

32.1157.114
January 3, 2023

Nicole Roberts
Lane Use and Planning Coordinator
Town of Winchendon
109 Front Street
Winchendon, MA 01475

Re: **Peer Review – Proposed Single Family House Developments, Doyle Ave**

Dear Ms. Roberts:

At the Planning Department's request, Tighe & Bond has reviewed the submission materials for the proposed Approval Not Required (A-N-R) Development on Doyle Avenue and provided a review letter on December 8, 2022. Subsequently, the Applicant submitted revised materials on December 28, 2022. This letter is in response to the revised submission materials and includes the original review comments, Consultant responses in bold, and Tighe & Bond's latest review comments italicized.

Basis of Review

Tighe & Bond received the following materials via email which served as the basis of our review:

- Doyle Avenue A-N-R Development Comment Responses and revised stormwater management application package, dated December 28, 2022
- Site Plans entitled "Doyle Ave A-N-R Development", prepared by GRAZ Engineering, LLC, revision date December 28, 2022

During our review the following items were referenced, as necessary:

- Town of Winchendon Stormwater Management Regulations (September 2021)
- The Massachusetts Stormwater Handbook
- Applicable State and Federal Regulations

Review Comments

The following comments pertain to general engineering practice:

1. The drainage area maps are cluttered and very hard to follow, they also do not show the time of concentration flow paths and other information that is specified in Section 8(B)(3)(D) of the Stormwater Regulations. We recommend that the Applicant should revise the maps to include the required information.

GRAZ Response: The drainage area maps have been configured to make them easier to read.

T&B Response: The comment has been addressed.

2. Under existing and proposed conditions, drainage area 1S is given the same time of concentration. This seems unlikely due to the decrease in area of this drainage area under proposed conditions. We recommend that the Applicant explain the rationale or correct the time of concentration in the model.



GRAZ Response: The subcatchment 1S is modeled as the entire area on the west side of Doyle Ave, including the west half of the road. In the post-construction condition, our intent is not to disrupt the flow path down Doyle Ave to the point where it flows off the road just past the driveway for Map-8 Lot-240. Although the drainage areas have changed, this is still the longest point stormwater flows to the analysis point.

T&B Response: The comment has been addressed.

3. We recommend that the Applicant should indicate how flow along the proposed driveway is directed to Basin 5P.

GRAZ Response: In the site plans, the slope of the driveway is downhill toward the house, and a curb is on the southern/southwestern side of the driveway to keep stormwater on the driveway. Once the driveway reaches the turnaround area, it is sloped to a small channel to the right of the driveway to the sediment forebay.

T&B Response: The comment has been addressed.

4. The HydroCAD calculations show that the (2) 8" driveway culverts contain 12,612 cf of storage as Pond 18P, and the (3) 10" culverts contain 1,430 cf of storage as Pond 17P. Culverts, in general, do not provide any storage volume. We recommend that the Applicant should revise the calculations. Also, it is generally recommended that culverts at grade be a minimum of 12" in diameter to prevent clogging.

GRAZ Response: Our intent was not to model storage within the culvert. The method of using a 'Pond' node at these locations is to model how much storage is behind the culvert, not within the culvert. The culverts are modeled as outlets of the 'pond' upgradient. A weir has also been proposed as an outlet to simulate the driveway overtopping during extreme storm events.

T&B Response: The comment has been addressed.

5. Pond 17P contains a 30' long rectangular weir that does not appear on the site plans. We recommend that the Applicant show or describe how a weir will function with the (3) 10" culverts.

GRAZ Response: See comment above.

T&B Response: The comment has been addressed.

6. A construction entrance detail is provided in the drawing set but locations of construction entrances are not identified in plan view. We recommend that the Applicant should consider adding the locations of the construction entrances to the plan views.

GRAZ Response: Our intent is that all dwellings, as they undergo construction, shall have driveways with a construction entrance where they intersect the road. They have now been labelled on plan view.

T&B Response: The comment has been addressed.

7. A Catch Basin Detail is provided, but not shown on the plans. We recommend that the Applicant indicate where the catch basin will be installed.

GRAZ Response: The proposed channel grate referenced in the comment below flows into the catch basin for pretreatment, and is labeled.

