

**556, 560 and 576 Conservation Drive
Draft Plan of Subdivision 30T-16402
Response to GRCA circulation comments (dated August 11, 2017)**

No.	Comment	Response
1	We note that a portion of the stormwater for the subject lands will be directed toward an off-site SWM facility, the location and design of which has yet to be determined. Please note that GRCA staff are unable to provide a comprehensive review and/or support of 30T-16402 and Z-16-14 without this information	The design of the off-site SWM facility at the south end of the Green Acre Park lands is being completed by others; the GRCA has been working with the developer group's consultants in order to advance the design and approval of this community SWM facility. We understand that this facility will be approved prior to Draft Plan Approval for any of the affected developments.
2	Please clarify whether any stormwater from the adjacent "Brohman lands" (620 Conservation Drive) will be directed east toward the subject site. If so, the Preliminary SWM Report will need to address whether the on-site SWM facility can adequately accommodate stormwater from the adjacent property	As much stormwater as can be drained from the Brohman Lands' lots will be directed to the subject site. These have been accounted for in the design of the stormwater management facility and the updated SWM Report addresses this. We have shared our servicing strategy with Brohman's engineer, GM Blueplan, who is currently conducting their own confirmation of the design.
3	As noted in our pre-consultation comments dated September 14, 2015, a portion of Park Block (Block 480) is proposed within the 30 metres wetland buffer. Park is not the intended use of the buffer area; therefore, this portion should be designated as Open Space instead	Park Block 34 (formerly Block 253) has been revised to reflect limits of Open Space Block 35 (formerly Block 254) and accompanying buffer
4	Section 5.4 of the Environmental Impact Study (EIS) states that "a formal trail system will be provided outside of buffers and natural areas" and GRCA staff of supportive of this approach. However, the location of any proposed trails should be illustrated directly on the Draft Plan to ensure this recommendation is implemented	Conceptual location of proposed trails identified on revised draft plan of subdivision
5	GRCA staff agree that the target unit flow rates for discharge to Beaver Creek, as derived from the NWSSS using GAWSER modelling of event rainfall from the Guelph Arboretum and 54 years of continuous meteorological data from Waterloo-Wellington Airport. However, in order to ensure conservative design of major system stormwater conveyance and end-of-pipe storage elements, please use the Regional Municipality of Waterloo 100-year, 3-hour IDF rainfall parameters instead of those applied by the City of Waterloo. The former has a 100mm of rainfall while the later has 90mm. For comparative purposes, it is worth nothing that the City of Cambridge SWM Policies and Guidelines, using AES and	The subwatershed study directs us to use the more conservative of the City of Waterloo and Guelph Arboretum IDF parameters to determine the size of the SWM facilities: <i>"Detailed design for the individual stormwater management facilities shall be completed with an event based assessment using both the 24-hour SCS data from the Guelph Arboretum as well as the City of Waterloo 3-hour Chicago data with the most conservative result selected for construction"</i> (Page 248 of the NWSSS).

	<p>Shades Mill meteorological data from 1971-2008, have identified 108mm as the 100-year, 3-hour rainfall depth.</p>	<p>We have run the RMOW's rainfall parameters through the current design in order to demonstrate that the pond is adequately sized for the 100-year design storm, regardless of which ABC's are chosen. This is because the outlet structure design is dominated by the Hurricane Hazel attenuation requirement. The table below shows the total flow rates to Beaver Creek in the 100-year storm event models:</p> <table border="1" data-bbox="1171 435 1892 776"> <thead> <tr> <th></th> <th>Total flow to Beaver Creek (m³/s)</th> <th>Pond Outflow (m³/s)</th> <th>Max. Storage Elevation (masl)</th> <th>Max. Storage Volume (m³)</th> </tr> </thead> <tbody> <tr> <td>Allowable</td> <td>0.677</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>City ABC's</td> <td>0.456</td> <td>0.312</td> <td>354.53</td> <td>6,144</td> </tr> <tr> <td>Guelph ABC's</td> <td>0.391</td> <td>0.232</td> <td>354.44</td> <td>5,562</td> </tr> <tr> <td>RMOW ABC's</td> <td>0.507</td> <td>0.394</td> <td>354.63</td> <td>6,723</td> </tr> </tbody> </table>		Total flow to Beaver Creek (m ³ /s)	Pond Outflow (m ³ /s)	Max. Storage Elevation (masl)	Max. Storage Volume (m ³)	Allowable	0.677	-	-	-	City ABC's	0.456	0.312	354.53	6,144	Guelph ABC's	0.391	0.232	354.44	5,562	RMOW ABC's	0.507	0.394	354.63	6,723
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6	<p>Please provide a section view of the proposed SWM facility discharge controls. In particular, the nature of the 7m wide outlet control weir (as labelled on Figure 4) and its relationship to the extended detention 75mm diameter outlet control orifice is unclear</p>	<p>The outlet system has been slightly reconfigured, and the section view on Figure 4 of the updated Stormwater Management Report has been clarified.</p>																									
7	<p>Please confirm that the SWM facility in Block 487 will have side slopes to satisfy the MOE safety criteria. It would be helpful to document this in Figure 4 of the SWM report</p>	<p>Side slopes in the SWM facility satisfy MOE criteria. Labels have been added to Figure 4 included in the SWM report.</p>																									
8	<p>Section 3.3 of the EIS includes a Grand River Fisheries Management plan which identifies the objectives for Laurel Creek fish community as "cold water fish community in areas where geological and biophysical characteristics are present, and habitat exists or has been rehabilitated". The EIS acknowledges historical brown trout spawning in lower reaches of Laurel Creek and the confluence of Beaver Creek. The target for water quality discharging from this proposed development</p>	<p>The facility has been designed to meet the "Enhanced" level of water quality (in regards to sediment removal).</p> <p>Cold water temperature targets for Laurel Creek and Beaver Creek upstream of the reservoir, provided in the NWSSS are:</p> <ul style="list-style-type: none"> • Less than 22°C from April 1 to October 31, and; • Between 4°C and 14°C from November 1 to March 31. <p>Available pre-construction monitoring of water temperature in Beaver Creek indicates that it is within the required temperature targets (Stantec 2018).</p>																									

