

June 16, 2021

Mr. Ross Povenmire
Office of the Conservation Commission
Town of Boxford
7A Spofford Road
Boxford, Massachusetts 01921

Re: Stormwater Engineering Review
Spofford Pond School
Boxford, Massachusetts

Dear Mr. Povenmire:

Roux Associates, Inc. ("Roux") has performed an engineering review and alternatives analysis (Peer Review) related to stormwater drainage design for the proposed modifications to the Spofford Pond School ("SP School") at 31 Spofford Road in Boxford, Massachusetts (the "Site"), for the Boxford Conservation Commission ("ConsCom"). Roux has reviewed and relied upon the following documents for our Peer Review:

- *Stormwater Report for Spofford Pond School*, prepared for Town of Boxford by Weston and Sampson, inc. ("W&S", the "Designer") dated May 13, 2021 (the "Stormwater Report");
- A plan set titled *Town of Boxford, Boxford Public Schools Site Renovation Project, Spofford Pond School* prepared by W&S dated May 13, 2021 (the "Civil Drawings");
- A letter prepared for the Boxford ConsCom by Licensed Site Professional (LSP) Prasanta Bhunia, of W&S titled *Stormwater Infiltration Spofford Pond and Harry Lee Cole Schools* and dated May 12, 2021 (the "LSP Letter");
- A letter prepared by the Massachusetts Division of Fisheries and Wildlife ("DFW") prepared for NHESP Tracking No. 21-39949 and dated February 10, 2021;
- A memorandum to Scott Morrison, Superintendent of Tri Town by Chris Olbrot, PE, Superintendent of Public Works/Town Engineer titled *Spofford School Parking Lot Improvements* and dated February 11, 2021 (the "Town Memo"); and
- *Wetland Delineation Report* by W&S dated October 2020 (the "Wetland Report").

This Peer Review is limited to the following tasks:

- A review of the Stormwater Report and associated drainage design by the project's Designer;
- An evaluation of potential stormwater low impact design (LID) elements; and
- An evaluation of potential impacts to surrounding wetlands.

As depicted on the majority of the Civil Drawings, true north (magnetic north) is oriented clockwise to the approximate 10 o'clock position. As this rotation can become cumbersome to narrate, we will be describing the Civil Drawings in relation to the top of the printed pages (or "Plan" north).

Proposed Development

The SP School is an elementary school located at 31 Spofford Road and comprises approximately 12 acres. It is our understanding that the Town of Boxford is seeking to make modifications to the grading, drainage, paving, and landscaping at the Site to improve access and traffic circulation. In general, these proposed modifications include, but are not limited to:

- Increasing impervious surfaces by approximately 10,600 square feet (an approximate 5.2% increase in area) from areas previously covered with grass (8,500 square feet) and woods (2,100 square feet);
- A stormwater filtering bioretention pond/rain garden (“2P”), to the south of the SP School, which accepts sheet flow from a vegetated area between parking lot entrances and a deep hooded catch basin (located west of 2P) from a portion of a paved entrance to the parking lot;
- A rain garden (“3P”) to the east of the building which accepts sheet flows from approximately 1 acre of impervious parking lot on the east side of the building; and
- A subsurface detention system (Stormtech MC-3500, “4P”) beneath the converted gravel parking area, to the northeast of the building, which (in general) accepts flows from:
 - A pre-existing “concrete stormwater vault” to the east of the building, which accepts flows from a network of mostly pre-existing catch basins from impervious areas to the north of the building and roof drains from the building; and
 - A pre-existing “concrete stormwater vault” to the southeast of the building, which accepts flows from a proposed network of mostly deep hooded catch basins (it is unclear if several existing catch basins will be retained) from impervious areas to the west and south of the building.

Please note:

1. The project does not appear to be modifying the leaching catch basin located in the central courtyard of the SP School by the drinking water supply well;
2. All of the stormwater conveyances discharge to wetlands; and
3. There are no connections to Town of Boxford municipal storm sewer.

Stormwater Design Review

Roux reviewed the Stormwater Report for completeness, correctness and compliance with the Massachusetts Stormwater Management Standards as defined in the *Massachusetts Stormwater Handbook* (“MA SW Handbook”). Our comments and questions are included below.