T&B Response: The comment has been addressed.

8. The plans show a proposed channel grate but no detail is shown. We recommend that the Applicant provide a detail of the structure.

GRAZ Response: A channel grate detail has been added to the detail sheet.

T&B Response: The comment has been addressed.

The following comments pertain to the Massachusetts Stormwater Handbook and Stormwater Standards:

9. **Standard 1** – Standard 1 requires evaluation of velocities in the 2-year, 24-hour storm. The provided HydroCAD modeling for the 2-year storm is limited and does not include velocities at each proposed outlet. We recommend that the Applicant provide this information.

GRAZ Response: The section of the 2-year hydrology report with this information has now been added to the submittal.

T&B Response: The comment has been addressed.

10. **Standard 2** – The standard is met; however, we note other comments in this letter may impact the project's peak rates.

GRAZ Response: The standard is still met with the changes made.

T&B Response: The comment has been addressed.

11. **Standard 3** – Standard 3 requires at least 2 feet of separation between the bottom of the infiltration structure and the seasonal high groundwater table. Based on the available test pit data near basin 5P/L-6, it appears that groundwater is at 21 inches below ground surface in nearby test pit TP-6-4. The proposed basin bottom is at elevation 1040' (based on contours), which provides only 1.75 feet of separation to groundwater. Additionally, we recommend the Applicant clarify the intended basin bottom as the grading shows elevation 1040' but the callout shows 1040.5'.

We recommend the Board consider a condition of approval that test pits are performed in the locations of the proposed infiltration features. Due to shallow groundwater throughout the existing test pits, there are concerns about making assumptions in areas where test pits have not yet been performed.

GRAZ Response: Further soil testing has been performed on 11/21/22, the logs have been added, and the basins adjusted according to the seasonal high-water elevation at each location.

T&B Response: The comment has been addressed.

12. **Standard 4** – The standard is met.
13. **Standard 5** – The project site is not a LUHPPL. The standard is not applicable.
14. **Standard 6** – The standard is met.
15. **Standard 7** – The project is primarily new development. The standard is met.
16. **Standard 8** – Standard 8 requires a plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities. The plan must identify all stormwater management activities that are needed during land disturbance and construction, including source control and pollution prevention measures, BMPs to address erosion and sedimentation, stabilization measures, and procedures for operating and maintaining BMPs, especially in response to wet weather events and frost. The plan must also include a schedule for sequencing construction. The provided materials do not include provisions for temporary stormwater and erosion controls beyond silt fence. We recommend that the Applicant revise the stormwater report to include the information required in Standard 8.

GRAZ Response: A full erosion control plan is outlined on the detail sheet, which addresses all erosion control/stabilization measures on-site. An inspection and maintenance manual is included in the application packet which depicts the frequency of inspection and the required maintenance on each BMPs. A construction sequencing has been added as well.

T&B Response: The comment has been addressed.

17. **Standard 9** – Standard 9 requires an estimated operations and maintenance budget. We recommend that the Applicant provide this information.

GRAZ Response: An operation and maintenance budget has been added to the maintenance agreement.

T&B Response: A budget has been added; however, the budget does not include line items for maintenance of the conveyance swales, infiltrator chamber bed, outlet protection, culverts, or mowing. We recommend the Applicant revise the budget to include these items.

18. **Standard 10** – The standard is met.

19. There are 6 infiltration basins proposed. Per Volume 2 of the Massachusetts Stormwater Handbook, infiltration basins require 1 foot of freeboard above the total of the required recharge volume and the direct precipitation volume to account for design uncertainty. The basins are currently proposed to be equipped with riprap outlets designed to receive flow in smaller storm events. The basins are not designed to be equipped with emergency spillways as required in Volume 2. We recommend that the Applicant revise these features to provide the necessary freeboard and to be equipped with emergency spillways.

GRAZ Response: The infiltration basins have been altered to provide 1 foot of freeboard above the flow over the weir outlets in the 100-year storm. These weir outlets are the emergency spillways for all of the basins, and also serve as the primary spillway for some smaller basins.

T&B Response: The Applicant did not provide revised HydroCAD calculations containing peak water surface elevations for the 100-year storm event. We recommend the Applicant provide this information.

