MWE

Consulting Civil Engineers and Land Surveyors

MetroWest Engineering, Inc.

August 23. 2024

Mr. Kevin Lake, Chairperson
Northampton Conservation Commission
210 Main Street
Northampton, MA 01060

RE: Notice of Intent for 8 View Avenue, Sovereign Builders, Inc.
MADEP File Number 246-0785

Dear Mr. Lake and fellow Commission Members:

I represent a group of concerned abutters/citizens to the above-referenced project, and I have been engaged to review stormwater management aspects of the plans and analysis submitted in support of the Notice of Intent. I have attached a separate list to this letter of the citizen group that has retained my services.

As a brief introduction to my qualifications, I am owner and president of MetroWest Engineering, Inc. MWE, located in Framingham, MA has been in business for 40-years, and we work extensively in the areas of site design and permitting of residential, commercial and institutional development projects. We are well-versed in the requirements of the MA Wetland Protection Regulations, 310 CMR 10.00, the MADEP Stormwater Handbook and Standards, and the general permitting process for development projects in Massachusetts. I hold a bachelor's degree from the University of Massachusetts in Amherst in civil engineering, as well as a master' degree in civil engineering with a focus on surface and groundwater hydrology from Colorado State University. My personal expertise lies in the areas of hydrologic analysis, stormwater management and drainage engineering. I periodically serve as a peer-review consultant to several MA communities including the Towns of Weston and Wellesley. I am a MA registered Professional Engineer and Land Surveyor.

My review of this project has included the following documents:

1. Plan Set, "View Ave", prepared by Berkshire Design Group, signed and stamped by Gregory Henson, PE, and Jeffrey Squire, RLA, last revised on July 17, 2024.
2. Stormwater Drainage Report, prepared by Berkshire Design Group, stamped and signed by Gregory Henson, PE, dated April 11, 2024
3. Stormwater Drainage Report, prepared by Berkshire Design Group, for North Street Condominiums, last revised 02/29/2009
4. USGS Topographic Quadrangle Map of Easthampton, MA dated 2021

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5. Notice of Intent, View Avenue, prepared by Berkshire Design Group, dated April 10, 2024
6. USDA NRCS Soil Survey for Hampshire County, Massachusetts, Central Part, interactive web page review, 8/19/24
7. MADEP Data Portal, Wetlands NOI Project Information, NOI File Number 246-0785

Executive Summary

My review of this project's stormwater management design and the supporting analysis has revealed several significant flaws that require the system to be re-analyzed and the re-analysis will most likely result in major design modifications that could also impact the project layout and density. These significant flaws include the following:

1. Failure to accurately map the location of Soil Series based on the USDA NCRS Soil Maps.
2. Improperly classifying surface soils as within Hydrologic Group D when the USDA Soil Maps indicate the presence of Hydrologic Group A, B and C/D soils, resulting in an over-estimate of Pre-development Stormwater runoff rates and volumes. Please note that an earlier hydrologic assessment for the same property, prepared by the same consultant, utilized Hydrologic Soil Group Classifications that conflict with the values selected for the current project.
3. Failure to provide sufficient soil testing within the footprint of proposed infiltration systems, thereby failing to establish accurate Seasonal High Ground Water levels for a system designed with the minimum 2-foot offset to the water table. Additionally, failure to establish soil type within the footprint of an infiltration system when using an assumed infiltration rate based on soil texture class.
4. Failure to provide a groundwater mounding analysis for infiltration systems with a groundwater offset of less than four feet that are being used to attenuate peak flows per MA Stormwater Standard 2. Given the high-water table at this site and the steep fill slopes adjacent to the infiltration systems, slope failure and groundwater breakout is clearly an issue.
5. Failure to provide a hydraulic capacity analysis to demonstrate the roof drain collection systems, street drains, and catch basin inlets can handle the flows assumed to be collected under the submitted hydrologic analysis (the hydrologic analysis assumes that flows are collected and conveyed to the two infiltration systems without documentation that the pipe network has sufficient conveyance capacity.
6. Adoption of excessive infiltration rates (2.41-inches per hour) in sandy-loam soils, where the Stormwater Handbook provides (by means of the Rawls Table) for a rate of 1.02 inches per hour. Given the documented presence of Fine Silty Loam (FSiL) soils, the actual infiltration rate may be as low as 0.27 inches pe hour.This issue alone is sufficient to invalidate the analysis.

