January 21, 2025

Ms. Mary Grover MADEP
Wetlands Division Western Regional Office
463 Dwight Street
Springfield, MA 01103

RE: MADEP File Number 246-0785
8 View Avenue, Northampton
SOC Proceedings
Response to Berkshire Design Group Letter dated January 10, 2025

Dear Ms. Grover:

I am in receipt of the Response to DEP Comments letter prepared by Berkshire Design Group (BDG), dated January 10, 2025. I offer the following comments:

I. General Comment Concerning Professional Qualification of Respondent

The BDG response was prepared by and signed by Jeffrey Squire, a registered Landscape Architect (RLA). The authorship and presentation by Mr. Squire is consistent with both the public proceedings before the local conservation commission, including the submittal of various response letters, and the site meeting that you held on December 4, 2024.

The technical issues that you raised in your request for information included several questions that related specifically to Stormwater Management as well as determination of Bordering Land Subject to Flooding. These are not issues that are within the defined expertise of Landscape Architects, as defined and regulated by the Massachusetts General Laws (MGL) Chapter 112, Sections 60L, 81D and 81R. Moreover, the Massachusetts Stormwater Handbook requires that Stormwater Plans, calculations, certifications and documentation be prepared and certified by Massachusetts Registered Professional Engineer.

Why is the distinction between the practice of Engineering and Landscape Architecture important for the subject project?

First, the analysis and design of engineered (not natural) drainage systems clearly falls within the legal definition of engineering and not landscape architecture. The same is true for the design of sanitary sewage systems and water systems as well as for hydrologic modeling and groundwater mounding studies. Additionally, flood plain mapping requires the expertise of either a Professional Engineer or, possibly, a Professional Land Surveyor. This is evidenced by the fact that FEMA requires all studies and reports relating to flood elevations to be prepared by a Professional Engineer or Land Surveyor.

My concerns, however, go well beyond the potential legalities of practicing outside the limits

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of professional registration. My real issue is that Mr. Squire is not qualified to evaluate the stormwater and flood plain issues that are central to the abutter concerns and the Wetlands Protection Act. This conclusion is based on my having sat through several presentations made to the local conservation commission, the presentation made at the DEP site inspection on 12/04/2024, and reviewing the BDG response letter. Many of his responses are simply not grounded in science and engineering principles central to the stormwater design.

I recognize that the plan set and original stormwater report were signed and stamped by Christopher Cumberland, a Registered Professional Engineer. However, all public presentations and technical responses have been provided by Mr. Squire. Public representations and written reports made by Mr. Squire clearly fall within the realm of professional engineering practice, and Mr. Squire is not a Professional Engineer.

I have enclosed copies of the relevant sections of MGL Chapter 112 for your review. In my opinion, MADEP must consider Mr. Squire's comments relating to Stormwater Management and Flood Plain issues as those of a non-professional, as he lacks the qualifications and registration to provide expert opinions in those areas.

II. Specific Comments to BDG Response

A. Resource Area Delineation: BLSF

The BDG response is based solely on the lack of a defined flood elevation on the most recent FEMA Flood map. This is non-conclusive. As I outlined in my 12/11/24 letter, 310 CMR 10.57 (2) (a) 3 requires, in the absence of a NFIP flood profile, a SCS TR-20/TR-55 analysis for the 100-year storm, to define the extent of flooding. This is not a difficult study to perform, especially given the hydraulic control that exists where the stream exits the property through the box culvert. The FEMA map that the applicant relies on is not for the perennial stream that flows through the locus, but rather for the Connecticut River, which is more than a half mile from the locus. The applicant's response is evidence of a lack of understanding and expertise in flood plain analysis.

B. Project Phasing

The response to DEP's question about project phasing is non-responsive. The response is predicated on the phrases "to be determined", "it may be possible", "could", and "would". A project as large as this, that includes work near sensitive resource areas, requires a comprehensive Construction Management Plan (CMP). A well-defined CMP will provide details on construction staging, material storage areas, construction sequencing, construction access routes, daily maintenance requirements, temporary stabilization requirements, water quality monitoring, emergency response contingencies, emergency contacts and other information needed to ensure that construction proceeds without impacts to either resource areas or local residents.

