



COMPREHENSIVE
ENVIRONMENTAL
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November 18, 2021

Robert Moore, Conservation Agent
Haverhill Conservation Commission
4 Summer Street, City Hall Room 300
Haverhill, MA 01830

**Re: Peer Review Services
887 Boston Road
Haverhill, MA**

Dear Mr. Moore:

As requested by the City of Haverhill, CEI has completed a follow-up review of the materials and information listed below for the proposed Mixed Use Development at 887 Boston Road in Haverhill, MA. Our review focuses on design elements of the proposed project that pertain to the stormwater management design, based on the following information furnished to the Conservation Commission:

1. Design Drawings entitled "Mixed Use Development Site Plan", revised November 16, 2021, prepared by Howard Stein Hudson;
2. Supplemental Data Report entitled "Mixed Use Development", Revised November 2021, prepared by Howard Stein Hudson.
3. Response to Review Comments, dated November 16, 2021, prepared by Howard Stein Hudson.

CEI offers the following comments based on our review of the design drawings and supplemental information listed above.

Standard 1: No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

Deep sump catch basins, hydrodynamic separator (CDS) and subsurface infiltration systems with isolator rows are proposed to provide treatment.

Standard 2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

A HydroCAD model was provided to represent pre and post-development drainage systems. The model results show post-development peak discharge and runoff volume is reduced at two analysis points along Boston Road. CEI has provided comments that may require revisions to the HydroCAD model.



1. The Watershed Plans provided with the Supplemental Data Report indicate the Infiltration Basin is located within Hydrologic Soil Group D (HSG D) soils. The model uses an exfiltration rate that is consistent with HSG A soils (1.02 inches/hour) and should be revised with a HSG D soils exfiltration rate (0.09 inches/hour) or remove the infiltration component for the basin in the model.

CEI recommends removing the infiltration component for the Infiltration Basin since the proposed Outlet Control Structure (OCS-1) includes an 8" orifice that is the same elevation as the floor of the basin and would not provide storage to promote infiltration.

Comment Addressed

The Applicant's Engineer has demonstrated the exfiltration rate, representing HSG B soil is consistent with test pit observations within the infiltration area. CEI agrees an infiltration rate of 1.02 inches/hour is supported by the soil testing information.

The infiltration component of the Infiltration Basin has been removed from the HydroCAD model and is consistent with the proposed OCS-1 design.

2. The outlet pipe for proposed Infiltration Basin is sized as an 18" HDPE. Stormwater from the basin is conveyed through the 18" outlet pipe and ties into an existing 12" pipe on Boston Road. HydroCAD models the basin with capacity of an 18" outlet pipe but the restriction would occur from the existing, downstream 12" pipe. The HydroCAD model should be revised to account for the existing 12" pipe to evaluate potential flow restrictions and determine the effect on the basin's capacity to attenuate peak flows.

Comment Addressed

The outlet pipe has been reduced to 15" to convey flow for the 100-year storm.

The HydroCAD model demonstrates the post-development peak discharge rates do not exceed pre-development peak discharge rates for the 2, 10 and 100-year storm events. The model also shows the post-development stormwater volume discharged to the existing drainage system along Boston Road is reduced for the 10 and 100-year storm events, with a slight increase during the 2 year storm. These results indicate the proposed stormwater management system is design to properly attenuate post-development peak flows and reduce the flow to the existing drainage system.

3. The design plans do not fully show the existing drainage system along Boston Road. It's not clear if the entire system conveys flow north, to South Main Street, or a portion is directed toward the existing culvert that crosses Boston Road. If a portion is directed to the culvert, the HydroCAD model should be revised to account for this additional inflow. CEI recommends the Applicant check with the Haverhill Engineering Department to confirm the configuration and flow direction of the existing drainage system.

Follow-up Comment

CEI recommends a condition to require a survey of the existing drainage system along Boston Road prior to start of construction. The survey shall identify all existing drainage



structures and pipe connections to confirm the subcatchment areas that were used to model runoff from the Site. A revised plan should be submitted to the Haverhill Conservation Commission for review upon completion of the survey.

Standard 3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures.

