January 20, 2021
Our File: 218173

Via Email: cstredwick@southgate.ca

Township of Southgate
185667 Grey County Road 9
Dundalk, ON N0C 1B0

Attention: Mr. Clint Stredwick

Re: 3rd Submission Responses to Comments
Wilder Lake Subdivision
Municipality of Southgate

Dear Mr. Stredwick,

This letter is in response to the Internal Review Comments provided by R.J. Burnside (Dated December 2020) following the 2nd Submission of Reports and Drawings regarding the Wilder Lake Subdivision.

At this time, prior to revising the Drawings and Reports, we wanted to provide written responses to the outstanding comments for Township consideration. We are in the process of providing the requested information.

The following responses are provided in the order included on the Project Comment Form and only includes the outstanding comments.

Stormwater Management Report Comments

8. I disagree with the requirement to enlarge the culverts. The culvert sizing calculations have been undertaken using a conservative approach which does not consider infiltration in the ditches leading to the culverts. As previously documented, based on the soils information significant infiltration is expected, which will reduce the peak flow that actually reaches the culverts. As such, enlarging the culverts to reduce the flow rate by 6%, to provide additional capacity seems excessive. We are satisfied with the size of the proposed culverts.

Drawings

16. Additional calculations can be provided.

28. I think the only location where a swale exceeds 5% is the swale leading to SWM Pond Block 30. Rip rap erosion protection can be provided for this swale.

32. To provide access to the outlet from SWM Pond Block 31, a 3.0 m wide easement would need to be provided for access across the south part of Lot 10 or the north part of Lot 11. I would suggest that it could be shown along the north side of Lot 11 as it is a bit wider. This could be discussed between the Planners to confirm it is acceptable.

34. It is our understanding that the two (2) existing cottages to remain across the back of Block 30 are to be non-inhabitable spaces. Any runoff spilling from Block 30 would drain to the north of the cottages, and we have no concern with the elevation or location of the cottages to remain. Township should comment on whether they have any concerns.

37. The streetlights can be shown on a revised section.

41. The Environmental Protection Zone is shown on the plan, which is expected to be the Hazard Limit and the Hazard setback. The Township should advise if any additional setbacks are to be shown.

Hydrogeology

49 & 60. As requested, the Hydrogeologic Report will be updated to provide soil and construction methods for the piezometers. In addition, further detail discussing the hydraulic contour mapping and support for conclusions will be provided. As a brief summary, we believe the contour maps provided more accurately portray the inferred groundwater flow conditions then the alternative possibility discussed in the response. Several lines of evidence support the contouring provided:

1. Piezometer location PZ-1 (with 1S and 1D) are situated in fine grained silty muck. It is common for creek beds to have areas of fine-grained deposition even within areas of coarser soils. PZ-1D is installed with a drive-point tip that is driven into the ground and PZ-1S is installed via manual excavation. We believe that PZ-1D is likely impacted by fine grained sediment, either through smearing, clogging of screen, or simply by nature of native soils adjacent to screen. We would agree that it is likely that PZ-1D has a falsely low water level reading.
2. Due to construction of the stainless steel drive point tips, it is not likely possible to develop – or clear out the screen effectively. However, as discussed below, we don't believe this is a critical point in establishing groundwater contours or the fact that the creek is groundwater fed.
3. It is clear from on-site visual and flow (volume) based review, that the creek is influenced by groundwater. Most notably it is confirmed to be a cold-water fishery. At the location of PZ-1, cold water and upwelling conditions have been confirmed through the EIS and through site reconnaissance. Further along the creek, evidence of upwelling and "gaining" conditions are observed, with vegetation species that suggest year-round saturation and groundwater discharge locations.
4. Flow is noted in the Creek year-round, even when Lake levels are at their lowest with limited discharge to the Creek.

Based on the foregoing, we will update the report to include the additional information and explanations.

57 & 59. The surface water dilution approach was not originally included since it was apparent from a practical perspective that the flow/dilution model would show that no impacts were present. In essence, the relatively low concentration in groundwater, and relatively low volume of groundwater contributed from the adjacent lots would not realistically cause impact. Anecdotally, the conversion of a golf-course (or similarly agricultural lands) to residential property use would not typically cause an increase in phosphorous (P) loading or decrease in water quality.

