BELLEVILLE
(HEAD OFFICE)
1—71 Millenium Pkwy.
Belleville ON K8N 4Z5
Tel: 613-969-1111
info@jewelleng.ca

TOLL FREE
1-800-966-4338

KINGSTON
208—4 Cataraqui St.
Kingston ON K7K 1Z7
Tel: 613-389-7250
kingston@jewelleng.ca

MISSISSAUGA
200A—2155 Leanne Blvd.
Mississauga ON L5K 2K8
Tel: 905-855-1592
mississauga@jewelleng.ca

www.jewelleng.ca

JEWELL ENGINEERING

January 6, 2023

Attn: Mr. Ray Essiambre
SWM Response Letter – Lakeside Estates

We have completed a review of the comments prepared by Quinte Conservation Authority (QCA) and Monument Geomatics & Estimating Inc. (MGE) regarding the preliminary SWM report for the Lakeside Estates Subdivision in Consecon dated January 12, 2022.

The responses below follow the numbering in the respective agency/peer reviewer comments.

This response letter and updated report clarify some typos and discrepancies from the original report. Note that the SWM concept and OTTHYMO output remain the same.

Quinte Conservation Authority (QCA)

1. It is noted that QCA has no SWM concerns.

Monument Geomatics & Estimating Inc. (MGE)

1. This was identified in Section 1; *Normal (Level 2)* treatment was selected based on correspondence with QCA. If the reviewer has concerns with the identified treatment target, they should discuss with QCA and note the following.

    - QCA selected *Normal* treatment since the receiver is Wellers Bay/Lake Ontario. *Enhanced* treatment is the standard in the QCA watershed when the receiving point is the BQRAP watershed. This development is not within the BQRAP watershed.

- If the reviewer is concerned with the wetland,

    - please refer to Section 3.1.4 (Table 3-3) of the original or updated report. Both show the combined TSS removal rate is >80%. While *Normal* protection is the target, *Enhanced* protection was provided.

    - The drainage outlet for the development is directly to the Loyalist Parkway roadside ditch. It does not drain to the wetland.

2. The imperviousness calculation is provided below (see Appendix B). It is based on the following assumptions:

    - The largest house size (conservative assumption) is applied to each lot with a 2,720 sq. ft bungalow. 2,720 sq. ft was converted to 253 m^2 for the rooftop footprint,
    - driveways with 6m width x 15m length, and
    - a 20m road allowance with 50% of the road allowance impervious area.

The typo of 40% in Table 2-2 has been corrected. It does not affect the modelling results. As described in the original report (Appendix B), "Since the imperviousness is less than 40%, the NASHYD command was applied in the OTTHYMO calculations in post-development conditions and the imperviousness was accounted for in a weighted curve number calculation."

Lakeside Estates Imperviousness Calculation

Land Cover	Area (ha)	% Imp.
Roof	0.83	8.8%
Driveway	0.30	3.1%
Roadway	0.59	6.3%
Landscaped	7.72	0.0%
Total	9.45	18.3%

3. An out-of-date label was shown in Table 3-1. The infiltration gallery component was removed from the design. The Hydrogeological Report notes low to medium hydraulic conductivity. Therefore, we selected LIDs that are permissible over any soil type. High infiltration rates are not a critical component to this design concept. See response #5.

    Once the low imperviousness was identified, it further concluded the infiltration gallery was not a necessary feature. Table 3-1 has been updated. See Section 3 of the revised report.

4. See response #3.

5. A 1m separation is a recommended separation distance best applied to soakaways or other facilities since their depth is limited by a drawdown time of approximately 48 hrs. It is not as critical to the application of enhanced grassed swales and filter strips since they are free draining. Refer to the *2010 TRCA and CVC LID guidelines* that describes these features in detail.

   The Hydrogeological Report prepared by Greer Galloway (GG) noted that groundwater is expected within limestone bedrock at depths ranging from 2 to 20m based on well records from the MECP database for wells within the immediate vicinity of the property (see excerpt from GG report below).

Table 2: Summary of well depths and yields in the vicinity of the subject property

Well Number	Water Found (m)	Stat Level (m)	Yield (L/min)	Depth To Bedrock (m)	Hole Depth (m)	Water Type	Screened Fm. (Bedrock, Sand and Gravel, Etc.)
530520	21.3	6.1	31.8	9.1	22.3	fresh	bedrock
530521	16.2	2.4	75.7	3.0	17.1	fresh	bedrock
530522	10.7	0.9	38.6	4.3	12.8	fresh	bedrock
530523	12.2	3.0	30.3	4.3	12.5	fresh	bedrock
530524	4.6	1.2	18.2	4.3	9.1	fresh	bedrock
5302104	6.1	0.9	13.6	0.9	7.0	fresh	bedrock
5302200	14.9	0.0	22.7	3.4	15.8	fresh	bedrock
5302291	18.9	1.5	4.5	0.9	21.3	fresh	bedrock
5302420	9.1	1.2	27.2	3.7	19.8	fresh	bedrock
5302462	5.8	1.2	22.7	4.0	6.7	fresh	bedrock
5302551	7.6	0.9	22.7	4.6	7.6	fresh	bedrock
5302588	12.2	1.8	22.7	3.7	13.7	fresh	bedrock
5302630	7.6	1.8	22.7	1.8	9.1	fresh	bedrock
5303209	9.8	2.4	45.4	7.6	10.7	fresh	bedrock
5304868	4.9	3.7	45.4	4.6	6.4	fresh	bedrock
5305315	5.5	4.6	136.2	4.3	10.7	fresh	bedrock
5305334			0	0.9	31.7	fresh	bedrock
5305626			0	0.5	48.8	fresh	bedrock
5305873	4.3	-0.2	68.1	3.0	12.2	fresh	bedrock
5306549			0	0.0	9.1	fresh	overburden
A207908	2.1		22.7	1.5	4.6	fresh	bedrock
A207906	2.1		27.24	1.5	4.6	fresh	bedrock
A207879	2.1		18.16	1.5	4.6	fresh	bedrock
A207874	2.1		13.62	1.5	4.6	fresh	bedrock
A148293	4.0	2.0	90	0.3	6.1	fresh	bedrock