1. Although deep hooded catch basins are specified, no dedicated petroleum (including oil, grease, petroleum hydrocarbon) removal BMPs (e.g., oil water separators) are included in the design, which includes stormwater flows from paved areas. Recommend Designer provide justification for why dedicated petroleum removal is not warranted for the project or if petroleum removal is sufficiently provided in accordance with applicable standards for the proposed improvements.
2. This redevelopment project includes the use of existing stormwater infrastructure (manholes, catchbasins, vaults, pipes, etc.) and (presumably) redirecting flows from the existing networks to new BMPs. The Civil Drawings did not (clearly) depict post-development conditions as the majority of the proposed drawings include features which are presumably being demolished. Recommend Designer simplify proposed condition drawings to only display post-development conditions.
3. Topographic maps potentially indicate off-site area may contribute runoff to the site. Specifically, there are potential inflows from portions of Spofford Pond Road (near 2P) and to the west and northwest of the building. Recommend Designer clarify the any catchment areas outside of the project boundary are included with stormwater calculations.

4. Although the project includes retention BMPs (to delay and slow the peak discharges), the lack of infiltration BMPs results in about a 10% increase in total volume discharged to the wetlands. There was no statement or evaluation included with the Stormwater Report regarding the impact (such as flooding) to the isolated wetland. Although Roux has provided an evaluation (see below) based on information included with the project documents, it is recommended Designer opine about the impact the increased stormwater volume will have on the vernal pool and associated wetland.
5. When the information presented in the Civil Drawings (Sheet Nos. C130, C131, C132, C505, L100, L101, and L102) are viewed holistically, the proposed rain gardens (2P and 3P) are inconsistent with the rain garden treatment BMP requirements in the MA SW Handbook:
 - o Elements, such as the extent of each bioretention area, the extent of the watertight membranes, and underdrain connections were either not located or not located easily;
 - o There does not appear to be pretreatment for 3P which is necessary to achieve the 90% TSS removal credits for sheet flows to bioretention areas;
 - o It is uncertain if filtering is occurring because the HydroCAD calculations did not include exfiltration and discharge associated with the soil filter and underdrain; and
 - o The soil layer is less than 2 feet and bushes are shown to be planted within the proposed rain gardens.

Recommend Designer provide additional details regarding the construction of the proposed rain gardens and, if necessary, review and revise TSS Removal calculations for flows which are treated by the proposed rain gardens.

6. The following items were identified with respect to 2P (the rain garden closest to Spofford Pond Road).
 - o Sheet No. C131 depicts the Perforated Underdrain (P-22) for 2P as 12-inch HDPE, and the detail sheet (No. C505) depicts the perforated pipe as 6-inch.
 - o Sheet No. C131 depicts the invert for the 18-inch outlet pipe from ORF-1 to DMH-7 as elevation (Elev.) 132.00, the top of the inlet grate for ERF-1 as Elev. 132.95, and the bottom elevation in the area of ORF-1 as Elev. 132. Based on these elevations, the outlet pipe is both above grade and the top of the pipe is above the structure (ORF-1) it originates from.
 - o If 2P is intended to be a filtering BMP, then ideally the majority of the inflow would infiltrate through the soil layer filter and be collected by the Perforated Underdrain for discharge to the nearby wetland. As proposed, a 24" inlet is placed at Elev. 132.95, which would effectively result in the majority of the flows to the bioretention area bypassing the soil filter and discharging directly to the wetland.
 - o The Perforated Underdrain (Elev. 130) is located at a lower elevation than the outlet pipe to DMH-7 (Elev. 132); therefore, the soils within the bioretention area will remain saturated (and some water will likely persist in the bottom of the basin) and rely on evapotranspiration/evaporation to empty the basin.
 - o Sheet No. C131 does not list an invert for the outlet pipe to 3L from DMH-7.
 - o Rain Garden 2P accepts flows from both impervious surfaces and vegetated surfaces. The HydroCAD report indicates there are no off-site stormwater discharges associated with the 2-year and the 10-year design storms. Recommend Designer determine if treating the impervious inflows separately is appropriate.

Recommend Designer evaluate and update the design of 2P.

