March 20, 2024 (updated in red 06172024)

Laurie Bachelder
RCI, LLC
366 Route 1
Falmouth, Maine 04105

Re: Stormwater Quantity/Quality Narrative, Edgewood Estates Subdivision, Windham, Me

SJR ENGINEERING, INC.
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Dear Laurie,

RCI, LLC owns a parcel of land along Chute Road in Windham, Maine. The project is to create 6 new residential lots. A new private Betty Lane Road is to be created for lot access. The 850' long road with cul-de-sac turnaround is to be paved with ditches on both sides. Each of the 6 residential buildings will be served with well water, private sewer, and underground electricity. It is anticipated that this projects site infrastructure will be started in late Spring of 2024 once all approvals have been obtained.

The site is identified as Tax Map 6 Lot 26 of the Town's Tax Map. The parcel is approximately 12.84 acres in size and lies within the Farm Zoning District.

Existing Site Conditions

The existing site consists of woods/brush areas. Portions of the parcel have been previously developed with a paved driveway leading to two mobile home locations (since removed). No other improvements are located on the existing parcel. Property boundaries have been taken from plans prepared by Wayne Wood & Company dated June 2023. The topography of the proposed developed site is shown at a two-foot contour interval in the areas of proposed development. The slope of the property varies from 1% along the flatter areas to 15% along the steeper slopes of the property.

Adjacent Areas

Adjacent areas and land uses are similar in nature to that being proposed (residential housing). Runoff from the property is generally wooded sheet and shallow concentrated flows to wetlands and/or ditches along Chute Road. Runoff eventually ends up in Colley Wright Brook.

Soils

Soils delineation was taken from the medium intensity soils maps published by Web Soil Survey. I have overlaid the proposed developed site onto this map. Onsite soils are identified as being Lamoine and Buxton (hydro group "C/D").

Summary Overview

We have prepared an erosion/sedimentation narrative under separate cover. This narrative is to address stormwater quantity/quality during (and after) the construction of the project.

We have prepared stormwater quantity and quality analysis in order to properly evaluate existing and proposed stormwater quantity impacts from the development. The Maine DEP Chapter 500 rules of the Maine DEP stormwater rules require proposed flow rates for 2/10/25 year storm events to be the same or less than existing flows at the property line of the parcel. We have designed this project to meet these standards by use of a combined soil filter pond/detention pond to be constructed with the project infrastructure.

Runoff from the developed portions of the parcel are directed to a proposed soil filter pond near the intersection of Betty Lane and Chute Road. Site drainage eventually enters an existing culvert under Chute Road which we have identified as the Design Point" for comparing existing/proposed flow rates.

We have designed the soil filter/detention pond to provide water quantity/quality enhancement. The pond will function as a detention pond to limit flows to less than pre-construction flow rates. Proposed soil filter/detention ponds are necessary to control flows to pre-existing conditions and to treat the stormwater quality within the pond.

Stormwater flows will be attenuated by diverting and capturing stormwater flows from the new construction into the new soil filter/detention pond with a stormwater control outlet being utilized to control runoff water discharges to pre-exiting conditions as well as providing stormwater quality treatment for the developed runoff water. In summary, the proposed stormwater flows will be less than the existing condition. No significant downstream impacts from stormwater flows are expected with this proposal.

Approximately 43007 sf of new impervious surface (roads, driveways, houses) will be treated during proposed construction improvements. Proposed impervious surfaces will be treated through the soil filter ponds. Building roof water will be infiltrated into 3' wide stone drip edges for water quantity/quality treatment within the lots.

Stormwater Quantity

I have reviewed the drainage characteristics of the watershed area which includes impervious areas, lawn areas, and woods, as well upslope watershed areas. The analysis requires post construction stormwater flow rates to be approximately equal to or less than the existing stormwater rates.

