Nitsch Engineering

2 Center Plaza, Suite 430
Boston, MA 02108-1928
T: 617-338-0063
F: 617-338-6472
www.nitscheng.com

March 10, 2021

Earth Removal Stormwater Advisory Committee
c/o Ms. Michelle Collette
Stormwater Inspector/ADA Coordinator
Town of Groton
173 Main Street
Groton, MA 01450

RE: Nitsch Project #13346.18
Hayes Woods
Stormwater Review
Groton, MA

Dear Committee Members:

Nitsch Engineering has received and reviewed the following documents:

1. The Definite Subdivision and Flexible Development Plan (the Plans) entitled "Definite Subdivision and Flexible Development Plan, Groton, MA, Hayes Woods" (24 sheets), dated February 10, 2021, and prepared by Dillis & Roy, Civil Design Group;
2. The Pre-Development Watershed plan ,Hayes Woods – Maple Ave, Groton, Massachusetts, dated February 10, 2021, and prepared by Dillis & Roy, Civil Design Group;
3. The Post-Development Watershed plan, Hayes Woods – Maple Ave, Groton, Massachusetts, dated February 10, 2021, and prepared by Dillis & Roy, Civil Design Group; and
4. The Stormwater Report for "Hayes Woods" Maple Avenue in Groton, Massachusetts (216 sheets), dated February 10, 2021, and prepared by Dillis & Roy, Civil Design Group.

Nitsch Engineering has reviewed the Plans and Report to determine conformance to the following:

1. "Earth Removal Stormwater Advisory Committee" Regulations, Chapter 352 from the Code of the Town of Groton, latest version; and

2. The Massachusetts Stormwater Management Standards.

WAIVERS REQUESTED BY THE APPLICANT

- Section 352-11 C.(10) – A waiver is being requested to allow underground recharge from roadway surfaces.

This letter is limited to review of the stormwater management system. Nitsch Engineering is also conducting a review of the Definitive Subdivision and Flexible Development Plan. Those comments will be provided under separate cover to the Planning Board.

Based on our review, Nitsch Engineering offers the following comments:

GROTON STORMWATER DESIGN CRITERIA AND THE MASSACHUSETTS STORMWATER MANAGEMENT STANDARDS

1. Section 352-11.C.(7) states that at least 80% of the TSS must be removed prior to discharge to an infiltration structure used for recharge if the discharge is within an area with a rapid infiltration rate greater than 2.4 inches per hour.

   80% TSS removal should be provided prior to discharge to all infiltration basins and systems since the infiltration rate is greater than 2.4 inches per hour.

2. Section 352-11.C.(10) states that the underground recharge systems may only be used to recharge stormwater runoff directly from rooftops. They may not be used to recharge stormwater runoff from other surfaces due to sediments in the runoff that may cause clogging of the recharge system and difficulty to rehabilitate these systems once they have failed.

   The Applicant has requested a waiver to allow underground recharge for runoff from roadway surfaces. Nitsch Engineering has no objections to this waiver request if a minimum of 80% TSS removal is provided prior to discharge to the underground recharge system and all pretreatment requirements are met.

3. Section 352-11.C.(14) states that a mounding analysis must be performed when the vertical separation from the bottom of an exfiltration system to seasonal high groundwater is less than four feet and the recharge system is proposed to attenuate peak discharge from a ten-year or higher twenty-four-hour storm. The mounding analysis must demonstrate that the recharge volume is fully dewatered within 72 hours and that the groundwater mound that forms under the recharge system will not break out above the land or water surface of a wetland. The Hantush or other equivalent method may be used to conduct the mounding analysis.

   A mounding analysis should be provided for Infiltration Basins #7 and #8 as they have less than four feet of separation to estimated seasonal high groundwater (ESHGW). The Applicant should also provide all test pits logs to confirm ESHGW elevations.

4. Section 352-12.B.(1) states that pretreatment devices shall be provided for each stormwater treatment system.

   The Plans do not show any pretreatment for the proposed rain gardens. The Plans should be modified to include pretreatment for the proposed rain gardens.

5. Section 352-13.A. states that at each analysis point, the post-development peak discharge rate shall be equal to or less than the pre-development peak discharge rate (based on a two-year, ten-year, twenty-five-year, twenty-four-hour storm).

   There is an increase in the post-development peak discharge rate in the two-year storm event for Design Point A, and an increase in the post-development peak discharge rate in the ten-year and twenty-year storm events for Design Point B. Also, there is an increase in the post-development peak discharge rate in the two-year storm event for the overall design point. While these increases are small, the Applicant should review options to reduce the post-development peak discharge rates to be at or below pre-development levels.