20. Volume 2 Chapter 2 of the Massachusetts Stormwater Handbook states that “the required storage volume of an infiltration basin is the sum of the quantity of runoff entering the basin from the contributing area and the precipitation directly entering the basin.” The current design includes runoff from the contributing area, but not precipitation directly entering the basin. This is typically accomplished by adding an additional node with a CN of 98 (Water surface) and an area equal to the basin footprint that discharges to the basin. We recommend that the Applicant update the model to reflect the runoff that directly enters the basin.

GRAZ Response: An extra node has been added to take in account for standing water in each of the basins and has been modeled as CN 98. The model previously modeled this area as grassed area.

T&B Response: The comment has been addressed.

The following comments pertain to the Winchendon Stormwater Management Regulations:

21. The Stormwater Report contains NRCS Soils information but does not include hydrologic soil group (HSG) data. We recommend that the Applicant include those materials to confirm the basis of design for the stormwater system and to demonstrate compliance with Volume 3 Chapter 1 of the Massachusetts Stormwater Handbook and Section 8(B)(5) of the Stormwater Regulations.

GRAZ Response: A full description of each soil unit has been added after the WebSoilSurvey summary to depict each Hydrologic Soil Group, and this information has also been added to the drainage maps.

T&B Response: The comment has been addressed.

22. Hydraulic calculations for the culverts are required as per Section 8(B)(4)(D) of the Stormwater Regulations. All culverts should be sized for the 50-year storm as per Section 8(F)(14) of the Stormwater Regulations. We recommend the Applicant provide revised hydraulic calculations with culverts sized for the 50-year storm event.

GRAZ Response: Analysis of the culverts during the 50-year storm event has been added to the stormwater report.

T&B Response: The comment has been addressed.

23. The Leaching Pit Detail specifies a cast iron or plastic cover. Please note that all drainage structures must be HS-20 rated as per Section 8(F)(16) of the Regulations. We recommend the Applicant revise the detail to be HS-20 rated.

GRAZ Response: The detail has been modified to specify a cast iron cover only.

T&B Response: The comment has been addressed.

24. In accordance with Section 8.D(1), stormwater management systems shall be designed to meet an average annual pollutant removal equivalent to 90% of the average annual load of TSS. Infiltration basins provide 80% TSS removal with proper pretreatment. We recommend that the Applicant provide documentation on how the site meets the required 90% TSS removal.

GRAZ Response: The site meets the 90% TSS Removal per regulation 8.D(1)(b), as every infiltration basin has been sized to retain the volume of runoff equivalent to, or greater than, 1 inch multiplied by the total post construction impervious surface area being routed to said basin. One infiltration basin was re-designed as a rain garden, which provides 90% TSS with the vegetated filter strip pretreatment as proposed.

T&B Response: While the infiltration basins are sized for the water quality volumes, the infiltration basins do not meet the requirement for 90% TSS removal. We recommend the Applicant revise the design to meet the 90% TSS removal requirement.

25. The rainfall data used in the analysis is the NRCC Rainfall data provided by Cornell. Per Section 8.F(9), we recommend that the Applicant revise the analysis to include the 24-hour rainfall data taken from National Oceanic and Atmospheric Administration Atlas 14, Precipitation-Frequency Atlas of the United States (Vol. 10, Northeastern States, published 2015, revised 2019), as it may be amended or rainfall data as specified by the MA Stormwater Handbook, whichever is more stringent.

GRAZ Response: We replaced the Cornell Rainfall data with the NOAA Atlas 14 data.

T&B Response: The comment has been addressed.

26. Section 8.F(10) requires that soil tests are conducted by a Registered Professional Engineer or Massachusetts Soil Evaluator. When tests are conducted in the locations of the infiltration features, we recommend that the Applicant ensure the tests are conducted by one or the other.

GRAZ Response: Soil tests have been conducted for the infiltration basins in November by personnel certified as Professional Engineers and Soil Evaluators.

T&B Response: The comment has been addressed.

27. Section 8.F(13) of the Stormwater Regulations require sizing calculations for all drainage swales to ensure that they can accommodate the 25-year storm event and velocities below 4 feet per second. The Stormwater Report does not appear to contain a hydraulic analysis of the drainage swales. We recommend that this analysis is provided by the Applicant.

