



GRADY CONSULTING, L.L.C.

Civil Engineers ♦ Land Surveyors ♦ Landscape Architects

April 6, 2020

Karen Joseph, Town Planner
Town of Scituate
610 Chief Justice Cushing Highway
Scituate, MA 02066

RE: Supplemental Engineering Review
483 Country Way
Residential Compound Development & Stormwater Permit

Dear Ms. Joseph:

The following is in response to Review by Chessia Consulting Review dated March 26, 2020. Responses to Mr.Chessia's Highlighted comments are highlighted in **Green**:

In response to your request, Chessia Consulting Services, LLC has reviewed the revised plans and calculations submitted for the above referenced work. It is proposed to construct a Residential Compound Development to service five new lots. It is my understanding that an ANR plan has been approved, which created the parcel such that it would meet requirements for a Residential Compound Development. I note that the initial filing had more parcels and existing houses included as part of the locus. Based on documentation from the Town Planner and the Applicant, the ANR has been recorded.

A review of MassGIS data indicates that the site is not in a FEMA flood hazard zone. No NHESP habitats nor Certified Vernal Pools or are listed in MassGIS, although there is a potential vernal pool in the southern part of the site. The locus is not in a Zone II or tributary to a public surface water supply area according to MassGIS mapping, but is within the Town of Scituate Water Resource Protection District.

Topographically, the site is on a slope that pitches from Aberdeen Circle towards Country Way, an isolated low area within the property or the potential vernal pool. Excess runoff from the potential vernal pool would also ultimately flow to a granite box culvert under Country Way. There is an intermittent stream and associated wetlands that crosses under Country Way through the granite culvert in the northeastern part of the property. Much of the easterly and southerly side of the property is wetlands.

Natural Resource Conservation Service (NRCS) soil data indicates Newfield and Woodbridge soils in the upland areas and Brocton Soils in the wetlands. Woodbridge soils have a dense layer of glacial till approximately 32 inches below the surface and are of very low permeability with seasonal high groundwater at 19-27 inches below grade. Woodbridge soils are Hydrologic Soil Group (HSG) C/D. Newfield soils have higher

permeability and are HSG B, but also have a high seasonal water table from 18-30 inches below grade.

Some on-site soil testing was performed over the past several years, including recent testing for both septic and stormwater purposes. On-site testing is more indicative of Newfield soils or even more permeable soils than NRCS data reports, where tested.

Most of the property proposed for the development is wooded. It is proposed to construct a new common driveway off of Country Way to service the five new dwellings. It is also proposed to install new septic systems and stormwater management systems to accommodate the new access drive and dwellings. It is my understanding that a Stormwater Permit was issued for #489 Country Way, but that a Certificate of Compliance has not been issued at this time. This parcel has been removed from the submittal.

I visited the site on September 24, 2019. Based on comments after my site visit there are some existing features that have been added to the plans. The site is heavily wooded with many large trees, the Board should identify if they will require trees of a certain size to be indicated. As this is a discretionary permit, the Board may require additional information to assist in their deliberations. I note that Country Way is a Scenic Road and there may be a stone wall and potentially street trees within the layout that would need to be removed to implement the plan.

This project has been reviewed under Section 610.2 D Residential Compound Section 720 for Common Drive, Section 770 Site Plan Review and also for compliance with Stormwater Permit requirements Section 32050 Stormwater and the associated Town of Scituate Stormwater Regulations approved April 29, 2010. In addition, I have utilized the DEP Stormwater Handbook, including Volume 3 Documenting Compliance with the Massachusetts Stormwater Standards. Specific BMP's were also reviewed in Volume 2 Chapter 2 for construction and maintenance requirements. My comments are listed under the appropriate section of the Regulations.

The following Materials were provided for review:

Plans Entitled:

“Special Permit Plan Residential Compound Development Subdivision 0 & 483 Country Way Scituate Massachusetts” dated April 25, 2019, last revised March 12, 2020 prepared by Grady Consulting, LLC consisting of 16 Sheets. (Plans)

Reports Entitled:

“Stormwater Management Design Calculations Compound Development - Country Way Bradford Merritt 483 Rear Country Way Scituate Massachusetts” dated April 25, 2019, last revised February 27, 2020 prepared by Grady Consulting, LLC. (Report)

“Operation & Maintenance Compound Development - Country Way Bradford Merritt 483 Rear Country Way Scituate Massachusetts” dated June 27, 2019, last

revised January 7, 2020 prepared by Grady Consulting, LLC. (O&M) *(not resubmitted)*

“Stormwater Pollution Prevention Plan (SWPPP) For Construction Activities At Special Permit Plan Residential Compound Development Subdivision 0 & 483 Country Way Scituate MA 02066” dated 11/11/2019, prepared by Grady Consulting, LLC (SWPPP) *(No revision date but additional data has been added in the SWPPP this has been reviewed under separate cover)*

Supporting Data:

Application for Public Hearing dated 7-2-19. *(not resubmitted)*

Application for Residential Compound Development Special Permit *(Reportedly resubmitted but the revised Application was not provided to Chessia Consulting Services)*

Miscellaneous emails regarding the property. *(not resubmitted)*

Response letters from Grady Consulting:

February 27, 2020, RE Engineering Review (2 letters one also covers public hearing comments)

February 21, 2020, RE SWPPP Engineering Review

I note that the revised data listed above was provided via email and reviewed as provided. No measurements or scaling of plans was performed but minimal plan changes were implemented.

I attended a meeting with the Grady Consulting, Applicant’s Counsel, Karen Joseph and Amy Walkey on January 14, 2020 to discuss issues regarding the plans. Current comments are in **highlighted type** following prior comments in underline type and *italic type* respectfully, which follow my initial comments.

Zoning Bylaws

Section 610.2 D Residential Compound

610.1 Purpose:

I defer issues under this Section for the Board’s review.

610.2 Standards:

The proposed development would consist of five new lots, one existing house would be divided out through the ANR process, another existing house would remain and would provide a drainage easement for the new project. I note this is a discretionary permit.