4. The Watershed Plans provided with the Supplemental Data Report indicate the Infiltration Chamber (IC-1) is primarily located within Hydrologic Soil Group D (HSG D) soils. The CN values to represent surface types in the HydroCAD model represent HSG D soils, however the model uses an exfiltration rate that is consistent with HSG A soils (1.02 inches/hour).
 - a. Proposed conditions HydroCAD should be revised to model IC-1 with a HSG D soils exfiltration rate (0.09 inches/hour).
 - b. 72 Hour Drawdown calculations for IC-1 should also be revised with a HSG D soils exfiltration rate.

Comment Addressed

The Applicant's Engineer has demonstrated the exfiltration rate, representing HSG B soil is consistent with test pit observations within the infiltration area.

Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

TSS Removal Calculation Worksheets were provided with the Stormwater Report.

4. The Applicant should provide supporting calculations to demonstrate the proposed isolator rows provide sufficient the Water Quality Volume (WQV) storage. Calculations were included in the Supplemental Data Report but the "Volume Provided" calculation is presented as a flow rate, not a volume. Please refer to the Stormwater Handbook design standards for sizing the isolator rows.

Comment Addressed

Water quality treatment calculations were revised and demonstrate the proposed infiltration systems and hydrodynamic separators provide sufficient TSS removal efficiencies.

Standard 5: For Land Uses with Higher Potential Pollutant Loads (LUHPPL), source control and pollution prevention shall be implemented.

The proposed project does not meet thresholds or characteristics of a LUHPPL.

Standard 6: Stormwater discharges near or to any critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices.



The Applicant has confirmed the Site is not within or adjacent to a Critical Area.

Standard 7: Redevelopments projects are required to meet the Massachusetts Stormwater Management Standards only to the maximum extent practicable.

The proposed project is not considered a redevelopment.

Standard 8: A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities.

5. The Demolition and Erosion Control Plan should identify locations of the following:

- erosion/sediment controls throughout the Site,
- staging and stock pile locations,
- temporary sediment basins,
- dewatering containment areas,
- concrete cleanout containment basin,
- inlet protection locations, including existing catch basins along Boston Road and South Main Street that are adjacent to the Site.
- snow storage areas during the construction period,
- installation of temporary fencing (orange snow fencing) around the proposed infiltration areas to provide an additional visual indicator to prevent encroachment of construction equipment into the areas.

Note: Details of these stormwater controls should also be added to the plans.

Comment Addressed

Plans have been revised to address many of the items listed above. The remaining items will be added to the SWPPP at a later date. This will allow the Applicant to work with the Site contractor to determine the best approach to manage construction related impacts to meet Standard 8 requirements.

6. Additional information should be included in the Erosion Control Plan Notes to help prevent potential stormwater related impacts:

- a. Revised Note 6 to read “prior to the start of any site work...”. This should be the first note listed.
- b. Inspections of the site will be performed once every 7 days, or once every 14 days and within 24 hours of the end of a storm event of ½ inch or greater.
- c. Remove trapped sediment when depth is half the height of compost filter sock.
- d. Additional sediment controls (siltsock) should be stockpiled on-site for use in repairing damaged sections and emergencies.



- e. Any sediment tracked onto the public right-of way shall be swept at the end of each working day.

Comment Addressed

7. CEI recommends replacing the proposed straw wattle with compost filter socks (silt sock). Silt socks are generally more durable and heavier barrier to provide a better protection.
 - a. Minimum 12” sock should be required.
 - b. The silt sock installation detail should show overlapping ends with a minimum 2-foot requirement.

Comment Addressed

8. The Stabilized Construction Entrance detail should be revised to show minimum 50’ length.

Comment Addressed

9. Two construction entrances are proposed at existing driveway entrances along Boston Road. The Site is sloped toward these entrances, which creates a concern for sediment being washed off-site during storm events. The Applicant may consider locating sediment basins at each construction entrance to direct runoff and help prevent off-site sediment migration.

Comment Addressed

This item will be included in the SWPPP.

10. Temporary construction fencing is recommended along the limit of work. Fencing helps contain trash and debris during the construction period and backing support for perimeter erosion and sediment controls.

Comment Addressed

11. A double row of erosion/sediment controls is recommended adjacent to the wetland area due to the close proximity of the proposed retaining wall, infiltration basin and grading. This could include a silt sock, backed by a row of silt fence along the temporary construction fencing.