As discussed, the report focused on the fate of phosphorous (P) in the groundwater only. Since we believe that the P in groundwater will be sufficiently attenuated to protect groundwater, supplemental attenuation calculations for surface water were not completed. To address the Burnside comments, we have also included for the dilution of the P in due to dilution in the Creek itself. To complete these calculations, the approximate base flow in the Creek was estimated by using the measured elevation of water in the culvert on January 11, 2021 and culvert measurements with Manning's equation for flow in a partially full pipe flow. It is noted that at that time, there had been limited to no precipitation in the previous week and no recent significant melt events.

The depth of flow in the 900 mm CSP culvert was 12.5 cm deep. The culvert has a fall of roughly 0.2 m over 18 m, for a slope of 1.1%. The resultant flow is calculated to be 0.043 m3/s.

The P attenuation calculations have been updated to include the use of initial concentration of P in sewage of 15 mg/L. To calculate the P attenuation that would be observed in the Creek under the "worst" case scenario, the dilution of P with precipitation is accounted for in the adjacent four lots (i.e., Lots 1 to 4). It is then assumed that all of this P will enter the Creek and be diluted by the baseflow. The background concentration of P in camp creek was also considered and was measured to be 0.007 mg/L as part of surface water monitoring in the creek. The mass of P in the creek volume was added to the dilution calculation. A table that shows a summary of the calculations is enclosed with this letter.

Based on these analyses, the resultant “worst” case concentration in Camp Creek would be 0.0228 mg/L. This is below the PWQO for flowing water, which is 0.03 mg/L (30 ug/L). Most importantly, it should be noted that this is a very conservative, or “worst case” estimate since it doesn’t account for any attenuation of P, beyond dilution and assumes a constant, relatively high concentration of P in the sewage effluent. More recent studies, as referenced in our Hydrogeologicaly Report, have shown that at least some level of attenuation can be expected and that source concentrations can be expected to be lower.

Based on the use of dilution approach and an initial concentration of 15 mg/L of P in sewage, no impacts to Camp Creek will be realized.

We trust the above responses are sufficient to allow for discussion between the Planners from the Town, County and Development Team to discuss next steps and moving forward with Draft Plan Approval.

Please do not hesitate to contact me if you have any questions regarding the above noted information, or should you wish to discuss this further.

Yours truly,

GM BLUEPLAN ENGINEERING LIMITED

Per:

Ian Eriksen, P.Eng.
IE/MN/mr

Per:

Matt Nelson, P.Eng., P.Geo.

Encl.

cc: H.Bye Construction: Randy Bye, via Email – rhbye@icloud.com
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File No. 218173

Table 11: Attenuation of Phosphorus from Sewage Output of Proposed Development

Parameters	Value	Source
Total Precipitation (mm/yr) =	1118.5	Obtained from Environment Canada. Meteorological Service of Canada. Canadian Climate Normals. 1981-2010 Climate Normals & Averages. Durham Ontario.
Evapotranspiration (mm/yr) =	304	Obtained from the MODIS Global Evapotranspiration Dataset
Phosphorus (mg/L)=	15	Concentration in untreated sewage effluent under Procedure D-5-4
Sewage Effluent (L/lot/day) =	1000	Allowable under Procedure D-5-4
Total Property Area (ha) =	4.16	Concept Lot Layout Proposal
Runoff Coefficient =	0.4	Ministry of Transportation of Ontario. Design Chart 1.07: Runoff Coefficients. Typical Suburban Residential.
Camp Creek Base Flow (m^3/s) =	0.043	Measured flow depth through culvert during a period of low precipitation
Camp Creek Base Phosphorus (mg/L) =	0.007	Measured from surface water samples taken at SW1, SW2 and SW3

$$C_N = \frac{N_{load}}{V_{sewage} + V_{hydrologic}}$$

		Volumes Available for Dilution					
Number of Lots	Phosphorus Load (g/yr)	User Input Sewage Effluent (m^3/yr)	Infiltration by Water Balance (m^3/yr)	Groundwater Phosphorus Concentration with no Attenuation mg/L	Camp Creek Base Flow (m^3/yr)	Estimated Maximum Additional Phosphorus Concentration (without Background P) mg/L	Estimated Maximum Total Phosphorus Concentration (Including Background Input) mg/L
4	21900.0	1460	20330	1.005	1356048	**0.0159**	**0.0228**