7. The Hydrologic Model and Proposed Site Plan are inconsistent, so that the conclusions of the hydrologic assessment are not valid for the design presented in the most recent plan set.
8. Based on the numerous issues presented in Items # 1 through 7, above, the applicant has failed to demonstrate compliance with MADEP Stormwater Standards, in particular Standard # 2, peak discharge rates, and Standard #3, Annual Recharge of Groundwater. The hydrologic model submitted in support of the project design is so rife with errors and inconsistencies that it clearly fails to demonstrate compliance with these standards.

I will discuss these topics in greater detail below.

I note that my initial review of this project has revealed so many consequential issues that I truncated my review to limit the expense that my clients are incurring for this review. Should revised plans and supporting documents be submitted, I may have additional comments on aspects of the project that I have not fully reviewed.

USDA NCRS Soil Survey and Hydrologic Soil Group Classification (Items #1 and #2 in Executive Summary)

Hydrologic modeling of the pre- and post-development conditions of the site requires a Curve Number Selection for site conditions based on surface land use and the underlying soil types as mapped by the NCRS. The NCRS mapping for site shows two major soil series. The rear or northerly portion of the site, roughly following the wetland resource, consists of soils within the Raynham Silt Loam Series. The USDA classifies these soils as Hydrologic Group C/D, with the more poorly drained soils, the D soils, likely within the wetland, and the better draining C soils upland of the wetland border.

The soils in the southerly portion of the site, the area of the site designated for development, lie within the Amostown-Windsor silty stratum-Urban land complex Series. These soils are classified as Hydrologic Group A and B soils, indicative of lower stormwater runoff than Hydrologic Group D soils. While it is true that both the Raynham and the Amostown/Windsor soils exhibit seasonally high groundwater levels, the Amostown/Windsor series produce much less stormwater runoff due to water retention in the upper soil horizons. I have provided the USDA NCRS description for the relevant soil series present on this site

The watershed delineation plans should identify the USDA NCRS soil boundaries on the plan, so that runoff curve numbers used in the hydrologic model may be accurately defined. This basic step in preparing a reliable hydrologic model has not been done, and it renders the results of the model as suspect.

The submitted hydrologic analysis assumes that all soils on the site lie within the Hydrologic Group D classification, an assumption that is in direct conflict with the published soil series. The result of this error is that the hydrologic model, for the pre-development condition, produces more runoff from a storm event than it would have shown had the correct classification of Hydrologic Group A and B soils been used. This masks the impact of converting wooded/meadow lands to impervious surfaces such as roads, houses and driveways. This invalidates the conclusion of the modeler, that the project will not increase stormwater runoff rates and/or volumes when compared with pre-development conditions.

Additionally, the use of the Hydrologic Group D soil classification reduces the volume of groundwater recharge required for the project.

This improper mapping and classification of Hydrologic Soil Group invalidates the stormwater hydrologic analysis and has resulted in under-designed infiltration recharge systems for the project. As designed and modeled, the project will result in an increase in stormwater peak flow rates and stormwater volume directed into the wetland and ultimately offsite.

Of interest is the fact that the same engineering consultant, in a hydrologic analysis conducted for the same property in 2009, classified the soils as within Hydrologic Soil Group C, rather than Group D, as in the current analysis. The Group C classification, while still in conflict with the USDA report, would have produced significantly less stormwater runoff in the pre-development condition than the Group D classification

Soil Evaluation within the footprint of Proposed Infiltration Systems (Item #3 in Executive Summary)

While the applicant's engineer has submitted results from various soil evaluation tests performed on the site, none of the evaluations provided with the NOI occur within the proposed footprint of either Infiltration System, as specifically required by the MADEP Stormwater Handbook, as stated in Volume 3, Chapter 1, Standard 3, pages 5 through 13. The soil evaluations that have been presented demonstrate that the soil conditions, particularly textural classification, on this property are highly variable over short distances.

I note that the Drainage and Grading Plan, Sheet LC-130, fails to provide the location of all the soil evaluation tests that were performed on the property, making it difficult to verify the soil conditions in the location proposed for infiltration. These test locations should be added to the plan.