   In 12 test pits obtained April of 2020, GG noted bedrock at a depth of 1.8m or deeper in 11 of the 12 TPs. One TP has slightly shallower bedrock at 1.4m. No water was observed in 6 of the 12 TPs. There was also no water in TP2 that is in the location of the SWM block. Abundant seepage was noted in TP-8 and TP-9 with the note that water ponded

in that portion of the field. This portion will be filled and re-graded so that surface ponding is no longer present. The remaining test pits had seepage observed at depths of 1.5m or greater. Since the proposed grades for the swales and filter strips are expected to be equal to or higher than existing topography, we have no concerns regarding the separation distance between bottom of filter strip/enhanced grassed swales from GW or BR. Note that 6 inches of topsoil may be added immediately beneath the swales for improved initial infiltration during detailed design. Final grading of the swale and filter strip bottoms will be able to achieve a 1m separation distance or greater from both BR and GW.

- In our opinion, one should consider the purpose of the 1m separation distance before making it a requirement. If a seasonally high GW level is between 0 – 1m below the filter strip or enhanced grassed swales, will they still function properly? Can they still infiltrate and filter pollutants to meet the target?
    - The answer is yes, since the filtration component of the LID does not rely on underlying soils, and the infiltration component will continue to occur although it may occur at a temporary slower rate until normal GW levels are established. If GW is exceptionally high for a short period of time (i.e. spring melt or other condition) it will not prevent the LIDs from achieving their annual treatment target. Note that MOE's TSS removal rates are measured on an annual basis. While the 1m separation will still be achieved with the detailed design grades, we point out it is not overly important for the selected treatment types.

6. Agreed. See Section 3.1.3 of revised report. The filter strip will have a length greater than 5m. This is achievable given the large open space landscaped area associated with the SWM block.

7. The wording in the 3rd paragraph of Section 3.1.4 has been updated to provide clarification. The frontage of the lots and the driveways will drain to the internal road, not Loyalist Parkway. The rear-yards of these lots will drain directly to Loyalist Parkway.

8. Groundwater recharge and a water balance were not a requirement. See Section 1 of revised report.

   The original report identified water balance benefits (i.e. opportunities for some infiltration to occur with grassed swales and open landscaped areas) as we make efforts on every site to maintain the natural hydrology of the developable area, even if a formal

water balance is not required. To avoid confusion, we have removed this 'constraint' label from the revised report.

9. These lines represent the wetland and its setback limit. This comment is best suited for the EIS and will be reviewed and addressed separately from the SWM report. The wetland limit and setback have been removed from Appendix A.

   Out of interest (not related to the SWM report), we understand the creation of lot is generally not allowed within setback limits. A lot line does not mean the setback limit would not be respected, as there are many instances where lots can be built upon while keeping infrastructure well outside of the setback limits. In our opinion, if one reviews the policies while considering the purpose of setback limits, they would find the reason for not allowing the creation of a lot within the setback limit, in some instances, is due to a technicality in the wording of the policies rather than meaningful protection of the wetland.

10. A separate drawing for major flows is not needed. The minor, major, and emergency drainage routes are the same. This is a rural development with open ditches that will convey the 100-yr flow. This was summarized in Section 3.2.2 and Appendix E of the original report.

    See Appendix A for SWM block label.

11. The ≥ 12m filter strip placement and its placement immediately downstream of the level spreader ensures a wide flow path and reduced maintenance intervals. The depth of the block is 51.5m, providing a length much greater than the minimum 5m required for the filter strip. Based on the block dimensions, the SWM block has sufficient size to accommodate the proposed SWM features.

    For added clarification, the requested figure has been added to Appendix A showing the concept layout for the SWM block.

Additional note:

The total removal rate of the filter strip and enhanced grassed swale in the treatment train was based on the removal rate of the second LID applied to the fraction of the TSS load remaining after runoff passed through the first LID. This intuitive method is what we refer to as the 'mass-balance' approach that was applied in the original report.

For reviewers that prefer technical references, it is the same concept as applied in the *New Jersey Stormwater Best Management Practices Manual* to calculate TSS removal rates for LID/BMPs in series (see below).

Excerpt Showing Equation 4-1 from Chapter 4 of NJ BMP Manual for Two BMPs in Series

A simplified equation for the total TSS removal rate (R) for two BMPs in series is:

$$R = A + B - [(A \times B) / 100] \qquad \text{(Equation 4-1)}$$

Where:

R = Total TSS Removal Rate

A = TSS Removal Rate of the First or Upstream BMP

B = TSS Removal Rate of the Second or Downstream BMP

I am happy to discuss should further clarification be required.

Sincerely,

Elliott Fledderus, P.Eng.
Jewell Engineering Inc.