C. Construction Debris

The response concerning construction debris is vague and the source of the information is unclear. The statement reports that the rubble includes asphalt, concrete, aggregate base

and random metal scraps. For construction debris to serve as clean fill, all materials must be broken down to a size with an average diameter of less than 6-inches, and all reinforcing steel and metal must be removed. This dumping ground appears to contain material that does not conform to this requirement and therefore poses a public safety hazard. The applicant proposes to remove only such material that may be within the limits of the stormwater management system, leaving the rest of the unsuitable material in place. Additionally, no protocol has been provided for inspection of the material removed, or an appropriate response should hazardous or otherwise dangerous materials be encountered during the excavation. For example, what response will occur should asbestos materials such as shingles or tiles be uncovered, or if drums or containers are present that may have stored petroleum or other hazardous liquids?

D. MA Stormwater Standards

Stormwater Standard 2:

a. The proponent's response fails to address the issue that the analysis was not conducted at the lowest point of discharge from the subject property and fails to account for all flows from and through the property. As I discussed in detail in my 12/11/2024 report, failure to consider the offsite, upgradient flow and the timing of hydrographs from the development site and the upstream watershed is a fatal flaw in the analysis, and the analysis continues to be non-compliant with Standard 2. This response demonstrates a fundamental lack of understanding and expertise in stormwater analysis and hydrologic modeling

b. Again, the response demonstrates a lack of expertise in stormwater analysis, impact and modeling. The fact that peak flow rates from the developed portion of the property have been controlled to remain below pre-development rates, does not demonstrate that no impacts occur. Again, the timing of hydrograph peaks from both the development area and the upper watershed are critical to understanding the project impacts. This is even more important since the model for the developed area predicts a 30 percent increase in stormwater runoff volume from the project. It is possible that both the peak flow rate in the brook, at the culvert crossing, as well as the total runoff volume, will increase as a result of this project. The proponent has not evaluated this possibility and has failed to address Stormwater Standard 2. Also, the proponent's comment on the larger watershed and the drainage study by the City of Northampton is puzzling. First, the study has not been included as part of the response. Second, the referenced "HydroCad" model was not attached for review. Finally, even had the HydroCad model been included, the study was performed prior to the design of the subject project and could not include modeling of the proposed stormwater management system. Accordingly, issues such as the timing of hydrographs could not have been addressed. This response is further evidence of a lack of understanding of the science of hydrologic modeling.

c. The response as to why SIS#1 is not modeled for larger storm events makes no sense. Whether or not the system infiltrates a significant volume during larger events is irrelevant. The system will be physically present, will collect

flow and will impact both the volume and peak flow rate discharged through the level spreader. The purpose of a hydrologic model is to simulate the performance of the engineering systems proposed. The model as configured fails this simple test, as it does not reflect the actual engineered drainage system proposed for this project.

Stormwater Standard 3:

d. According to the submitted HydroCad Report (page #9 of 9/20/24 model output, attached herewith) the storage volume for SIS #2 begins at elevation 135.70-feet, 6-inches below the bottom of the Stormbrix chambers, not at the actual bottom of the chamber. This is contrary to what is reported in the BDG response letter. As stated in my report of 12/11/24, since there is no test pit within the footprint of SIS #2, interpolation of the groundwater levels in adjoining test locations indicates that the groundwater elevation at SIS #2 is, approximately, at elevation 133.9-feet. This yields a groundwater offset for SIS #2 of 1.8-feet, less than the 2- feet required under Standard 3. While the proponent has stated that the plan details have changed to eliminate the stone base and accompanying storage, a revised HydroCad analysis has not been submitted to model how SIS #2 performs under the new design assumptions. I note that if the design assumptions for SIS #2 are adjusted for consistency with the BDG response letter, it impacts not only Stormwater Standard #3, but also Stormwater Standard #2, as the system storage will be reduced and the peak runoff rate discharged through the level spreader will increase from that reported in the Stormwater Compliance Report
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e. Stormwater Standard #3 requires that a soil evaluation be performed within the footprint of each proposed infiltration system. Given the extremely high groundwater levels at this site, coupled with a design that calls for the bare minimum offset to groundwater, it is critical that a proper soil evaluation be performed within the area proposed for SIS #2.