6. Section 352-13.G. states that the Applicant shall use the curve number (CN) values as provided in Table 2 to calculate stormwater runoff rates for pre-/post-construction ground surface conditions.

   The Applicant has used some CN values that are different from the values found in Table 2. Specifically, the Applicant used grass cover in fair condition for the pre-development analysis and in good condition for the post-development analysis, which results in less runoff in the post-development condition. Based on Table 2 all lawn areas should be assumed to be in poor condition. The Applicant should revise the hydrologic calculations to only utilize CN values from Table 2.

7. Section 352-26.A. states the specific system design guidelines for bioretention systems.

   Nitsch Engineering recommends the Applicant follow this section for the design and detail of the rain gardens.

GENERAL COMMENTS

8. The Plans should be revised to show the time of concentration paths for all existing and proposed subcatchments.

9. The Stormwater Report Checklist notes that the Stormwater Pollution Prevention Plan (SWPPP) will be submitted before land disturbance begins. Nitsch Engineering recommends this requirement be included as a condition of the stormwater management permit.

10. It appears that the label for Infiltration Basin #8 is missing from the drainage plans. The Plans should be revised to label all proposed infiltration basins.

11. Silt fence should be provided in addition to the compost filter sock for all perimeter erosion control protection.

12. Some infiltration basins have been provided with less than one foot of freeboard. A minimum of one foot of freeboard is recommended.

13. On Drawing C3.2, a callout is pointing to the proposed infiltration basin instead of the sediment forebay at Infiltration Basin #3. The callout should be revised to point to the sediment forebay.

14. On drawing C7.1, some details are overlapping with each other. The Plans should be revised to clearly show the details with no overlapping.

15. Infiltration Basin #6 shows one foot of separation from the bottom of the basin to ESHGW. All proposed infiltration basins should be provided with at least two feet of separation from the bottom of the basins to ESHGW. The design should be modified to meet this requirement.

16. TSS removal calculation sheets should be provided for all proposed treatment trains and they should note the specific BMPs used in each treatment train.

17. The routing diagram for the post-development HydroCAD report is not clear and difficult to read. The Applicant should provide a clear copy of this routing diagram.

18. Drain manholes (DMH) and yard drain (YD) inverts on Drawing C7.3 do not match the information in the structure and pipe schedules on Drawing C4.4. The Applicant should update the Plans so they are consistent.

19. Stormwater recharge and drawdown calculations for Infiltration Basins #4, #6, #7, and #8 have not been provided. Also, there are duplicate sheets for Infiltration Basin #5 in the Stormwater Report. The Applicant should update the Stormwater Report to include all infiltration basins.

20. Water quality volume calculations should be provided for each rain garden to confirm they are sized appropriately based on the contributing drainage area.

21. The Applicant should provide all test pit logs and a plan with their locations on the site.

22. Sediment forebay volumes provided on Drawing C4.4 and in the Stormwater Report do not match. The Applicant should update the Plans and/or Stormwater Report so they are consistent.

23. Subsurface Infiltration System #2 is designed as a tiered system on the Plans that steps down in elevation twice, resulting in three different system bottom elevations. In the HydroCAD report this entire system is modeled with a bottom elevation of 218.00, which does not reflect the design on the Plans. The Plans and/or HydroCAD report should be updated so they are consistent. If the goal is to maintain a tiered system, Nitsch Engineering recommends the system be broken up into three separate systems on the Plans and in the HydroCAD model. As currently designed all flow into the system will collect in chamber lines 8 to 11 only, which reduces the available storage volume and infiltration capacity of the system.

24. At several rain gardens, ESHGW is within one to two feet of the bottom surface elevation, which puts it in the planting soil layer. For a rain garden to provide proper treatment, ESHGW should be no higher than the bottom of the crushed stone layer so runoff can flow freely through the planting soil layer, or the system needs to be lined with an impermeable barrier. Also, at a rain garden groundwater recharge occurs at the bottom of the crushed stone layer, not at the surface. In order to include exfiltration in the HydroCAD model (which it currently is), a minimum of two feet of separation is required between the bottom of the crushed stone layer and ESHGW.

25. The Applicant should confirm if the future homeowners will be responsible for the operation and maintenance of any stormwater BMPs. Some are located partially or completely outside proposed drainage easements.

RECOMMENDATIONS

The Plans and supporting documents appear to conform to the Code, except as noted. The applicant should revise and resubmit the applicable documents for review.

If the Earth Removal Stormwater Advisory Committee has any questions, please let us know.

Very truly yours,

Nitsch Engineering, Inc.

Basel Alhadidi
Project Designer

Approved by:

Jared E. Gentilucci, PE, CPESC, LEED AP BD+C
Project Manager

BA/jeg

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