7. The following items were identified with respect to 3P (the rain garden closest to the wetland).
 - o The HydroCAD reports indicate the proposed raingarden (3P) overflows during all design year storms (including the 2 year storm).

- The storage table included with the HydroCAD reports indicates the basin has storage between Elev. 133 to 134.45; however, Sheet No. C131 indicates the basin bottom contour is Elev. 132.
- Electrical components, including handholes for electrical vehicle charges, light poles, conduits, and (most critically), what appears to be the main electrical feed to the SP School, traverse beneath or through 3P. Recommend Designer evaluate whether these design elements present a conflict or may interfere with rain garden functionality.

Recommend Designer evaluate and update the design of 3P.

8. The following items were identified with respect to 4P (the Stormtech MC-3500 subsurface detention system).

- The TSS Removal Calculation Worksheet for 4P is mislabeled "Infiltration Chamber Area".
- For the outlet of 4P, drawing C132 specifies the baffle invert for OCS-1 as Elev. 132.0, but the HydroCAD report lists the "long Sharp-Crested Rectangular Weir" as Elev. 128.25. If the baffle invert is Elev. 132, then there may be additional subsurface storage.
- Elements, such as the extent of the watertight membrane, the underdrain, underdrain connections, and manifold were either not located or not located easily on drawings for the MC-3500 and/or OCS-1. Recommend Designer depict these elements in drawings associated with the MC-3500 and the Outlet Control Structure.
- A plan view and profile view of the MC-3500 (3P) was not found in the detail sheets. Recommend Designer include at least a plan view for the MC-3500.

Recommend Designer evaluate and update the design of 4P.

9. The following items were identified with respect to the Operations and Maintenance Plan (Attachment H).

- Item 4.2 states, "The site is considered a land use with a higher potential pollutant load, therefore if catch basins are found to be filled to capacity with sediment during a cleaning, the frequency of cleaning shall be increased." Recommend Designer address this statement which is inconsistent with the Standard 5 statement in the Stormwater Report ("This site is not considered a LUHPPL, as such, Standard 5 does not apply.").
- Operations and Maintenance plan does not include considerations for pre-treatment BMPs for the bioretention areas (beyond catch basin cleaning).
- The inspection for the bioretention basin (Item 4.7) states, "Basin inspection should include checking for rilling and other signs of erosion." Recommend Designer add "and gullyng" to the inspection criteria.
- The inspection for the bioretention basin (Item 4.7) states, "Care must be taken to maintain the plants in the basin. Salt use must be restricted where runoff flows to the bioretention areas to maintain the plantings." At the same time, however, the Long Term Pollution Prevention Plan (Attachment F) states, "The operation will utilize salt and sand to treat the paved surfaces of the site during snow and ice events." Recommend Designer address this conflict.
- Item 5 states, "The onsite stormwater basins will be shielded from public access by fencing." However, no fencing was observed around bioretention areas in the Civil Drawings.
- The Operations and Maintenance Plan does not include a plan showing the location of all stormwater BMPs.
- It is unclear if an operation and maintenance plan exists for current stormwater infrastructure and if the Operations and Maintenance Plan included with the stormwater report addresses existing BMPs. Recommend Designer include pre-existing BMPs (such as features labeled "Stormwater Vaults" that appear to be retained) in the final Operations and Maintenance Plan.

- The BMP inspection checklists for the Operations and Maintenance Plan are appended to the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan. Recommend Designer move the checklist to the Operations and Maintenance Plan.

Recommend Designer address these items.

10. The Illicit Discharge Compliance Statement (Attachment I) included with the Stormwater Report does not make a statement that no illicit discharges exist nor document efforts to investigate illicit discharges. We recommend Designer provide a signed statement which states there are no illicit discharges that meets the requirements outlined in the MA SW Handbook.
11. With respect to the above recommendation, a sanitary sewer line is shown (Sheet No. C132) crossing the MC-3500 (4P) detention system. Recommend Designer evaluate whether these design elements present a conflict or may interfere with detention system functionality.
12. By reference, Roux includes recommendations presented in the Town Letter

Evaluation of Potential Low Impact Design (LID) Alternatives

As documented in the LSP Letter, W&S has recommended to the ConsCom that infiltration improvements not be performed at the property as arsenic is present in the environmental, there is a history of arsenic in groundwater at or near the Site, and the property includes a wellhead protection area. It has been assumed by Roux that the ConsCom has adopted the recommendation from the LSP letter; therefore, we do not believe that additional LID alternatives are appropriate at this time.