The Application lists the following parcels:

- 032-007-014 (this is the parcel with an existing house #483 Country Way)
- 032-007-015 (this parcel is not listed on the plans)
- 032-007-016 (this parcel is not listed on the plans but appears to be #489 Country Way, the plans may have a labeling error)
- 032-007-021 (this parcel is the lot between #483 and #489 Country Way and has 50 feet of frontage)

- 032-007-013A (this parcel is east of #483 with over 100 feet of frontage on Country Way)

It is my understanding that an ANR plan to create the specific site parcel has been approved but not recorded.

It is my understanding that the ANR has been recorded.

The project does not meet the requirements of this Bylaw as there are a total of seven lots two existing lots and five new lots. In addition, all lots are required to share common frontage and access, which is not the case for the two existing dwellings to remain.

If recorded the ANR would create the parcel proposed for the development.

No further comment required.

a. Tract Frontage

The project site would have 474.63 feet of continuous frontage on Country Way, inclusive of all of the subject parcels. There are currently four separate lots with frontage on Country Way. #489, #483 and the vacant parcel to the east (032-007-013A) all have over 100 feet of continuous frontage. Lot 032-007-021 has only 50 feet of continuous frontage. This frontage is proposed as the access point for the five proposed new lots. Lot 032-007-013A may not have accessible frontage as nearly all of the lot's frontage is wetlands with an intermittent stream.

According to the ANR the site would have 268.72 feet of frontage.

b. Minimum Tract Size

Based on the data provided, the property does not currently exist as one tract. The total proposed land area of the development parcel is listed as 428,294 square feet on Sheet 1. Based on the numbers on Sheet 2 the area of the land to be developed, excluding the two existing parcels after any reconfiguration, would be 430,747.7 square feet. Including all the parcels listed in the Application there would be 511,875.64 square feet of land. Although seven houses are not allowed under this permit, the maximum allowable number would be 6 based on 4 times the 20,000 square foot minimum lot area for the district. A total tract size of 560,000 square feet for the 7 lots would be required and is not met by the project. This requirement would not be met.

Based on the Cover Sheet and the ANR Plan the site contains 431,048 square feet.

Adding the lot areas on Sheet 2 indicates a total area of 431,053.

The sum of the lot areas listed on Sheet two now totals 431,054.

Comment remains relative to Sheet 6 I note that Sheet 2 was not included in the emailed set provided. The areas total 431,048.

c. Dimensional Requirements

It is required that all structures must be 50 feet from a perimeter lot line. The plans should indicate the setback and all proposed structures within this setback. My understanding, based on a discussion with the Town Planner, is that the 50 foot setback should exclude driveways, buildings and other constructed features. There are several areas where the 50 foot perimeter has driveways, stormwater and wastewater structures. The Board should review this aspect of the project and provide direction to the Applicant. Plans should indicate this buffer for all parcels included in the Application.

The Board should make a determination on this issue. My research on-line indicates that in many cases a driveway would be considered a structure. In

other cases, if specifically addressed in the Zoning Bylaws (ZBL) of the Town, it is not a structure. The definition in the Scituate ZBL does not address whether paving is a structure only what is considered paving.

The Board should make a determination on this issue. The plans have been revised to have no buildings or individual lot driveways, except a section of the Lot 1 driveway within 50 feet of a perimeter lot line. Some utilities are within the 50 foot area.

Comment remains, the Board should address this issue.

d. Minimum Lot Size

All lots are required to be a minimum of twice the require lot size in the underlying district. The site is in the Residential R-2 District where 20,000 square foot minimum lots are required. The proposed lot all exceed 40,000 square feet as required, except for #483 Country Way.

The ANR if recorded would remove #483 Country Way from the project.

No further comment required.

e. Access

The proposed access is a 20 foot wide paved roadway. The plans do not specify the easement width but it scales approximately 28 feet wide. I recommend that the design plans for the roadway include the easement location. I recommend that the Fire Department comment on the proposed plans. Refer to comments in Section 720 Common Driveways. The two existing lots would have separate private driveways, this is not consistent with the Bylaw.

An easement plan has been provided and the easement is now approximately 38 feet wide along the roadway. It is unclear if the Fire Department has commented on the plans. Subject to recording the ANR the two existing developed lots would not be part of the project.

No further comment required.

f. Open Space

No open space is proposed. I note that the site abuts other Town of Scituate Conservation land and portions of the site including the wetlands and potential vernal pool could be separated as open space without impacting the development design.

No further comment.

Section 720 Common Driveways

720.1 Applicability:

This project would be applicable to this section of the Zoning Bylaw (ZBL). The project proposes a driveway to serve five lots, which would be allowed as a common drive under Section 610 although three lots is the maximum allowed under this Section.

720.2 Purpose:

No comment required.

720.3 Application Requirements:

The Application for a Residential Compound should address this aspect of the regulations relative to forms, plans and legal agreements. I recommend that the Board and Town Counsel review legal aspects of the project.

I defer these issues to the Board.

The Board should address these issues.

The Board should address the above issues.

A Special Permit Plan set was provided. I recommend that Plan Sheet 2 include full dimensional data for the proposed access easement. It is unclear if this easement would also serve as a utility easement. I recommend that the easement be of sufficient size to provide space for installation and maintenance of all proposed utilities and access driveways to the individual lots. Easements for #489 Country Way to drain into Lots 1, 2, 4 and 5 should be provided. All easement lines should be indicated on utility and grading plans to demonstrate sufficient space to construct and maintain all required utilities and access drives, including associated grading has been provided. No lot areas within 75 feet of the easement are indicated, it is unclear if this aspect is required for a Residential Compound development.

A separate easement sheet has been provided (Sheet 3). The connections between #489 and the site have been eliminated. Sheet 3 indicates the lot area within 75 feet of the easement.

The width and proposed surface of the common drive are indicated on the plans and details as required and cross section details are indicated as required. I recommend that the cross section specify materials as defined by MassDOT for gravel, pavement and non-frost susceptible material. The depth of the non-frost material should be clarified as it overlaps with the gravel on the detail.

Satisfied.

The plans include all of the lots and the existing street across the parcel's frontage. Whittier Drive is also located on the plans. Additional locus information should not be required. The plans are stamped by a Professional Engineer and Land Surveyor.