I have used the SCS TR-20 (HydroCad 10.2 computer model) method of computing stormwater runoff peak flow rates. This method accounts for soil types, existing land uses, topography, vegetative cover, and proposed land use for the parcel to be developed. The proposed conditions were analyzed using data for Cumberland County type III, 24-hour storm distribution (Northeast Regional Climate Center June 2014) with a design frequency of occurrence of 2/10/25/100 years. One day precipitation values of 3.19"/4.77"/6.01"/8.54" have been used for each respective event. All supporting calculations and data are submitted with this report.

The existing and proposed site conditions were analyzed using information taken from existing/proposed topographic plan of the parcel to be developed. Impervious areas, lawns, meadows, and woods areas for each hydrological soil condition were measured within AutoCad in order to calculate a weighted curve number that typifies the drainage condition of the site.

Watershed calculations (pre and post construction)

Please see the attached stormwater plans for both the existing and proposed conditions to help determine location of each watershed and drainage flow path.

The project has one larger watershed area within the parcel that will be split to control runoff and provide water quality enhancement. Watershed "A" consists of the land area that will be disturbed with road/driveway/house construction and flows into the soil filter pond. Watershed B is the remaining land area that also drains to the Design Point. We have designated the Design

Point of interest on the plan as being the Chute Road 15" CMP culvert inlet.

Soil Filter Ponds:

In the proposed development condition, the watershed area has significant increases in impervious and developed areas as compared with the existing condition. The increased flows are captured in the soil filter/detention pond within the parcel. Runoff water within the soil filter pond will be detained and treated in the pond.

The soil filter pond have been sized to accommodate and store flows for stormwater quantity and quality functions and to control flows to pre-development runoff conditions. We have calculated increases in flow rates in the developed portion of the project for the 2/10/25 year storm events. However, by constructing the soil filter/detention pond and sizing the inlets within the stormwater control structure, stormwater flows are captured and contained. These increased flows are then stored (detained and treatment provided) within the pond for short periods of time (24-48 hours) allowing existing peak flow rates to be approximately the same.

Design Point A – Chute Road 15" CMP Culvert

The stormwater existing/proposed Design Point A is located at the Chute Road 15" diameter CMP culvert. We have calculated the existing flows with the proper land surface cover and soils hydrological group in order to compare these flows with the proposed flows. Existing flows at this design point location have been calculated to be 3.41/6.82/9.65 cfs for the 2/10/25 year storm events.

Soil Filter Pond: Our analysis indicates that the incoming flow rates to Soil Filter Pond 1 are 2.21/4.19/5.79 cfs and are reduced to 0.90/3.52/5.40 cfs for the 2/10/25 year storm events at the outlet from the soil filter pond control structure. The soil filter ground elevation is set at elevation 170.0. The water elevation within the pond is expected to peak at elevations 171.69/172.0/172.17 for the 2/10/25 year storm events.

When these flows from the pond are hydraulically added together (with respect to time) with the uncontrolled watershed areas (Watershed B), the flows are less than the existing condition at the Design Point

Stormwater Summary at Design Point

	2 year storm (cfs)	10 year storm (cfs)	25 year storm (cfs)
Existing flows	3.41	6.82	9.65
Proposed flows	1.70	4.24	6.58

Pond construction Control structures

Pond 1: The soil filter pond will need to be configured with a control manhole structure that has a 18" diameter outlet pipe at invert 167.0. The control structure has inlet connection to the 6" diameter underdrain pipe within the pond filter area at elev 167.50. The manhole has a 36" wide by 9" tall orifice cut into the manhole structure on the pond side at elevation 171.50 to allow water into the structure. The control structure has a steel panel installed along the center of the structure with a 1-1/2" orifice cut at elevation 167.50. No water will flow from the pond (except filtered water within the filter media underdrain) until the water elevation reaches 171.50. A second 36" wide by 9" tall hole is cut into the steel plate at elevation 171.50. The top of the steel panel is elevation 172.25. A 15' wide emergency spillway is to be constructed at elevation 172.25. The top of the berm is to be constructed to elevation 174.0. We have checked the spillway design for a 25-year storm event with the control structure plugged (ie all flows through the spillway). Calculated flows reach elevation 172.54. The top of berm is 17.5" higher than this water surface. We have also checked the spillway design for a 100-year storm event. Calculated flows reach elevation 172.37. The top of berm is 19" higher than this water surface.