Evaluation of Potential Impacts on Wetlands

Based on information provided to Roux, this section includes an evaluation of the potential impacts to surrounding wetlands. The project is located proximate to five wetland resources as identified by W&S in their October 2020 *Wetland Delineation Report*:

- Lake bank (bank of Spoffard Pond) located southwest of the Site and identified as TOB A on Figure 1 of the *Wetland Delineation Report*;
- Bordering vegetated wetlands along Spoffard Pond located southwest of the Site and identified as BVW A on Figure 1 of the *Wetland Delineation Report*;
- Isolated vegetated wetland, identified as a MassWildlife Natural Heritage and Endangered Species Program (NHESP) Certified Vernal Pool, located east of the Site and identified as IW A on Figure 1 of the *Wetland Delineation Report*;
- Isolated vegetated wetland located south of the Site and identified as IW B on Figure 1 of the *Wetland Delineation Report*;
- Stormwater wetlands that convey Site runoff to IW A, located east of the Site and identified as SW A and SW B; and
- Stormwater wetlands located northwest of the Site along BVW A and identified as SW C.

The proposed work will not have any purported impacts on SW C and IW B.

Redevelopment activities will occur within the 100-foot buffer of BVW A which is adjacent to TOB A (Spoffard Pond). These areas also discharge to the existing stormwater sewer system that ultimately discharges to BVW A. These activities include an asphalt driveway, grading, bioretention BMP and signage. Based on the results of the HydroCAD model, stormwater discharge volumes and peak rates to BVW A will be reduced; therefore, there will not be adverse impacts due to stormwater runoff volumes or erosion. With respect to potential impacts to BVW A based on stormwater quality, Designer should address other questions/comments outlined in this letter regarding the stormwater treatment BMPs prior to Roux rendering an opinion. The Site is separated from Spoffard Pond and BVW A by Spoffard Road so a significant portion of the 100-foot buffer in this area is not functional and the Site use will not change; therefore, it is not anticipated that there will be adverse effects on wildlife within BVW A based on the proximity of disturbances. This is also confirmed by Massachusetts DFW in their February 10, 2021 letter.

The stormwater drainage swale, SW A and SW B, will continue to convey Site stormwater runoff to IW A (vernal pool). Work in SW A and SW B is limited to modifications to the headwall/outlet, a plunge pool at the outlet and two check dams for additional flow attenuation. The HydroCAD stormwater runoff model indicates that peak discharge rates will be reduced. It is our opinion that these activities will likely not adversely impact SW A and SW B.

IW A (the vernal pool) is the most sensitive resource potentially impacted by Site activities. As outlined in W&S' HydroCAD stormwater runoff model results, the proposed development will result in approximately 37,000 gallons of additional stormwater runoff conveyed to IW A (vernal pool) under a 2-year return period storm. Although, vernal pools are generally very sensitive to water elevations, particularly in the spring, 37,000 gallons of additional stormwater runoff results in less than one inch of additional water in IW A given its size of 10,000 square feet.¹ As such, it is our opinion that the quantity of stormwater runoff will not impact IW A. With respect to potential impacts to IW A based on stormwater quality, Designer should address other questions/comments outlined in this letter regarding the stormwater treatment BMPs prior to Roux rendering an opinion. The Site work is being performed outside the 100-foot buffer of IW A (vernal pool) and the Site use will not change; therefore, it is not anticipated that there will be adverse effects on wildlife within IW A based on the proximity of the disturbances. This is also confirmed by Massachusetts DFW in their February 10, 2021 letter.

Roux appreciates the opportunity to assist the ConsCom in the evaluation of this development project. Please contact us to discuss this evaluation in further detail if needed. We look forward to your questions and comments regarding this Peer Review.

Sincerely,

ROUX ASSOCIATES, INC.



William Hansen, PE
Senior Engineer



Meredith Harris
Project Principal

¹ Note that the 2.6-inch/24-hour storm, used to establish vernal pool boundaries in Massachusetts, will result in even less additional runoff to the IW A.