There should be a note added to the plan stating that the driveway shall never be considered for acceptance as a public way. There should also be a note on the plans specifying that maintenance responsibility is that of the property owners served by the driveway.

Satisfied, the required note is on the Cover Sheet.

720.4 Additional Requirements:

It is unclear if the Board will require additional information.

No further comment.

720.5 Common Driveway Agreement:

It is unclear what form of agreement for maintenance is acceptable to the Board. I recommend that the Stormwater Operation and Maintenance Plan be an appendix to the Agreement.

I defer this issue to the Board.

No further comment required.

720.6 Procedure:

No comment required.

720.7 Design Standards:

- A. The proposed common drive would require a cut for the first 225 feet up to a maximum of approximately 2.5 feet. The remaining 250 feet would require fill up to maximum of approximately 4.5 feet. The plans do not identify any large trees, the area proposed for the roadway is currently wooded. Based on observations during my site visit there are many large trees on the site. The Board may require trees of a specified diameter to be indicated on the plans and may require efforts to preserve large trees if feasible. Proposed clearing and grading encompass most of the area outside of the no disturb wetland buffers on the property.

Not specifically addressed, I defer this issue to the Board.

The Board should make a determination on the above issue.

The Response letter indicates that it is not feasible to save trees over most of the site due to grading requirements. I recommend that the Board make a determination on this requirement. The project has been broken into 2 tree clearing phases (sheet 16 & 17). Phase I is the Roadway and infrastructure phase and Phase II is the individual lot development phase. The roadway and drainage facilities are necessary aspects of the development. There is no alternative location for the roadway or drainage systems. As such Phase I does not afford a good opportunity to retain trees. A tree cannot be located in the roadway. Infiltration basin is not allowed to have vegetation other than grass as noted in previous peer reviews. The best opportunity to retain trees will be in the Phase II tree clearing phase. A note has been added to sheet 17 (construction sequence phase II) to select and retain trees. This gives an opportunity to the developer/buyer of the property to retain any significant or specimen trees for their yard. This is the best time to select trees as a house could be designed around a specimen tree or tree stand. We also note that based on field observation there are no significant/specimen trees located within the site. The site was historically a Farm. It was clear of trees. The trees within the site are primarily pioneering locust and white pine. It is our opinion that there are not trees of significance within the proposed developed area. We have also prepared a landscape plan to offset the loss of the overstory by providing shade trees within the development.

- B. The proposed common driveway would be 20 feet wide as required under Section 610. One side of the of the drive would have a cape cod berm according to the detail. The west side has a berm from Country Way to Sta 1+50 and the east side has a berm from Sta. 1+50 to the end according to the plans. The plans should provide two foot shoulders exclusive of the berm, it appears that there would not be a two foot shoulder near the west side of the roadway by the stormwater basin. The Fire Chief should comment on the plans.

Shoulders have been added. I recommend that the temporary grading easement be permanent as it affects the stability of the roadway and shoulders changes on the abutting lot could be proposed in the future.

Satisfied.

- C. This section is not applicable Country Way is a through street.
- D. The plans indicate a new looped water line. In addition, separate water service lines to the new houses are also indicated as required. The new dwellings would have underground utility service for electric, cable and telephone. As noted the space within the easement for utilities does not appear adequate for maintenance of subsurface utilities.

The easement area has been widened for utility service maintenance. As noted above I recommend that the temporary easement be a permanent easement. The gas is approximately 2 feet off the westerly property line in this area.

Satisfied.

- E. The proposed roadway surface and gravel exceed requirements, which is acceptable. The plan proposes all impervious asphalt paving. The approach grade to Country Way is 5.25%, which is steeper than allowed for a subdivision roadway. The Applicant should comment on safety of the intersection as it is a north facing roadway and susceptible to icing in the winter, in particular as runoff is proposed to flow across the roadway to the catch basin on the west side.

The proposed roadway is now steeper than previously proposed at 5.99%. The roadway is now crowned with catch basins on each side, which will help reduce icing across the roadway. The Board may want the opinion of a transportation engineer regarding safe access. Although a Common Drive is not a subdivision it does service five lots and safety at an intersection with a major roadway should be a design consideration.

It is my understanding that the Board has not requested review by a transportation engineer.

- F. The length of the proposed common drive is 468 feet. The length would comply with the requirements.
- G. It is required that runoff not exceed predevelopment conditions. Refer to comments under Stormwater Regulations below for comments on the drainage design.

Refer to comments under Stormwater Regulations below.

Refer to comments under Stormwater Regulations below.

Runoff conditions would be met, refer to comments under Stormwater Regulations below.

- H. None of the proposed common driveway is located above a septic system.
- The revised plans have a portion of the Lot 2 septic system under the turnaround. This aspect of the plans does not comply with requirements.*
- Satisfied, the location of the system has been revised to avoid the turnaround area.

- I. The common drive is not adjacent to exterior lot lines based on the parcels, although as noted the existing houses if separated from the development parcel would not be screened. The Board should determine if any screening is required.
- The revised design, by removing the two adjacent parcels from the project, now has the common drive adjacent to exterior lot lines, subject to recording the ANR plan. There is no screening proposed. The pavement is within five feet of the westerly lot line. The Board should review this issue.*

The Board should review this issue and make a determination regarding screening.

- J. The proposed hammerhead turnaround appears to be a few feet short of the dimensional requirements in the Regulations. I recommend that the Fire Chief comment on the plans.

The turnaround appears to comply, the Fire Department should comment on the plans.

It is not known if the Fire Department has commented on the current layout.

It is my understanding that the Fire Department has commented on the project. I defer review of these issues to the Fire Department.

- K. Sight distance data is indicated in the plan set. The point of measurement is required to be no less than 15 feet from the edge of the existing way under Subdivision Regulations. The measurement point used is 14.5 feet off the edge of pavement. Country Way would likely be a major street and under the Subdivision Regulations and the applicant should base the sight distance on the 85th percentile speed. Based on my sight visit there would likely be sufficient sight visibility as long vegetation and other obstructions as applicable be removed and any new plantings remain outside the sight lines. I recommend that the plans indicate any existing trees, etc. that are within the sight line and if the required sight line is outside of the public way an easement should be provided to allow clearing of vegetation, etc. Landscape plans should include the required sight lines to properly locate proposed plantings.