Water quality - Soil Filter Pond

The Maine DEP Chapter 500 rules of the Maine DEP stormwater rules require a 75% impervious surface stormwater treatment and an 50% disturbed area stormwater treatment for linear type projects (subdivision roads). We have designed this project to meet and exceed these standards by use of a combined soil filter pond/detention pond to be constructed with the project infrastructure. Roof drip edges for residential structures have also been designed into the project that will also treat stormwater runoff from the building roof surfaces.

Soil Filter Pond 1: We have designed the project to redirect impervious and lawn areas runoff into a soil filter pond downslope from the developed areas.

We have identified watershed A will be captured and diverted to the soil filter pond. The total disturbed area draining to the pond 1 is 148,860 sf. We have calculated 25,845 sf of the new impervious area (portion of street, sidewalks, and driveways) and 123,015 sf of the grassed area of the project would be treated through the proposed soil filter pond.

The soil filter/detention pond is designed to act such that initial and ending runoff flows are captured and infiltrated through the soil filter media within the pond. The higher flows will be bypassed through the pond control structure and emergency riprap spillway.

The soil filter pond is to be constructed to a ground elevation of 170.0 (top of ground surface for filtering system). The pond is to be sized such that the surface area meets (or exceeds) 5% of the impervious area plus 2% of the landscape area that drains to the pond. As noted above, we have calculated 25,845 sf of impervious area runoff and 123,015 sf of landscape area runoff will enter the pond. Therefore, we are required to have a minimum of 3,752 sf of surface filter area. We have provided 3,873 sf of available area within contour 170.0.

In addition, a minimum treatment volume must be contained such that the required volume contained is less than 18" deep over the surface filter area. The channel protection volume is based on 1" of impervious surface area and .4" of vegetative area entering the pond. Using the same impervious and landscape areas noted above, we are required to have 6,254 cf of pond storage above the soil filter surface area. Our design has provided 6,748 cf of storage area at elevation 171.50 (18" deep).

Pond 1 is controlled by a stormwater control manhole that has a steel plate (or concrete panel) with specific holes cut into the control panel to limit flows leaving the ponds and provide adequate holding time to be treated by the filter media. Water quality enhancement flows are detained within the soil filter pond by restricting the discharge flow through a small 1-1/2" orifice control in the control structure steel plate at invert elevation 167.50. The hole has been sized using the DEP orifice Regression Equation for both filter area and quality area sizing requirements.

We have provided concept building locations as required by the ordinance, but this should not be interpreted as being the only development that can be located on the project. We have noted that each building be constructed with

a roof drip edge that runoff will be infiltrated through a filter media and drain to an underdrain to daylight. The total impervious treated area divided by the total impervious area within the parcel is 34260/43007 which is 79.7% treatment.

Similarly, the 160,700 sf total disturbed area within the parcel has 148,860 sf treated runoff, which is 92.6% treatment. The proposed development of the parcel can be constructed utilizing the soil filter pond as designed to the berm height and control structure in the ponds as noted above.

Summary

Please feel free to contact me if you have any questions concerning the calculations of stormwater from this project. It is important to note that proper erosion control and revegetation of disturbed areas are essential for the proper operation of the stormwater facilities. Maintenance of the yard impervious areas, careful attention to the pavement/seeded interface, and continued maintenance to the pond system must be a top priority in order for the system to function properly. Thank you for involving this firm on your project.

Sincerely yours,

Stephen Roberge

Stephen Roberge, PE
for SJR Engineering Inc.