March 5, 2020

Mr. Scott MacCallum
Clayton Developments Limited
255 Lacewood Drive, Suite 100C
Halifax, NS B3M 4G2

Dear Mr. MacCallum,

Re: Water Quality Analysis
Sub Area 10, West Bedford

As part of the requirements related to the development of Sub Area 10 in West Bedford, a water quality analysis has been completed by Strum Consulting. The main focus of the water quality analysis was to determine if the anticipated total phosphorus (TP) and total suspended solids (TSS) are expected to increase in the post-development condition when compared to the pre-development condition. The goal is to provide a design that produces no-net increase in TP or TSS generation.

TP and TSS generation numbers have been assigned based on land uses as outlined by Halifax Regional Municipality (HRM) in the most recent Stormwater Management Guidelines dated March 2006. The assigned land uses also have a corresponding runoff coefficient (C), which represents the surfaces ability to shed or retain water. The higher the value of C, the more likely a site is to shed water off the surface without an absorption or retention. The C values have been assigned based on provisions provided by HRM as well as accepted industry standards. Table 1 and 2 outline the land uses, C values, and anticipated TP and TSS generation rates, for both the pre-development and post-development conditions.

Table 1. Pre-Development Area and Nutrient Generation Summary

Land Use	Area (ha)	Runoff C	TP Generation (mg/L)	TSS Generation (mg/L)
Upland Forest	1.42	0.15	0.20	19.7
Industrial	10.73	0.65	0.30	57.8
Total	12.15	-	-	-

Table 2. Post-Development Area and Nutrient Generation Summary

Land Use	Area (ha)	Runoff C	TP Generation (mg/L)	TSS Generation (mg/L)
Upland Forest	1.42	0.15	0.20	19.7
Industrial	5.24	0.65	0.30	57.8
High-Density Residential	5.49	0.59	0.30	47.7
Total	12.15	-	-	-

TP and TSS generation numbers are calculated based on particular rainfall events. Halifax Water's published rainfall data for the 2, 5, 10, 25, 50, and 100-year return period storms retrieved from Section 5.2.2 of the 2018 Design Specifications & Supplementary Standard Specification were analysed and the rainfall data used is summarized in Table 3 below.

Table 3. Rainfall Summary

Storm Return Period	Rainfall (mm)
2	83
5	107
10	125
25	146
50	162
100	176

Applying the generation rates to the rainfall amounts for each return period provided the anticipated TP and TSS quantities expected from the site in both pre-development and post-development scenarios. Table 4 outlines the anticipated TP and TSS generated during each storm event for both pre-development and post-development.

Table 4: Anticipated TP and TSS Generated in Pre and Post-Development Scenarios

Storm Return Period	Pre-Development		Post-Development	
	TP (kg)	TSS (kg)	TP (kg)	TSS (kg)
2	1.8	338	1.7	295
5	2.3	436	2.2	380
10	2.7	509	2.6	444
25	3.1	595	3.0	519
50	3.5	660	3.3	576
100	3.8	717	3.6	626

As is evident from the results shown in Table 4, the post-development scenario provides no net increase in both TP and TSS for all required storm return periods. In fact, developing the site from its current state of mainly industrial land use towards more high-density residential will reduce the amount of TP and TSS generated. However, to further aid in the removal of TP and TSS, the site design will include approximately 360 m of enhanced grassed swale as well as several grassed filter strips.

Thank you,

Original Signed

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