I disagree that sight design does not have to be based on the 85th percentile speed in this case for connection to a major street as that is common design practice for intersections, but defer to the Board whether they will require a speed study. Based on the plan (Sheet 9) a clearing easement would be required across the frontage of #489 Country Way.

It is my understanding that the Board has not requested review by a transportation engineer or further traffic study data.

- L. It is unclear if this requirement relative to lot width applies to a Residential Compound.

720.8 Construction:

No comment required.

720.9 Surety:

No comment required.

Stormwater Regulations

Section 7 Approval of Stormwater Permits by Planning Board or Conservation Commission.

General:

A stormwater permit has previously been issued for #489 Country Way. This permit should be closed out with a Certificate of Compliance and the modeling data for runoff

used in the approved/as-built design incorporated into the model. Since there is work on #489 Country Way there will need to be a new permit filed for this project inclusive of any proposed changes to the existing permit if allowed by the Board. The Application did not include a stormwater permit Application form.

The ANR if recorded will separate #489 from the project site and associated comments would not apply. A Stormwater Permit Application has been included for the subject site.
No further comment required.

A. Requirement

The site triggers this section of the Stormwater Regulations, a Stormwater Permit Application is not included in the Report. This is the applicable review section.

A Stormwater Permit Application has been included for the site, subject to recording of the ANR plan.

No further comment required.

B. Procedure

1.) Application for Stormwater Permits

- a. Stormwater Application Form
A Stormwater Permit Application Form should be submitted.
Satisfied subject to recording of the ANR and any changes in the Map and Block designations.
No further comment required.
- b. Statement of Adequacy of Stormwater Management System
The required certification statement was not included in the Report.
Satisfied.
- c. Stormwater Management Plan
The required plans and supporting calculations were included with the submittal.
Refer to comments below under Section 9.
Refer to comments under Section 9.
Refer to comments under Section 9.
- d. Narrative and Drainage Calculations
A Narrative and Drainage Calculations were provided in the submittal. Refer to comments below under Section 9.
Refer to comments under Section 9.
- e. Information on Operation and Maintenance of Stormwater Management System
An Operation and Maintenance Plan is included in the submittal. Refer to comments below under Section 9.
Refer to comments under Section 9.

Section 8 Low Impact (LID) Approach to Stormwater Management

This section discusses the general approach to stormwater management using LID techniques. The proposal is to utilize two stormwater basins one is a bio retention area and the other would be a detention basin by design and several roof infiltration systems. There are also features previously permitted on #489 that would be

modified under this proposal. Part of the site would flow through a drainage channel and part captured in a catch basin. I note that the basin near Country Way includes work in the Town Layout to implement the design, work should be contained within the property. The design proposes modifications to an existing permitted site without providing the data used in that permit. The approved design as adjusted through as-built conditions should be used as the existing condition for that lot. It is unclear that the existing systems can be modified as proposed.

Work associated with #489 has been eliminated from the project. The revised design includes a subsurface infiltration system, an infiltration basin and subsurface roof infiltration systems. The roof systems are proposed for compliance with the Zoning Bylaws and are not included in the runoff modeling. Pretreatment includes catch basins and the infiltration basin is also preceded by a forebay and water quality swale.

Section 9 Stormwater Management Performance Standards

Standard 1 – Untreated Stormwater

This standard requires all outlets for stormwater to be treated prior to discharge and to design systems to prevent erosion into wetlands.

There is one new pipe outlet proposed. There are also two pipe outlets into stormwater basins. Runoff from the road, driveways and house roofs would discharge to some treatment system prior to discharge.

The revised design includes one outlet from the infiltration basin. There is also an outlet into the forebay. The subsurface system for the entrance portion of the roadway does not have a specific outlet but in storms larger than the 100 year 24-hour storm would likely overflow at the catch basins.

No further comment required.

The Report should include calculations for the outlet protection from the basin and I recommend that other outlets also be sized to prevent erosion at the outlet.

The Response includes some data on sizing but no specific calculations as required. I checked the sizing and the 12" outlet protection is adequate. I note that the data for the 10" pipe is inconsistent in the table on Sheet 14.

Satisfied.

Outlet sizing data is required to comply with this Standard.

Satisfied.

This Standard would be met.

Standard 2 – Post Development Peak Discharge Rates

This Standard requires an Applicant to demonstrate that the development does not result in an increase in the rate of runoff from the site.

As noted above the data for #489 Country Way is required as the existing condition for the project. Total area should match pre development to post development. It is proposed to direct runoff from new impervious areas and expanded lawn areas to a detention basin (Basin 1) or a bio-retention basin (Basin 2). It is proposed to direct building roofs to subsurface infiltration systems. I note that bio-retention basins are not considered a BMP for peak rate control by DEP.

The design has been revised to have a subsurface infiltration system for the lower part of the roadway closest to Country Way and an infiltration basin for the remainder of the roadway and the driveways for the proposed houses. Roof runoff would still be discharged to separate infiltration systems.

No further comment required, I note that roof systems are only for compliance with Zoning requirements and are not included in the calculations.

Tables for pre and post runoff rates and total volume have been provided in the Report. I note that the program does not sum the flows at a control point but it is possible to add the flows together from the program. This is not necessarily correct as there is a time factor for runoff rates that would skew the results.

No further comment required.

Existing Conditions:

The existing conditions plan has four control points, Country Way (Pre-1), an existing low area within the site (Pre-2) and wetlands to the east (Pre 3 and 4). The model should include the low area near Country Way observed in the field and the potential vernal pool as that appears to be an area that would contain runoff as separate subareas and the areas that flow to the wetlands to the east should be one subarea.

The model now includes the low area near Country Way and the Vernal Pool has been assessed in the revised model.

The existing conditions subarea plan should include additional spot grades to identify drainage divides. Based on my site visit there is a low area that would trap runoff at the front of the site where the proposed common drive would be located. This low area should be modeled as a pond/infiltration area. The elevations and details used to model the overflow from the low area (Pre-2) should be on the subarea or general plans. Based on my observations there is a lower area that flows toward the potential vernal pool between Aberdeen Drive and the EL 64 +/- low area that is included in the model. As noted, the potential vernal pool should be separately analyzed to assess impacts.