Infiltration System #1

Referring to Infiltration System #1, the larger of the two systems, two soil evaluations were conducted in the general vicinity of the system, TP-9 and TP-10. A third soil evaluation, TP-(2), is shown on Sheet LC-130 of the plan set, but a soil log for that evaluation was not provided in the NOI. The system elevation was set based on the groundwater level reported on the plan for this test pit, at elevation 134.83-feet. No textural classification is provided for TP-(2). TP-9, located 30-feet south of the system, reports a textural classification of Fine Silt Loam (FSiL),.

TP-10, located 10-feet north of the system indicates that is was excavated within historic fill and therefore does not have a texture classification. Based on the FSiL textural classification, the infiltration rate used for modeling of the infiltration system should be 0.27-inches per hour. The engineer, however, applied a rate of 2.41 inches per hour, a rate appropriate for Loamy Sand (LS) soils. Based on this, the model likely over-estimates the infiltration capacity of the system an order of magnitude, or nearly 800 percent.

Beyond the question concerning infiltration capacity, it is important to note that the system has been designed with the minimum offset of two-feet between the seasonal high water table and the bottom of the infiltration system, based on a sole evaluation point, TP-(2). Any variation in the natural water table elevation across the system, such as that which occurs when surface topography varies, may result in this system being non-compliant with the two-foot offset requirement.

As a minimum, at least two additional soil evaluations should be performed within the actual footprint of Infiltration System #1, both to definitely establish the soil textural classification and to develop a profile of the natural high-water table across the system.

Infiltration System #2

No soil evaluations have been conducted within the footprint of Infiltration System #2. Sheet LC-130 indicates that a soil evaluation, TP-(1), was performed approximately 10-feet to the northwest of the northerly end of the system, with a reported high water table 16-inches below the ground surface at elevation 132.67-feet, and a ground surface elevation of 134.0-feet. No NCRS soil textural classification was provided. The existing ground surface elevation at Infiltration System #2 varies from 134-feet on the northerly end of the system to 135.5-feet on the southerly end of the system. Assuming a similar depth to the water table of 16-inches below grade, the maximum high water table within the system area is 134.2-feet. The bottom of Infiltration System #2 has been set at 135.0-feet, less than a foot above the seasonal high groundwater table. This system clearly fails to satisfy even the minimum standard required in the MADEP Stormwater Handbook.

Additionally, the hydrologic model has assumed that the native soils where Infiltration System #2 will be constructed has an infiltration capacity, of 2.41 inches per hour, based on the Rawls Table rating for Loamy Sand (LS) soils. Several previous soil evaluations conducted in the vicinity of this system report soil textures that vary from Sandy Loam (SL) to Loamy Sand (LS). Since a SL soil has a rated infiltration capacity of 1.02 inches per hour compared to 2.41 inches per hour for a LS soil, it is critical to have soil evaluations conducted within the footprint of the infiltration system, in accordance with MADEP Stormwater Management Handbook guidelines. At least two such evaluations should be performed, one at either end of the system.

Requirement for a Groundwater Mounding Analysis (Item #4 in Executive Summary)

The MADEP Stormwater Handbook, in Volume 3, Chapter One, Page 28, requires that a groundwater mounding analysis be performed when infiltrations systems are used to attenuate peak flows for the 2- and 10-year storm events, if the offset between the high groundwater elevation and the bottom of the infiltration system is less than 4-feet. This design does use the infiltration system to attenuate peak flows and has less than a four-foot offset to the water table, so a mounding analysis is definitely required.

Groundwater mounding is a serious concern for this design. First, the parent soils on site have low hydraulic conductivities, which leads to the development of pronounced groundwater mounds. Second, the offset to the water table is at best, only two feet, and possibly less given the lack of definitive soil evaluations within the infiltration footprint. Finally, and most importantly, the infiltration systems are to be constructed immediately adjacent to steep slopes constructed in fill. This will, definitely (not speculatively) lead to a groundwater breakout through the slope, which is considered a failure under the MADEP Stormwater Handbook.

For example, for the 10-year storm event, Infiltration System #2 shows a peak water surface elevation within the chambers of 136.2-feet. The 2 to 1 fill slope located at the north end of the system shows the 136-foot contour only 10-feet away from the stone surrounding the chambers. This will lead to a water breakout through the slope. This in turn will lead to an eventual slope failure, flooding into the wetland, as well as slope erosion and the transport of sediment into the wetland resource. A similar condition exists at Infiltration System #1.

