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VIA EMAIL

Ipswich Planning Board
Town Hall
25 Green Street
Ipswich, MA 01938

RE: New England Biolabs - 240 County Road
Site Plan Review Application for Child Care Facility
Drainage and Stormwater Management Review - Task 1

Mr. Ethan Parsons and Planning Board Members:

As requested, I have conducted an initial drainage and stormwater management review of the above referenced project with respect to regulatory standards of the Planning Board and routine engineering design practice for drainage and stormwater management facilities similar to that being proposed by the Applicant. Pertinent technical material received includes the following plans and documents as prepared by Meridian Associates of Beverly, MA (unless otherwise noted).

- “Permit Site Plans, New England Biolabs Child Center Development (to accompany an Application for Site Plan Review)...” consisting of six (6) sheets, all dated February 18, 2021.
- “Stormwater Management Report...” dated February 18, 2021, including appendices for Construction Period Pollution Prevention Plan and Operation and Long Term Maintenance Plan.
- “Stormwater Analysis and Calculations...” dated February 18, 2021.

In addition to the above, the following material was received and examined for background and informational purposes only:

- “Site Plan Review Application” dated February 12, 2021.
- Building Elevations and Perspective Plans dated February 18, 2021.
- Landscaping and Planting Plans dated February 18, 2021.

At this time, the following comments and opinions are offered for your consideration relative to the proposed drainage and stormwater management design.

Overview: Conceptually, the stormwater management design proposed for this project is focused on collecting, treating, and infiltrating surface runoff such that post development peak runoff rates do not exceed existing rates. Bioretention basins and infiltration basins are the principal stormwater best management practices utilized to achieve the stormwater management design goal. The proposal is a common approach to stormwater management, particularly when existing soils are permeable and groundwater levels are fairly deep. While the overall design concept is appropriate, there are particular issues of concern outlined in the body of this report that merit revision and clarification by the Applicant.

Stormwater Management:

1. Pre Development Calculations – Several existing depressions on the site have been omitted from the hydrologic model. As a result, existing peak runoff rates from the associated catchment areas is likely to be overestimated. Recalculation is warranted and specific locations of concern are:
 - a. Existing depressions located in the southerly section of Subcatchment 2. The depressed areas account for approximately 15 percent of the catchment area.
 - b. An existing depression in the northerly section of Subcatchment 3. The depressed area accounts for approximately 10 percent of the catchment area.
2. Pre Development Calculations – Based on the topography provided, the westerly boundary of Subcatchment 1 appears to be inaccurately delineated. Hence, the area of the subcatchment and the resulting runoff to ‘Pond 1’ is underestimated. Re-delineation of the boundary and recalculation of the subcatchment runoff rate and volume should be conducted.
3. Post Development Calculations – The following items should be addressed by the design engineer.
 - a. The westerly boundary of Subcatchment 11 appears inaccurately delineated (similar to item 2 above) and should be revised and recalculated.
 - b. A modelling or calculation error appears to exist in the hydraulic connection between the Bioretention Basin and Infiltration Basin 1. For the 10 and 100 year design storms, the peak elevation in Infiltration Basin 1 is higher than that in the Bioretention Basin (this would imply a reverse in flow direction, which is improbable for the design scenario). This issue should be re-examined by the design engineer.
 - i. Related to the above, the dynamic tailwater elevations for ‘Pond 1’ and the Bioretention Basin should also be rechecked. The elevations generated are less than what would be anticipated for the 10 and 100 year storms.
 - c. The 100 year peak stage of Infiltration Basin 1 will exceed the rim elevation of the proposed drain manhole in the driveway, thereby causing a surcharge of runoff that will ‘short circuit’ flow back into the Bioretention Basin. This condition is not considered by the model. Revision or recalculation is warranted.
 - d. Proposed grading of the Sediment Forebay and Infiltration Basin 2 should be specified on the plans.
 - e. The geometry of the spillway grading for ‘Pond 1P’ (westerly of the bioretention basin) should be more specifically defined on the plans to reflect design intent.
 - f. The design engineer should recheck the ability to construct the outlet control devices specified for the Bioretention Basin. Specifically, the outlet pipe is modelled to be a 12 inch pipe with an invert elevation of 35.50, but the three outlet control rims are specified to be at an elevation lower than the crown of the 12 inch outlet pipe.
 - i. A construction detail of the outlet control structure of the Bioretention Basin should be provided on the plans.
 - ii. A cross section of the Bioretention Basin should be provided in conformance with the requirements of the MA DEP Stormwater Handbook, including specification of soil depth and soil composition within the basin.
 - g. A construction detail of the outlet control structure of Infiltration Basin 1 should be provided on the plans.
 - h. All new roof runoff is designed to be conveyed directly to Infiltration Basin 1. This design intent should be specifically noted on the plans.