Spot grades have been added but they appear to be computer generated not the actual survey points. The control points have been modeled as noted above.

Soil test data cannot be reconciled between the Plans and Report as there are multiple tests with overlapping numbers. A clear plan with all tests properly labeled should be provided. Based on testing that has been done soils appear to be mostly sand or loamy sand and are likely Hydrologic Soil Group (HSG) A in upland areas tested. The runoff model should adjust the soils to those encountered in the field from published data. This will reduce existing runoff values.

Partially addressed, there is a clearer plan but there are duplicate numbers for test pits. Based on the elevations etc. it appears that the 2013 test pits were not on the subject property, but may be associated with the developed lots. The revised calculations assume HSG A soils consistent with test results.

Satisfied.

Time of concentration calculations should use the most hydraulically remote flow path, which is not necessarily the longest flow length. In particular the sheet flow segment in Pre-2 and Pre-4 would be much longer using a flatter slope for the sheet flow. I recommend that Tc calculations utilize the cover type for shallow concentrated flows consistent with National Engineering Handbook 4 (NEH4). The unpaved condition is a simplification of any surface from compact gravel to woods with substantial leaf litter. The flow through woods would be slower in this case.

There remain issues with the time of concentration (Tc) as previously noted. Dense woods for sheet flow do not exist in New England according to NRCS guidance. The use of unpaved overestimates flow times. Since the Tc is the longest hydraulic flow time it is not consistent to have a longer post development flow through an unaltered wooded area. I disagree with the Response that use of simplified TR-55 assumptions is consistent with standard practice or good engineering practice. NEH4 is available on-line and is the standard reference for development and use of the TR-20 program which the proprietary program used in this submittal is based on. The calculations have a longer sheet flow component and a shorter shallow concentrated component. The end result is a longer Tc which results in lower runoff rates.

Satisfied.

Proposed Conditions:

Comments under Existing Conditions relative to soils conditions, and flow to the potential vernal pool also apply to Proposed Conditions.

This aspect has been addressed in the calculations.

The model should sum flows to the same control points as modeled in the existing conditions. In the proposed case there are four control points listed discharging to the easterly wetlands, three of these are from the detention basin. These could be summed as one point. Depending on the total volume of runoff an assessment of the impact at the culvert under Country Way to assess flooding may be required. If the total runoff volume to this point is met as required under Standard 3, this analysis would not be required.

Satisfied.

The subarea plan, based on the contour data should have some flow from Post 3 into the existing #489 property. As noted above under existing conditions the potential vernal pool should be divided out of area Post 7. It is unclear why there are three areas to the same location (Post 3, 4 and 5). Areas Post 8 and Post 2 should be one area and should include the area on #489 proposed to flow into new basin. The post development calculations include the lot (#489) but there is no way to compare results as it is not

included in the existing calculations. I note that a contour is missing between the houses on Lots 4 & 5 or the areas are incorrect.

Satisfied.

It is unclear what is proposed for a “gravel road” in Post 3 and the curve number (CN) is lower than appropriate. The impervious area also appears lower than measured. The woods and grass should not be considered fair for the existing house at #489 if the approved permit assumed that the grass and woods would be in good condition. The woods appear to be in good condition in any case and if the grass has not been established per the permit conditions it should be reseeded and if necessary soils amended to promote appropriate growth.

Satisfied.

The Time of concentration seems excessive in areas Post 3, 4 and 5. The Manning’s “n” value is higher for both the sheet flow component which would be mostly grass and in the water quality swale. This will reduce the flow time and increase the peak rate of runoff.

The time of concentration (Tc) uses dense woods for sheet flow in Post 1, Post 2. This condition is not found in New England. Woods in New England have a sheet flow Manning’s roughness of 0.4, versus 0.8 used in the calculations. Dense grass typical of a well-established lawn in New England would have a sheet flow Manning’s roughness 0.24, the values are incorrect for this area in most of the calculations as Manning’s roughness of 0.4 was used. Flow through the proposed water quality swale would increase the Tc in subarea Post 3 as revised but the channel roughness used is .5 which is not consistent with a grass channel. In addition, a water quality swale should be designed to pass the larger flows and hold the water quality volume, which represents a much smaller flow than even the 2 year storm. I disagree with the Response in this case, the Tc should be shorter in the water quality swale for runoff analysis. It is likely that adjusting the above values will increase the runoff rate calculated.

Satisfied.

It is proposed to mitigate runoff by installing a raingarden or bio retention basin (Basin 2), depending on which part of the submittal data is referenced. The majority of the basin is on #489 Country Way with a portion on Lot 1 and some in the public roadway. As Country Way is a scenic roadway it is unclear that this is permissible and is not recommended as it would limit options for roadway improvements. I recommend that the system be located wholly on the subject property. DEP does not recognize rain gardens or bio retention basins as rate control structures, an alternative system should be proposed. The model assumes that the system is an infiltration basin which would be acceptable for runoff controls if appropriately designed. The proposed design would need to be modified to comply with infiltration basin design criteria. Some soil tests are nearby but as noted the data is not clear relative to test pit numbers, etc. If designed as an infiltration basin additional testing will likely be required. I recommend that any additional testing if performed be performed by a Licensed Soil Evaluator and witnessed by an agent of the Town. Allowable infiltration systems that are used for rate control in storms 10 year duration or greater are required to have 4 feet of groundwater separation or a mounding analysis performed. The Report includes mounding analysis data but as it

is unclear where the groundwater is as the test data is not clear. I have not reviewed this aspect of the report at this time as there is insufficient data to review the assumptions.

The rain garden has been removed. It is now proposed to have a subsurface infiltration system for runoff rate control at the entrance to the site. There are some assumption issues with the mounding analysis, but the mound would not impact the basin based on my independent checks. I note that there are no tests directly under the system as required in the DEP Handbook. I recommend that any additional testing if performed be performed by a Licensed Soil Evaluator and witnessed by an agent of the Town.

Testing has been performed and indicates suitable sandy soils. Mounding calculations are consistent with requirements and would not result in breakout.