Accordingly, it is imperative that a groundwater mounding analysis of both infiltration systems be performed. The likely result of such an analysis is that a significant groundwater mound will develop under both infiltrations systems, and the fill slope at the 35-foot wetland buffer will need to be relocated further away from the infiltration systems and within the 35-foot wetland buffer.

Hydraulic Capacity of Stormwater Collection and Conveyance Pipe Network (Item #5 in Executive Summary)

The submitted Hydrologic Assessment of the project is predicated on the stormwater collection and conveyance system being able to fully collect flows from the 100-year storm event and, once collected, conveying those flows to the infiltration systems. No hydraulic capacity analysis has been submitted to demonstrate that gutter systems, roof drains, and piping network within the driveway/parking lot have the hydraulic capacity to convey those flows. A hydraulic analysis of the collection and conveyance network should be provided to demonstrate that the systems have been properly designed to collect and convey the 100-year storm event.

Infiltration Rates Used in Hydrologic Model (Item #6 in Executive Summary)

As has been previously discussed, the infiltration capacity for the two infiltration systems has been modeled using an infiltration rate of 2.41 inches per hour, a value derived from the Rawls Table for soils with a Loamy Sand (LS) texture classification. Insufficient soil evaluations have been provided to demonstrate that soil conditions within the two infiltration areas are consistent with the LS classification. In fact, most of the soil evaluations that were conducted on site indicated that soil textures belonged to the Sandy Loam (SL) classification. As noted earlier, one evaluation located near Infiltration System #1 reports a textural classification of Fine Silty Loam (FSiL). The Rawls Table provides for an infiltration capacity of 1.02-inches per hour for SL class soils, and 0.27 inches per hour for SiL class soils, both significantly lower than the values used in the model.

I further note, as previously discussed, that the modeler has placed all soils on the soil as within Hydrologic Soil Group D (HSG-D). HSG-D soils typically consist of Loam (L) or Silt-Loam (SL) soils and are not consistent with soils comprised of Sand (S) or Loamy Sand (LS). There is an obvious conflict between the modeler's classification of Hydrologic Soil Group to calculate surface runoff and the assumption of LS soils to calculate infiltration capacity.

This question is concerning selection of the proper infiltration rate is significant, as if the soil texture class is a SL type rather than a LS type, infiltration capacity of these systems will be reduced by nearly 60-perecnt. If the soils fall with the SiL class, the infiltration capacity will be nearly 600 percent lower than the values used in the model.

This conflict is best resolved by conducting additional soil evaluations within the footprints of the infiltrations systems, as discussed previously. I recommend that any such soil evaluations be witnessed and confirmed by an independent third party.

Inconsistency and Discrepancies between Hydrologic Model and Site Plan Set (Item #7 in Executive Summary)

The latest site plan set available for my review provides for a revision date of July 17, 2024. The hydrologic analysis provided to me has a date of April 11, 2024. The layout and elevations for the infiltration systems provided in the hydrologic model conflict with those provided on the July 17th plan set. If a revised hydrologic analysis has been provided to the Conservation Commission, it should also be provided to the concerned citizens group for review. If a revised analysis has not been submitted, one needs to be submitted, as the April 11, 2024, Hydrologic Analysis does not reflect the actual design proposed on the July 17, 2024, Plan Set. The discrepancies between the two documents are significant and must be resolved.

Failure to Demonstrate Compliance with Stormwater Management Standards #2 and #3.

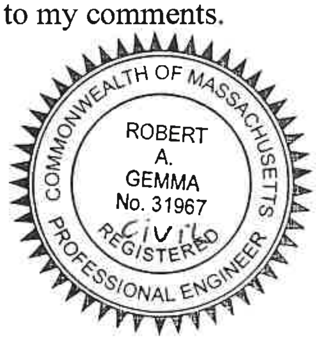
As discussed in the preceding paragraphs, the Hydrologic Model submitted in support of this project has numerous inconsistencies and lacks data to support several assumptions made in the model. Specifically, the model incorrectly classifies all soils on site as being within Hydrologic Soil Group D, when published soil surveys classify the soils as belonging to HSG A and B, in the case of the Amostown-Windsor series, and HSG C/D in the case of the Raynham Silt Loam Series. Moreover, the soil evaluations provided do not demonstrate the presence of Loamy Sand (LS) within the footprint of the two infiltration systems. Also, the soil evaluations fail to establish the high groundwater levels throughout the footprint of the infiltration systems. Finally, no groundwater mounding study has been provided to demonstrate that a groundwater mound will not result in a surface breakout of infiltration water. Based on these issues, the applicant has failed to demonstrate compliance with Stormwater Standards #2 and #3.

