or warranted in this situation.
26. Due to the shallow grade of the SWM pond inlet pipe, storm water may back up into the storm sewer system for the different storm events. Conduct a hydraulic grade line analysis of the storm sewer system for the different storm events.	A 100-year hydraulic gradeline analysis will be provided at detailed design and plotted on the plan and profile drawings for review.

<p>27. It was noted that the pond outlet elevation is at an elevation of approximately 420.70m, and the outlet invert of the drainage channel at Middle Monora Creek is approximately 419.50m based on dwg FIG. 4. However, on site, the invert of the drainage channel at the outlet to Middle Monora Creek appeared to be approximately 1 m higher than the drainage channel and the creek. Is a Hydraulic Performance Test/hydraulic analysis required for the drainage channel to ensure that outlet flows from the SWM pond are being conveyed to Middle Monora Creek? Provide a cross- section showing elevations of the drainage channel at the outlet of Middle Monora Creek.</p>	<p>The existing drainage feature was not perfectly graded towards Monora Creek and did have localized low/high points throughout. As shown on Figure 2, the channel is proposed to be regraded with proper 3:1 slopes and continuous fall from the pond to the Monora Creek low flow channel. Cross sections are provided on Figure 3B.</p>
<p>28. Demonstrate safe conveyance of the Regional storm flows from the site to the downstream watercourse.</p>	<p>The Regional flow approaching the pond is approximately 1.66 m<sup>3</sup>/s. This flow can be safely conveyed on the ROW and through the pond emergency spillway to the downstream watercourse. Refer to Appendix B for the conveyance calculations.</p>
<p>29. Due to the proposed heights of the berms and the proposed Normal Water Level being above the ground elevations of the adjacent Orangeville Mall and Hansen Boulevard, a breach of the berms may have catastrophic results. Alternative design of the SWM Facility should be considered. It must be confirmed by a geotechnical engineer that the proposed berms will be geotechnically stable over the design life of the SWM Facility.</p>	<p>Refer to the supplemental letter by Soil-Mat in Appendix D confirming the pond slope stability.</p>
<p>30. A geotechnical engineer is to recommend the need for a Dam Safety Break Analysis for the proposed berm. Although the proposed embankment does not necessarily meet the definition of a "dam", CVC recommends the Town review Ontario Dam Safety Guidelines (MNR) for reference, in order to be aware of potential risks. The guidelines stipulate that the dam owner is responsible for inspection and maintenance to ensure long term safety.</p>	<p>Refer to the supplemental letter by Soil-Mat in Appendix D confirming the pond slope stability.</p>
<p>31. Typically details of a pond liner would be required at detailed design; however, due to the location of the pond, a pond liner should be taken into account when analyzing a factor of safety for the pond berm.</p>	<p>The requirement for an impermeable liner has been accounted for in the geotechnical analysis. Refer to Appendix D for preliminary details.</p>
<p>32. The SWM pond is to provide 25 mm – 48 hr detention for erosion control, per CVC's Stormwater Management Criteria document.</p>	<p>Acknowledged. The SWM facility has been designed to detain the 25mm storm to a suitable drawdown time.</p>

<b>Water Balance</b>	
<p>33. It has not been demonstrated that post-development recharge matches pre-development recharge based on calculations that include infiltration LID measures for the overall site water balance and the feature-based water balance. See hydrogeology comments above for more information.</p>	<p>The proposed LID measures on Figure 5B have sufficient storage to capture the majority of the contributing runoff through the year. The total runoff captured is expected to meet or exceed the recharge requirements.</p> <p>As demonstrated in the FSR, the feature based water balance is satisfied as it relates to surface drainage to the NHS and Feature A.</p> <p>The Azimuth hydrogeology study has assessed the water balance to the Q1/Q2 feature. Refer to the Revised Hydrogeological Addendum Report (April, 2019) prepared by Azimuth and the supporting response letter for this item.</p>
<b>Erosion and Sediment Controls</b>	
<p>34. It is our understanding that an Erosion and Sedimentation Controls Plan and Staging Plan will be provided for review at detailed design. Refer to the Greater Golden Horseshoe Area Conservation Authorities' document, Erosion &amp; Sediment Control Guidelines for Urban Construction for more information: <a href="https://cvc.ca/wp-content/uploads/2011/01/010-ESC-Guideline-for-Urban-Construction.pdf">https://cvc.ca/wp-content/uploads/2011/01/010-ESC-Guideline-for-Urban-Construction.pdf</a></p>	<p>Acknowledged. ESC Plans will be provided with the 1<sup>st</sup> detailed design submission.</p>
<b>Comments for Detailed Design – Provided for Reference</b>	
<p>35. Detailed review of the SWM pond has been reserved for the detailed design stage.</p>	<p>Acknowledged.</p>
<p>36. A representative from Soil-Mat is to be present during the backfilling and compaction of berms within the SWM pond block. Backfilling and compaction activities are recommended to be supervised by a representative from Soil-Mat per the geotechnical report.</p>	<p>Acknowledged.</p>
<p>37. The geotechnical report is to make recommendations regarding the design and construction of the impermeable liner of the SWM pond.</p>	<p>Refer to supplemental letter from Soil-Mat in Appendix D. Further details will be provided on the detailed design drawings.</p>
<p>38. Please note CVC will require confirmation from qualified Professional Engineer(s) that construction and operation of the pond liner within the SWM facility is per the approved design, and the pond, berms, and proposed earthworks have been built as per design and recommendations of the geotechnical engineer. Site grading within the pond block area and construction of the liner must be supervised and certified by a geotechnical engineer.</p>	<p>Acknowledged.</p>
<p>39. A dewatering plan will likely be required at detailed design, pending and in accordance with a satisfactory hydrogeology report.</p>	<p>Acknowledged.</p>