A large open basin (Basin 1) is called an infiltration basin in the Report but is designed as a detention basin. Basin 1 is proposed in roughly the center of the site. The outlet has a stepped weir in the detail but is modeled as three separate weirs with limited heights. More data to justify the outlet coefficients should be provided. The lowest weir would be essentially flush with the bottom of the basin and outlet structure versus the upper weirs which would have a free flow dropping into the structure. These factors change the parameters of the outlets. The top width of the basin should be 10 feet based on recent DEP data and have access all around. To be an infiltration basin the outlet would need to be raised above the base of the basin.

Partially addressed, the outlet is now a single structure with a rectangular weir set above the bottom of the basin. As modeled, there would only be outflow in the 100 year storm. A low flow drain has been added, but the basin width at the top is only proposed as 6 feet. I have had different feedback from DEP regarding top width based on a Superseding Order currently under review by the Southeast Region than the comments in the Response.

It is my understanding that the Board has accepted the narrower width berm.

There is a new inlet and outlet pipe proposed where the existing infiltration system is on #489 Country Way but no data on this inlet or pipe has been provided. This aspect of the plan should be clarified.

No longer applicable there is no work on #489, except for grading in an easement that would not impact the existing systems.

Roof infiltration systems are proposed for each house. A separate typical model for the roof areas is included in the Report. I recommend that the houses and infiltration systems be included in the overall model for consistency of areas. All of these systems will require confirmatory soil testing. Testing should be performed by a Licensed Soil Evaluator and witnessed by an agent of the Town.. The model only analyzes the 100 year storm and assumes that the soils are HSG A. As noted above this assumption should also be applied to the existing conditions where appropriate based on soil testing. The proposed systems should provide four feet of groundwater separation or a mounding analysis should be performed. The shape of the systems affects the mounding calculations if they are performed. Based on correspondence with DEP only the bottom area should be used in the calculations. The calculations use “wetted area” which includes the sides. The design of the collection and conveyance from the roof to the

infiltration systems should be addressed. The Board could condition a final design for the houses and collection systems be submitted for approval prior to house construction. I recommend if this is conditioned that the size of the houses be limited to that indicated on the plans and calculations. Note that the collection and conveyance system should have capacity for the 100 year storm to be consistent with the model or the model could be modified.

No longer applicable, the calculations do not include the roof drywells.

The current plans add two new infiltration trenches for the edge of the open infiltration basins and part of Lot 3. These are long narrow trenches. The width of the downstream area that is to slope back to the trench is unclear. As the trench is essentially at the 50 foot wetland setback I recommend that the detail indicate the location of the setback and associated sloped area. The natural grade is generally away from the trenches.

Satisfied, the plans indicate the area beyond the trench.

As proposed the submittal does not meet this Standard. Additional information is required to demonstrate compliance with this requirement.

It is likely that this Standard could be met but some additional supporting data is required.

This Standard would be met.

Standard 3 – Recharge to Groundwater

The regulations require that no increase in volume be discharged off site. The submittal should include an assessment of the total runoff volume from the site pre and post development.

Tables for pre and post runoff rates and total volume have been provided in the Report. I note that the program does not sum the flows at a control point but it is possible to add the flows together from the program. For total runoff volume the time of the flow is not a factor and summing the values will give the total runoff volume.

As noted under Standard 2 above insufficient soil testing has been performed to justify the design of several of the infiltration components.

I disagree with the response that soil testing is not require at the location of proposed infiltration systems. The DEP requirements, which are part of the Stormwater Bylaw requires site specific testing at the proposed location of infiltration systems. I agree that soil testing that has been performed indicates suitable soils. The Board could include a condition for testing prior to construction at the Applicant's risk if requested. It is not uncommon in this area to have differing soil conditions or human altered soils within short distances.

Satisfied, testing has been performed at system locations.

Rain gardens and bio retention basins can provide recharge of runoff. The Report lists Basin 2, the bio retention basin, as the only infiltration BMP. The calculations do not comply with either DEP or the Town of Scituate Regulations. As noted Scituate requires

all runoff volume be contained on site in all storm up to and including the 100 year storm. This requirement has not been met.

The revised submittal addresses this requirement.

DEP requirements have not been met either as at least 65% of all impervious area is required to be recharged. The only areas proposed for recharge is the lower part of the roadway and not all of that is proposed to be captured. In addition, it is proposed to reduce recharge by directing an area of the #489 driveway that is currently recharged on the lot to detention Basin 1.

Satisfied.

The proposed system of infiltration for roof runoff can be used for recharge. In this case there should be site specific soil testing and either the model modified, a mounding analysis performed or greater (4') groundwater separation should be provided if these areas are also used for peak rate control as proposed. The Report did not address the roof systems except for peak rate controls under Standard 2, they are not included in the recharge calculations.

The roof systems have been eliminated from the model and are only proposed to meet zoning requirements.

This requirement would not be met.

This requirement would be met subject to soil testing as noted above.

This Standard would be met.

Standard 4 – 80% TSS Removal

It is required to remove 90% of TSS prior to discharge as the site is in the Water Resource Protection District. The calculations should use 1" of runoff as the site is in the Water Resource Protection District. A runoff of 0.5" was used in the calculations.

The calculations now use 1" of runoff as the site is in the Water Resource Protection District. I note that soils are reported as highly pervious and 44% TSS removal is required prior to discharge to an infiltration system.

The submittal has the following BMP's

The systems have been completely redesigned as described below:

There are some revisions as noted below.

Basin 1 system:

- Dry water quality swale – Runoff from part of the proposed roadway and the lot driveways flows into a water quality swale at Sta. 1+45 +/- . Properly designed water quality swales remove 70% TSS. In this case a properly sized forebay or appropriate alternative should be installed for pretreatment to receive this credit. Data on the sizing of the water quality swale should also be provided, refer to page 81 of the DEP Handbook Volume 2 Chapter 2.

- Detention Basin – The design proposed is a dry detention basin, which would not receive TSS removal credit. The Report lists the structure as an infiltration basin but the design is not consistent with an infiltration basin design.

This system would not meet TSS removal requirements.