Conclusion

It is my professional opinion that the project, as presented, fails to demonstrate that the eight interests of the MA Wetland Protection Regulations, as described in 310 CMR 10.01 (2), will be protected. Further, the submission fails to demonstrate compliance with MADEP Stormwater Standards #2 and #3.

Thank you for considering my input as you evaluate this project and please do not hesitate to contact me if I may provide any clarification to my comments.

Sincerely yours,



Robert A. Gemma, PE, PLS
President

Enclosure : USDA NCRS Soil Map and Descriptions

CC : Concerned Citizen Group as listed below:

Jacqueline McCreanor
124 North Street
Northampton, MA 01060

Adam Cohen
134 North Street #2
Northampton, MA 01060

Jacquelyn Ballance
35 Warner Street
Florence, MA 01062

Dennis Helmus
174-176 North Street
Northampton, MA 01060

Jane Myers
74 Straw Avenue
Florence, MA 01062

Arnold Levinson
14 Hancock Street
Northampton, MA 01060

Heather McLaughlin
193 North Street
Northampton, MA 01060

Leah Gregg
James Scott Jackson
Joanne Sickles
1 View Avenue
Northampton, MA 01060

Michael Kane
12 Garfield Avenue
Florence, MA 01062

Fred Zimnoch
23 Pomeroy Terrace
Northampton, MA 01060

David and Katie Kates
125 North Street
Northampton, MA 01060

Soil Map—Hampshire County, Massachusetts, Central Part

72° 38' 3" W | 72° 37' 25" W

42° 20' 6" N

694900 695000 695100 695200 695300 695400 695500 695600 695700

4689700 4689600 4689500 4689400 4689300 4689200 4689100 4689000 4688900 4688800 4688700 4688600

42° 19' 29" N

695000 695100 695200 695300 695400 695500 695600 695700

72° 38' 3" W | 72° 37' 25" W

Map Scale: 1:5,540 if printed on A portrait (8.5" x 11") sheet.

Meters: 0 50 100 200 300

Feet: 0 250 500 1000 1500

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

Hampshire County, Massachusetts, Central Part

741A—Amostown-Windsor silty substratum-Urban land complex, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 99z2
Elevation: 100 to 330 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Amostown and similar soils: 35 percent
Windsor, silty substratum, and similar soils: 25 percent
Urban land: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amostown

Setting

Landform: Terraces, outwash plains, deltas
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable sandy glaciofluvial deposits over silty glaciolacustrine deposits

Typical profile

H1 - 0 to 7 inches: fine sandy loam
H2 - 7 to 32 inches: fine sandy loam
H3 - 32 to 60 inches: stratified very fine sand to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: B
Ecological site: F145XY005MA - Moist Lake Plain
Hydric soil rating: No

Description of Windsor, Silty Substratum

Setting

Landform: Outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loose sandy glaciofluvial deposits over silty glaciolacustrine deposits

Typical profile

H1 - 0 to 8 inches: loamy sand
H2 - 8 to 21 inches: loamy sand
H3 - 21 to 45 inches: sand
H4 - 45 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Enosburg

Percent of map unit: 10 percent
Landform: Terraces
Hydric soil rating: Yes

Maybid

Percent of map unit: 5 percent
Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Hampshire County, Massachusetts, Central Part
Survey Area Data: Version 18, Sep 10, 2023

Hampshire County, Massachusetts, Central Part

30A—Raynham silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9b1h
Elevation: 50 to 500 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Raynham and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Raynham

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Silty glaciolacustrine deposits

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 37 inches: silt loam
H3 - 37 to 60 inches: stratified loamy fine sand to fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 31 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F145XY004CT - Wet Lake Plain
Hydric soil rating: Yes

Minor Components

Maybid

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Scitico

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Belgrade

Percent of map unit: 5 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Hampshire County, Massachusetts, Central Part
Survey Area Data: Version 18, Sep 10, 2023