Groundwater Mounding Analysis:

MODELING APPROACH

The groundwater mounding analysis submitted in support of SIS #2 uses the Hantush approach to solve the differential equations that define groundwater flow. This approach makes several simplifying assumptions to solve these differential equations. Most importantly, Hantush assumed that the aquifer in which an infiltration basin lies is both homogeneous and isotropic, meaning it is uniform in all directions. In the case of SIS #2, the design calls for an impervious liner, intended to control groundwater breakout, to be installed 15-feet off the edge of the infiltration system. This liner therefore serves as a limiting boundary condition, creating an anisotropic aquifer and violating the fundamental assumption made by Hantush in simplifying the governing differential equations. The model is invalid given the design conditions imposed by the impervious barrier. With the impervious liner in place, the lateral development of the groundwater mound will be truncated, and the vertical mound height will be substantially higher than the Hantush solution predicts. An engineer with expertise in groundwater hydrology and modeling would understand that the model assumptions were not consistent with the design conditions for SIS #2.

I have included, as an attachment to this letter, a copy of the USGS report "Simulation of Groundwater Mounding beneath Hypothetical Stormwater Infiltration Basins ", Scientific Investigations Report 2010-5102, where further discussion of the basis and limitations of the Hantush approach may befound.

HANTUSH MODEL INPUT

Recharge Rate -

Even if the Hantush approach was appropriate for this application, which it is not, the modeler has misunderstood the basic data requirements. In particular, the modeler has confused the Recharge Rate, R, with the infiltration rate assigned to various soil textures in the Rawls Table. The Recharge Rate input for the Hantush model is the total stormwater volume discharged into the infiltration system for a given storm event, divided by the surface area. The Recharge Rate varies based on the design storm rainfall depth and duration, and the geometry of the infiltration basin, and is not a constant value related to soil properties (the soil properties are characterized by Hydraulic Conductivity, which is a measure of how easily water moves through soil).

In the case of SIS #2, the correct recharge rate for a 24-hour design storm and a basin with a bottom area of 1382 SF, are as follows:

1. 2-Year Storm, Inflow Volume = 0.06 AF: R= 1.89 FT/DAY
2. 10-Year Storm, Inflow Volume = 0.112 AF: R=3.53 FT/DAY
3. 100-Year Storm, Inflow Volume = 0.228 AF, R=7.19 FT/DAY

This further demonstrates that the modeler/designer lacks the expertise needed to model groundwater conditions.

Duration of Infiltration -

In the Hantush model, the duration of infiltration refers to the time period in which water is discharged into the infiltration basin and is equal to the storm duration. The drawdown time, used by the modeler in this case, is simply incorrect.

Specific Yield -

TP-1, the test pit referenced in the BDG response letter, reports a C2 horizon, at a depth of 40 to 80-inches below the ground surface, has a soil texture of a Fine Silt-Loam. The Specific Yield for Loams typically falls within the range of 0.05 to 0.10. The value of 0.2 that the BDG has selected significantly overestimates the Sy value.

III. Conclusion

As has been noted in this review, despite the opportunity given by MADEP to correct flaws in the Stormwater Report and supporting documentation, significant errors in the submittal remain uncorrected. It is unfortunate that the resident group that lives in this modest neighborhood is

forced to bear the costs of my peer review work.

Based upon the applicant's response deficiencies, it is reasonable to request that the Department spare the resident group the expense of additional reviews and issue a SOC denying the project and require that any future submittals to be subject to the appropriate public hearing process at the local level. The current project does not meet the Massachusetts Stormwater Standards, nor does it not meet the performances standards of the Act or its Regulations. Denial is warranted.

Further, to get the project into an approvable state would likely require substantial plan changes that necessitate the restart of the public hearing process since the changes go beyond DEP's Plan Change Policy (Policy 91-1).

Thank you for your consideration.

Sincerely yours,

Robert A. Gemma, PE, PLS
President

1/17/25