Basin 1 system:

- *Deep sump catch basin – Runoff from part of the proposed roadway and the lot driveways flows into a catch basin at Sta. 1+53. Catch basins provide 25% TSS removal subject to ¼ acre maximum impervious area tributary to the catch basin. There is over ¼ acre of impervious area tributary, although the roofs would flow to infiltration structures and would be deducted from the area, it still appears that over the allowable impervious area is tributary to the catch basin. The calculations should demonstrate the impervious area tributary to justify the credit.*

No longer used for credit, although there is a catch basin as the initial treatment unit it has a larger tributary area than acceptable for credit. I note that it is included in the Report as used for pretreatment and should be eliminated in this case for this specific calculation.

Satisfied.

- *Dry water quality swale – Runoff discharged from the catch basin and some overland flow discharges to a dry water quality swale. A properly sized forebay is provided for pretreatment as required. Properly designed water quality swales remove 70% TSS. Data on the sizing of the water quality swale should also be provided, refer to page 81 of the DEP Handbook Volume 2 Chapter 2. The Response indicates that the calculations are on Sheet 12, but those are only for the forebay.*

Satisfied.

- *Infiltration Basin – An infiltration basin can provide 80% TSS removal subject to adequate pretreatment and design. As noted above, further data on pretreatment is required. If the pretreatment issues are addressed the infiltration basin would provide 80% TSS removal.*

Satisfied.

This system could meet TSS removal requirements subject to additional data on the pretreatment systems. I note that the TSS calculations in the Report double count the forebay as it is an integral part of the swale to receive 70% TSS removal.

This system would provide adequate treatment. The pretreatment is overestimated but would comply with requirements.

Basin 2 system.

- Catch basin – One catch basin is proposed to collect runoff from a portion of the new roadway. The detail on Sheet 12 indicates a 3 foot sump is proposed. To receive credit a 4 foot sump is required. A properly designed catch basin, which is not proposed in this case would receive 25% TSS removal credit.
- Rain gardens/bio retention basin: Rain gardens/bio retention basin receive a credit of 90% removal subject to certain design considerations. Based on the description on page 25 of the DEP Handbook Volume 2 Chapter 2, there should

be a forebay in addition to the deep sump catch basin to receive 90% TSS removal. It is unclear if any pretreatment is proposed for the driveway discharge from #489 Country Way. Contours are also unclear relative to the grading of the driveway relative to the basin. It appears that the driveway will bypass the basin versus the current system that has been installed. The planting plan should include a list with the number of each species proposed.

Subsurface Infiltration system:

- *Deep sump catch basins* – *Runoff from the lower part of the proposed roadway flows into a pair of catch basins at Sta. 0+4. Catch basins provide 25% TSS removal subject to ¼ acre maximum impervious area tributary to the catch basin. There is less than ¼ acre of impervious area in the entire watershed and there are two catch basins each capturing approximately ½ of the pavement each. These catch basins would receive 25% TSS removal credit.*
- The submittal lists two forebays as supplemental pretreatment after the catch basins. The plans indicate a standard manhole with a four foot sump and an added baffle wall. This structure is not a forebay nor consistent with an Oil/Grit Separator design, which could be provided to achieve 25% TSS removal. Alternatively, a proprietary swirl type system could be used that would typically receive 30% TSS removal if properly sized. It is not clear that installing these systems in series would in fact provide the same removal percentages as the first units in the treatment train remove the easier to settle heavier particles limiting the effectiveness of the following units.

The revised design includes an oil/grit separator. I recommend that catch basins be located partially recessed into the berm to collect all the runoff from the roadway. The cover is minimal as proposed and is less than 2 feet which is the required cover under typical standards for Class V RCP. The catch basin could not be constructed in accordance with the detail on Sheet 14. There should be calculations for the bypass inverts and the volumes in the various compartments of the oil/grit separator. My calculations indicate that the oil/grit separator is appropriately sized. Due to the shallow cover it is unclear if a standard flat top catch basin is feasible as there does not appear to be space for the frame and grate. The catch basins have been relocated to be partially recessed into the berm as requested. The catch basin elevations have been adjusted to ensure the pipe can be installed below the manhole cover (rim el=60.6, inv el=58.25, 60.6-58.25 = 2.35 – 10/12=1.5 ft). The 1.5 ft allows for 4” frame and cover and 12” flat top (16” required, 18” provided). Additionally, the 1.5 ft of cover over the class V pipe is more than adequate for this residential driveway project. The minimum fill height is a function of both the load being applied at the surface above the pipe, and the strength of the class of pipe provided. Since concrete pipe is a composite of concrete and steel, you can reduce your fill height as low as you like, provided you design the pipe to sustain the applied loads. In some cases where extremely heavy machinery will be traveling over the pipe, you may have to utilize a concrete pipe with strength above a Class V pipe, the highest class of pipe denoted in ASTM C 76/AASHTO M 170. This can be accomplished by working with your local producer. However, in most cases where an AASHTO HL-93 highway load is applied, and the fill height is equal to or greater than 1 foot of cover, a standard Class III pipe or greater will suffice.

The bypass pipe has been set 0.25 ft above the oil & grit inlet pipe invert. The 2 year storm is .04 ft above the pipe inverts. The first flush storms will all be routed to the oil & grit separator. Calculations that were requested are attached to the letter.

- *Subsurface Infiltration System – A subsurface infiltration system can provide 80% TSS removal subject to adequate pretreatment and design. In this case for highly pervious soils additional pretreatment is required as only 25% removal is achieved in the catch basins. If the pretreatment is added to meet 44% TSS removal the subsurface infiltration system would provide 80% TSS removal.*
Subject to pretreatment data as noted above the system would remove 80% TSS.
Subject to the above cover issue and design calculations for bypass this system would meet requirements.

This system could meet TSS removal requirements subject to additional pretreatment. I note that the submittal only credited the system with 85% TSS removal. It will need additional treatment units to meet 90% TSS removal as required by the Town in this district.

Additional data on pretreatment is required.

Subject to the above cover issue and design calculations for bypass this system would meet requirements.

Infiltration Trench 1.