GRAZ Response: Swale Analysis has been conducted and has been added to the stormwater report.

T&B Response: The comment has been addressed.

28. Section 8.F(15) requires that stormwater basins are sized to accommodate the 100-year storm event with a minimum of one foot of freeboard. We recommend that the Applicant revise the basins to comply with this requirement.

GRAZ Response: The basins have been redesigned to provide for the 1-foot of freeboard.

T&B Response: The Applicant did not provide revised HydroCAD calculations containing peak water surface elevations for the 100-year storm event. We recommend the Applicant provide this information.

29. Section 8.F(17) requires that catch basin structures are to be constructed as required by the Winchendon Department of Public Works. We recommend that the Applicant confirm the catch basin detail is in accordance with those requirements.

GRAZ Response: The basins have been redesigned to provide for the 1-foot of freeboard.

T&B Response: The Applicant did not provide revised HydroCAD calculations containing peak water surface elevations for the 100-year storm event. We recommend the Applicant provide this information.

30. Section 8.F(20) requires that all drainpipes are to be RCP or HDPE and have a minimum diameter of 12 inches. We recommend that the Applicant modify the following to meet the requirements:

- a. 6-inch outlet pipe from Basin 6P/L-6-1

GRAZ Response: Pipe has been modified to a capped 12" HDPE Culvert with a 6" Orifice drilled into the cap.

T&B Response: A 6-inch orifice has similar clogging potential to a 6" pipe. We recommend the Applicant revise the design so that all orifices and pipes are a minimum 12 inches in diameter.

- b. 6-inch outlet pipe from Basin 7P/L-6-2

GRAZ Response: Pipe has been modified to a capped 12" HDPE Culvert with a 6" Orifice drilled into the cap.

T&B Response: A 6-inch orifice has similar clogging potential to a 6" pipe. We recommend the Applicant revise the design so that all orifices and pipes are a minimum 12 inches in diameter.

- c. 6-inch outlet pipe from Basin 8P/L-6-3

GRAZ Response: Pipe has been modified to a capped 12" HDPE Culvert with a 6" Orifice drilled into the cap.

T&B Response: A 6-inch orifice has similar clogging potential to a 6" pipe. We recommend the Applicant revise the design so that all orifices and pipes are a minimum 12 inches in diameter.

- d. (3) 10-inch culverts at the driveway (Node 17P)

GRAZ Response: These culverts have been resized as 18" culverts.

T&B Response: The comment has been addressed.

- e. (2) 8-inch culverts at the driveway (Node 18P)

GRAZ Response: These culverts have been resized as 12" culverts (and a third added).

T&B Response: The comment has been addressed.

- f. 8-inch pipe from the catch basin to the infiltration chamber bed

GRAZ Response: This pipe has been resized as a 12" pipe.

T&B Response: The comment has been addressed.

31. Section 9.B. dictates that, if a SWPPP per the NPDES General Permit for Storm Water Discharges From Construction Activities is required, then the Applicant is required to submit a complete copy of the SWPPP. We recommend the Applicant provide a complete copy of the SWPPP.

GRAZ Response: A NPDES General Permit is now active on-site. A SWPPP has now been submitted.

T&B Response: The comment has been addressed.

32. Section 10.B(3) requires a maintenance agreement, including the signature(s) of the owner(s) and all persons responsible for operation and maintenance, financing, and emergency repairs, as defined in the maintenance agreement. We recommend that the Applicant provide this information in a maintenance agreement.

GRAZ Response: Responsibility of maintenance/repairs and the associated costs belongs to the owner and will be only transferred through sale of the property to new owners. A maintenance agreement has been added to the submittal package.

T&B Response: Section 10.B(3)(f) requires signature(s) of the owner(s) and all persons responsible for operation and maintenance. We recommend the Applicant provide a signed agreement.

We appreciate the opportunity to provide these comments for the Board's consideration. Should you have any questions, please do not hesitate to contact me at 413-572-3238 or jechristy@tighebond.com.

Very truly yours,


Jean Christy, PE
Senior Engineer