		<p>The pre-, during-, and post-development monitoring of groundwater and in-stream flows will identify if there are any changes to water quality parameters such as dissolved oxygen, phosphorus, etc. that may be able to be (partially) mitigated by modifications to the proposed stormwater management facility, should the need arise. As the SWM facility's discharge point via the level spreader is $\pm 100\text{m}$ away from the Creek, it is anticipated to be additional natural treatment between the pond and the Creek. The intervening lands are mixed swamp wetland with hummocky topography and groundwater seepage areas. Water discharging from the facility will flow through this wetland community and infiltrate into the ground. Given the exposed water table in this area, flows from the facility will likely intercept the shallow groundwater which will provide cooling and mitigation of any thermal effects.</p> <p>Further, as the majority of the annual flows will be directed to the Creek as groundwater, rather than surface water, there will be a time lag between storm events that is anticipated to further "smooth out" the influence of the runoff from the subdivision to the in-stream flows. The approach of maximizing infiltration at SWM outlet, as well as at the lot level will avoid thermal impacts to the creeks.</p>
9	Buffer and setback dimensions (EIS Section 4.9) should be identified as minimum dimensions (i.e. not fixed dimensions at this stage in the planning process)	This has been corrected in the EIS to state that buffer dimensions are a minimum. Buffer and setback dimensions have been coordinated amongst the project team, to be consistent.
10	EIS Section 5.4.4 should identify a thermal discharge target that will maintain water temperature supportive of the cold water fish community in Beaver Creek and Laurel Creek. Given the close proximity of the site to the confluence of Beaver Creek and Laurel Creek, the instream targets identified in the NWSSS should be used for long term monitoring	As the majority of annual flows will be directed to the Creek as groundwater, rather than surface water, the temperature of the pond's outflow $\pm 100\text{m}$ away from the Creek is largely irrelevant. Again, this is not expected to have any effect on the in-stream temperatures in Beaver Creek. SWM discharge will be further cooled and treated through a spreader swale, sheet flow and infiltration prior to reaching Beaver Creek. Again, this is not expected to have any effect on the in-stream temperatures in Beaver Creek.

		Temperature is part of the ongoing water quality monitoring in Beaver Creek and will continue through the construction and post-construction phases
11	Thermal discharge of surface and groundwater should be monitored and measured to assess effectiveness of mitigation measures (EIS Section 6.3)	The NWSSS recommends that temperature mitigation is through subterranean infiltration measures. Planting of trees and shrubs around the SWM facility to create shade is also an accepted practice. Addition of a cooling trench on piped outflows could also be added during the detailed design stage, but is not anticipated to be recommended nor required, as the 2-year design storm (representing over 90% of annual rainfall events) will be infiltrated during the summer months. Therefore thermal monitoring of discharge will not be carried out.
Additional Comments to be Addressed at Detailed Design		
a)	GRCA staff agree that the site soils, groundwater and observed groundwater elevations appear to provide opportunities for maintaining and enhancing existing annual infiltration volumes. For design purposes, we suggest using site-specific water balance values provided in the NWSSS rather than the MOE Stormwater Management Planning and Design Manual generic values used in the SWM Report's appended calculations	We have revised the preliminary calculations in the SWM report to reflect the NWSSS values.
b)	Table 6 of the SWM Report correctly uses annual infiltration values derived in the NWSSS (ie: 188.4mm on the eastern side of topographic divide and 222.5mm on the western side (NWSSS 2013, Figure 6.4)). However, the SWM plan uses an MOE 228 generic for the entire development's pervious area. As implied in the comments above, post development infiltration rates need future evaluation	We have revised the preliminary calculations in the SWM report to reflect the NWSSS values.
c)	Unless the guidelines of the TRCA 2012 document, Preserving and Restoring Healthy Soil: Best Management Practices for Urban Construction, are applied, post development rates will typically be reduced due to subgrade compaction, degraded soil structure and decreased soil depths	Noted, thicker topsoil depths will be incorporated into the detailed design/lot grading plans, in order to reduce this negative impact.
d)	Groundwater contour mapping is recommended using the highest observed water surface elevations from both the LVM standpipes and the Stantec monitoring wells	Noted
e)	A detailed site grading plan will be required, and a Geotechnical Engineer should assess the replacement fill material imported onto the site to ensure that it does not interfere with surface water infiltration or groundwater movement. The importation of fill material also needs to be	An earthmoving surplus is currently proposed; no importation of fill is anticipated.

	coordinated with the final SWM plan to ensure the intended water balance is achieved	
f)	A detailed dewater plan will be required to demonstrate how groundwater contributions to the adjacent watercourse and PSW will be maintained	To be addressed during detailed design. The temporal impacts of localized dewatering to install sanitary sewers, where they extend deep enough to be into the groundwater table, are anticipated to be minor.
Advisory Comments for Consideration		
	The maximum forebay velocity to prevent scour of accumulated sediment is 0.15 m/s rather than the 0.5 m/s identified in the design calculations. 0.5 m/s is the maximum velocity for dispersion of inflow over the forebay berm. As the proposed design achieves 0.10 m/s average velocity through the forebay, this comment is advisory only	Noted, the forebay design has been updated accordingly.