- *Infiltration Trench 1 – An infiltration trench can provide 80% TSS removal subject to adequate pretreatment and design. In this case no pretreatment is required as the roof is considered clean relative to pretreatment requirements. The infiltration trench would provide 80% TSS removal but not meet the Town requirement for 90%.*

The Response claims that the infiltration trenches remove 90% of TSS but DEP only credits an infiltration trench with 80% TSS removal. In this case as there is not tributary pavement, the roof is separately routed to an infiltration system that is not included in the credits such that the only runoff is from vegetation it would seem likely that minimal sediment would be discharged after vegetation is established. The Board should review this aspect of the plan.

No further comment, a mass balance TSS removal calculation has been provided that indicates 90% TSS removal overall.

Part of the proposed roadway would not receive any treatment.

Satisfied.

This requirement would not be met.

Some additional data on pretreatment and overall treatment to meet 90% TSS removal is required.

Some additional data on pretreatment and overall treatment to meet 90% TSS removal is required.

I recommend that the above issues be addressed.

Standard 5 – Higher Potential Pollutant Loads

The project is not considered a source of higher pollutant loads, this standard is not applicable.

Standard 6 – Protection of Critical Areas

It does not appear that the project is in a critical area although the Conservation Commission is investigating the presence of a vernal pool on the site and the site is in the Town's Watershed Protection District so it should be treated as a critical area under the Bylaw. It is my understanding that site in the Watershed Protection District are considered critical areas by the Town.

Refer to comments under other Standards.

Refer to comments under other Standards.

Standard 7 – Erosion/Sediment Control

This Standard requires construction phase stormwater, erosion and sediment controls. As the proposed work area exceeds one acre a Stormwater Pollution Prevention Plan (SWPPP) through the EPA for construction will also be required.

I recommend that a separate Erosion Control/Construction Plan be developed. The plan provided indicates a perimeter sediment barrier, a tracking pad and a stockpile area. There is a large area to be stripped and disturbed no phasing is indicated. I recommend that the minimal clearing necessary to construct the roadway and stormwater components be considered as phase one and lot development be performed after the roadway and drainage infrastructure is completed.

A Grading and Erosion Control Plan has been added to the set, Sheet 16. The plan includes elements listed above including two construction phases, roadway and infrastructure work Phase 1 and lot construction Phase 2. The plans have added two sediment basins near the end of the common drive. It is likely that some means of sediment control will also be needed near Country Way. The plans have labeled an area for stockpiling and staging. Calculations for the sized of temporary basins should be provided together with a detail(s).

A "Construction Phase Operation & Maintenance Plan Best Management Practices" is included in the report. This is very general I recommend that a more detailed plan and construction sequence be provided.

The Grading and Erosion Control Plan has a construction sequence for each phase.

I recommend that a draft SWPPP be submitted to address this Standard together with an Erosion and Sedimentation Plan that includes the information listed in the DEP Checklist and address at a minimum, prior to issuance of any permits.

I recommend that the SWPPP that is required for the project be submitted and approved by the Board and or Conservation Commission prior to the start of construction. This could be a condition if the project is approved.

A SWPPP has been provided. Please refer to SWPPP review to be submitted under separate cover.

A SWPPP has been provided. Please refer to SWPPP review to be submitted under separate cover.

Standard 8 – Operation and Maintenance Plan

A “Post Construction Phase Operation & Maintenance Plan Best Management Practices” (O&M) was provided. The Following BMP’s are listed in the O&M, my comments on the O&M are included following the BMP.

Catch Basins: Catch basin maintenance should require quarterly inspections. As noted the catch basin should have a four foot sump.
Satisfied.

Sediment Forebays – I note that no forebays are indicated on the plans. If proposed maintenance is acceptable.
A forebay is now proposed.

Water Quality Swale: The data for the Water Quality Swale, is actually for the forebay as noted in the text. The data should be revised for a swale and conform to DEP requirements.
Satisfied.

Infiltration Basins: As designed there are no infiltration basins. If there are revisions to create infiltration basins, the maintenance should specify mowing a minimum of twice a year. There are specific features listed in the DEP Handbook that should be incorporated into infiltration basin design if proposed. The proposed basins do not comply as currently designed. For example, infiltration basins should include monitoring wells, low level drains, etc. as indicated in the DEP Stormwater Handbook. A minimum 10 foot wide level access around the top of the basin should be provided and the design should provide 1 foot of freeboard above the 100 year storm.
Satisfied.

Rain Garden/Bio Retention Basin - Rain Garden/Bio Retention Basin maintenance should be consistent with the DEP manual. It is unclear what is proposed for plantings, etc. and the maintenance program may need to be edited to depending on the plantings. The frequency of maintenance of plantings should be listed.
No longer proposed.

Subsurface Drainage Systems – Maintenance of roof infiltration systems including gutters, downspouts and pipes is a critical part of the proposed maintenance as the infiltration systems are assumed to infiltrate all runoff from the 100 year storm from the roofs. No data has been provided.
Satisfied relative to house units.

It is unclear if this aspect is also for the roadway subsurface system, I recommend that this aspect be clarified.

Satisfied.

Detention Basin – No data on maintenance of the detention basin is included in the O&M.

No longer applicable.

As noted in other sections easements between the various lots for access and maintenance of all stormwater systems should be provided.

An easement plan has been provided. The access easement should also be for utilities. I recommend that the easement for the infiltration basin include the flow path from the outlet to the intermittent stream and the intermittent stream to Country Way.

Satisfied.

I recommend that the Board consider a condition, should the submittal be approved, that the O&M be prepared as a standalone document together with a plan indicating the location of various BMP's. In addition, there should be some sort of enforcement mechanism should the Homeowners Association not comply with the maintenance requirements. The Town should be provided with copies of contracts with the parties engaged to perform the work.

Recommendation remains, the Response indicates that the Town has enforcement capabilities.

I recommend that the Board consider the above conditions.

Additional information is required to demonstrate compliance with this requirement.

Some minor issues should be addressed.

This Standard would be met.

If you have any questions please do not hesitate to call.

Sincerely,

GRADY CONSULTING, L.L.C.



Kevin Grady, P.E.
Principal Engineer

cc: Jeff DeLisi, Brad Merritt