- i. The size, invert, and slope of the roof drain pipe conveying runoff to the Infiltration Basin 1 should be specified on the plans and analyzed by hydraulic calculation (consideration should be given to tailwater impacts related to operation of Infiltration Basin 1).
 - j. Planting specifications for the bioretention basin should be coordinated between the permit site plans and the landscaping plans.
4. To be consistent with the post development design assumptions, the existing depression (analyzed as 'Pond 1') should be labelled as an area to remain undisturbed (i.e., a no fill area) to ensure that the assumed stormwater detention/infiltration properties of the area will be maintained.
5. No soil testing data was received in support of the assumptions made in the stormwater management design. The following is noted:
 - a. Soil testing should be conducted at each Infiltration Basin and Bioretention Basin, in conformance with MA DEP Stormwater Handbook requirements, to confirm soil composition, infiltration rate, and seasonal high groundwater levels.
 - b. The Rawls Rate used for soil infiltration rates within Infiltration Basin 1 and the Bioretention Basin is not consistent with the underlying hydraulic soils groups shown on the watershed maps (and identified by the Natural Resources Conservation Service (NRCS) at the site). The design engineer should elaborate on how the contrary information was established and provide technical documentation supporting the conclusion.
 - i. Runoff curve numbers (CN) used in the hydrologic model should be consistent with the soil properties utilized in the design of the Infiltration Basins and Bioretention Basin (i.e., if the Rawls Rate used in Infiltration Basin 1 corresponds to a hydrologic soil group B, then the CN used for the associated subcatchment area should correspond to the same hydrologic soil group; similar consideration should be given to the subcatchment containing the Bioretention Basin).
6. It is suggested that the design engineer consider shifting the Sediment Forebay and Infiltration Basin 2 further away from the existing main driveway to avoid destabilization of the driveway foundation due to infiltration of stormwater directly adjacent to the pavement.

Drainage & Grading:

1. Drainage information should be provided on the plans to reflect the full intent of the stormwater management design. Currently, the following information has been omitted from the plans and should be added to the plans in a comprehensive revision:
 - a. All pipe sizes and invert elevations.
 - b. Spillway locations, crest elevations, and geometry.
 - c. Drainage structure and outlet control structure details.
 - d. Construction details for drainage and stormwater related items.
 - e. Revise the specified drain manhole detail to enable construction of the 'shallow manhole' indicated on the plans.
 - f. Outlet protection and rip rap apron details should be provided, and locations indicated.
 - g. Construction detail, cross section, and specification for the fill embankment needed at Infiltration Basin 1.

DEP Stormwater Management Standards:

1. Standard 3 Items:
 - a. Infiltration Basin 2 is designed with an infiltration rate of 8.27 in/hr. Soils with an infiltration rate greater than 2.4 in/hr are considered to have ‘rapid infiltration’ per the MA DEP Stormwater Handbook (refer to Volume 2, Chapter 2). As such, the associated infiltration basin is required to have pretreatment capable of removing 44 percent of total suspended solids (TSS) prior to infiltration of runoff. The proposed design does not satisfy this requirement. Revision and redesign are suggested.
 - b. The finished surface of Infiltration Basin 2 should be designed to ensure that it is capable of infiltrating stormwater at a rate comparable to the underlying soil (i.e., at least 8.27 in/hr).
 - c. Recharge calculations indicate that 2,885 sf of impervious area will not be directed to a recharge best management practice (BMP). This condition is not apparent or implied on the proposed grading plans. The design engineer should clarify this inconsistency.
 - d. The Applicant should elaborate on how Rawls rate was established for the three infiltration areas. No soils testing data was received.
2. Standard 4 – Calculations for Sediment Forebay sizing should be provided to document adequate water quality volume is available at this BMP.
3. Standard 8 - Address and coordinate the following items as presented on the plans and in the Construction Period Pollution Prevention Plan (CPPPP):
 - a. Plans should be revised to indicate areas intended to receive erosion control measures.
 - b. Specific notes and graphics should be outlined to prevent compaction of, and erosion and sedimentation transport into, the Infiltration Basins and the Bioretention Basin during construction.
 - c. A construction detail should be provided for ‘Storm Drain Inlet Protection’ as described in the CPPPP.
 - d. Include provisions in the CPPPP for dust control, diversion swales, and sediment basins during construction.
 - e. Provide construction sequencing in the CPPPP.
 - f. Include a note in the CPPPP referencing the requirements of the project SWPPP.
 - g. Include a note on the plans referencing the requirements of the CPPPP and the SWPPP.
4. Standard 9 – Address and coordinate the following items as presented in the Long Term Operation and Maintenance Plan (O&M Plan):
 - a. The O&M Plan should refer to the design plan of record and any ‘as-built’ plans that may be generated after construction.
 - b. A construction detail should be provided for the ‘Stone & Turf Filter Strip’ as described in the O&M Plan.
 - c. The O&M Plan section entitled ‘Snow disposal and plowing plans...’ should be expanded to address how stone storage will be addressed within and/or adjacent to the Infiltration Basins and Bioretention Basin.
 - d. Provide estimated annual costs for maintenance of the stormwater management system.
 - e. Training and Emergency Contact information is listed as ‘to be determined by the owner’. Given that this is a relocation of an ongoing operation, these items should already be established, and should be identified in the O&M Plan.
 - f. The description of the Bioretention Basin, Infiltration Basins, Sediment Forebay, outlet protection areas, and stone and turf filter strips should all be revised to include the locations where the elements are provided on the project site.

- g. The 'Inspection Schedule and Evaluation Checklist' should be revised to address the following items:
 - i. Indicate inspection for two Infiltration Basins, not one.
 - ii. Coordinate Bioretention Basin inspection frequency with that specified in the narrative description.
 - iii. The quantity of outlet and rip rap locations should be indicated.
 - iv. Inspection of the proposed drain manhole should be added to the checklist.
 - v. Inspection of the Stone & Turf Filter Strip should be added to the checklist.
 - vi. Inspection of outlet control structures should be added to the checklist.
5. Standard 10 - A fully executed Illicit Discharge Compliance Statement should be submitted.

Please feel free to contact me if you have any questions or require any additional clarification of the above comments and opinions.

Very truly yours,

R.E. Puff

Robert E. Puff, Jr., PE

cc: April Ferraro, PE (via email)