FUSS & O'NEILL

February 26, 2016

RE: Palmer Pointe Neighborhood
Comprehensive Permit Application
91/97 Sowams Road, Barrington, RI

Stormwater Management Summary

The Palmer Pointe Neighborhood design incorporates a stormwater management system designed to mitigate the impacts of stormwater runoff generated by the proposed site in conformance to requirements of the Rhode Island Stormwater Design and Installations Standards Manual (RISDISM) using various low-impact development (LID) techniques and best management practices (BMP's).

The proposed drainage system design incorporates the following stormwater management components:

- *Pretreatment Forebays.* Pretreatment of runoff from all paved areas is provided within forebays. Pretreatment of runoff from the proposed roadway is achieved with a single forebay located to the east of the proposed roadway, easily accessible by maintenance vehicles.

- *Dry Swales.* The site's two proposed dry swales are designed to attenuate the water quality volume and convey excess stormwater from the project. The swales consist of a 30" bioretention soil filter depth, 4:1 side slopes, and longitudinal slopes averaging 1.5% toward the east. Check dams spaced 50-feet apart, retain the water quality volume and at an average depth of 4.5 inches.

- *Bioretention Basin*. A bioretention basin is incorporated to provide water quality treatment, and groundwater recharge. In accordance with RISDISM requirements, peak flow attenuation is not required, as stormwater discharges directly to tidal waters. The bioretention basin is designed in accordance with Section 5.5 of the RISDISM. The bioretention basin contains a 24" layer of bioretention soil media, which will filter stormwater runoff generated. Due to suitable groundwater separation, the basin will also allow infiltration and groundwater recharge. The embankment is designed to allow 9" of ponding within the bioretention basin. A 50-foot wide spillway in the embankment will discharge at grade outside of regulated buffers, directing overland flows toward the Palmer River.

- *Tree Filters.* Two tree filter systems (StormTree) are proposed to the north of Red Maple Road near its intersection with Sowams Road. These filters consist of a concrete frame and removable support grate, with a 24" engineered soil filter bed underlain by geotextile fabric and 12" of washed stone. During larger storm events, a PVC pipe discharges runoff to a catch basin, which connects to the existing Sowams Road closed conduit drainage system.

The proposed project has been designed to fully mitigate the water quality impacts from the proposed site development. Under pre-development conditions, the site has no stormwater treatment system in place and poses risk of pollutant migration to bordering properties and to the Palmer River. The stormwater management system, consisting of catch basin sumps, two tree filters, five pretreatment forebays, two dry swales, and a bioretention basin, will treat the runoff from new impervious areas prior to infiltration

and/or discharge, will reduce pollutant loads to the Palmer River, and comply with the requirements of the RIDSISM.

Runoff volumes and runoff peak flows from Subwatershed 1 to the Sowams Road drainage system will be reduced for the 2-, 10-, 25-, and 100-year storm events due to the significant reduction in the area of the watershed. Increases in peak flows to the east (Watershed 2) are anticipated for the 10-, 25-, and 100-year storm events, while peak volumes will be reduced for the 2-, 10-, and 25- year storms. The increases are attributable to the increased size of Watershed 2 which has been proposed to maximize runoff treatment on the property. The RISDISM does not require peak flow mitigation for the watershed because runoff is discharged from the property directly to the Palmer River.

The results of the analysis and calculations for the pre- and post-development conditions are summarized in the tables below.

Table 1
Watershed 1: Pre- and Post-Development Runoff

24-Hour Storm Event	Pre-Conditions Peak Flow Rate (cfs)	Post-Conditions Peak Flow Rate (cfs)	Change in Flow Rate (cfs)	Pre-Conditions Volume (cf)	Post-Conditions Volume (cf)	Change in Volume (cf)
2-Year	3.59 cfs	0.28 cfs	-3.31 cfs	14,243 cf	881 cf	-13,362 cf
10-Year	6.05 cfs	0.45 cfs	-5.60 cfs	24,391 cf	1,454 cf	-22,937 cf
25-Year	8.05 cfs	0.58 cfs	-7.60 cfs	32,885 cf	1,892 cf	-30,993 cf
100-Year	11.69 cfs	0.84 cfs	-10.85 cfs	48,832 cf	2,814 cf	-46,018 cf

Table 2
Watershed 2: Pre- and Post-Development Runoff

24-Hr Storm Event	Pre-Conditions Peak Flow Rate (cfs)	Post-Conditions Peak Flow Rate (cfs)	Change in Flow Rate (cfs)	Pre-Conditions Volume (cf)	Post-Conditions Volume (cf)	Change in Volume (cf)
2-Year	4.22 cfs	3.10 cfs	-1.12 cfs	20,604 cf	14,373 cf	-6,231 cf
10-Year	10.10 cfs	12.26 cfs	2.16 cfs	45,592 cf	42,237 cf	-3,355 cf
25-Year	15.53 cfs	19.09 cfs	3.56 cfs	68,877 cf	67,625 cf	-1,252 cf
100-Year	26.24 cfs	34.73 cfs	8.49 cfs	115,791 cf	127,526 cf	11,735 cf