Comment Addressed

12. The Applicant is required to submit NPDES Construction General Permit filing with EPA. The site owner and the contractor are each considered "operators" under that permit, and each will need to file an EPA Notice of Intent for coverage under that permit. Prior to filing a



Notice of Intent, the applicant and its contractor must prepare a Stormwater Pollution Plan (SWPPP).

- a. The Applicant shall provide the Conservation Commission with a copy of the SWPPP before land disturbance commences.
- b. The Applicant shall provide the Commission with evidence that all "operators" (as defined in the NPDES Construction General Permit) have filed for coverage under the permit.
- c. The Applicant shall obtain authorization from the Conservation Commission or its agent prior to filing a Notice of Termination under the EPA permit.

Comment Addressed

The Applicant has acknowledged these requirements.

Standard 9: A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

13. A Site plan should be included with the O&M Plan to identify the locations of stormwater BMPs. Snow storage areas should also be identified on the plan at locations where snow melt runoff will be directed to stormwater BMPs for proper treatment.
 - a. Snow storage requirements should be outlined in the O&M Plan.

Comments Addressed

Snow storage areas have been added to the Layout and Materials Plan. The O&M plan outlines snow removal procedures and requires off-site disposal once piles exceed designated storage areas.

Follow-up Comment

Designated Storage areas should be identified on the O&M Plan BMP Map.

14. Outfall riprap apron inspection and maintenance procedures should be included in the O&M Plan to require removal of sediment and debris and repair of any erosion channels or vegetation loss.

Comment Addressed

Standard 10: All illicit discharges to the stormwater management system are prohibited.

15. Upon completion of the drain age system construction, the Applicant shall furnish documentation to the Conservation Commission, which states illicit discharge inspections



were performed following the construction of the drainage system. Inspections are required prior to the discharge of any stormwater to post-construction BMPs.

Comment Addressed

The Applicant has acknowledged this requirement.

16. Dumpster locations should be included on the plans. The dumpster pad should include curbing to direct runoff to an adjacent catch basin for proper treatment.

Comment Addressed

General Comments

17. IC-2 includes a header pipe only for chamber rows with 11 chambers. This configuration would require stormwater to flow through the voids in the crushed stone bed to reach the other chamber rows, which could potentially result in upstream surcharging if the flow rate entering the infiltration system exceeds the flow rate that can be achieved through the stone voids.

CEI recommends extending the header pipe to all chamber rows to better distribute stormwater in the infiltration system.

Comment Addressed

The infiltration system configuration has been revised to include additional structures and header pipes.

18. A detail should be added to the plans for each DMH located at the inlet of the infiltration chamber systems.
 - a. The details should illustrate invert elevations for all inlet and outlet pipes;
 - b. The structures should convey the first flush volume (equivalent to the WQV) in the isolator rows before flow is directed to the infiltration chambers. This is typically achieved with an overflow weir wall within the DMH. The weir wall also provides a method to contain sediment in the isolator row. Please refer to the figure provided on page 2 of the Stormtech Isolator Row O&M Manual that was included in Appendix A: Operation and Maintenance Plan.
 - c. Inlet DMHs should be located in line with the isolator rows to provide maintenance access for sediment removal.

Comments Addressed

The infiltration system configuration has been revised to align the DMHs with the isolator rows for better maintenance access. Elevations of the header system and DMHs are included on the detail.



19. The plans do not include a detail of 12” outlet pipe connections for each infiltration system. CEI recommends including an outlet DMH (downstream end of header pipe) in order to provide access for future maintenance or repairs. This configuration is illustrated in the Stormtech figure referenced above.

Comment Addressed

The infiltration system configuration has been revised. Infiltration Chamber (IC-1) includes a cleanout port for the 8” outlet pipe and IC-2 includes additional DMHs provide better access to the header pipe.

20. Infiltration system inspection/cleanout ports are needed at the ends of chamber rows to provide proper maintenance access to remove sediment and debris. Locations of risers, inspection ports and cleanouts should be indicated plans.

CEI recommends locating the cleanout ports along the header pipe to allow a JetVac to flush water back into the header pipe and direct it to the outlet DMH. A vacuum truck can be used at the outlet DMH to collect water and pollutants while jetting the chambers and prevent downstream discharge to the City’s drainage system.

Follow-Up Comment

Additional inspection ports were added to the infiltration system chambers but additional cleanouts should be included along the header pipes that are directly connected to the isolator rows. Potential sediment migration from the isolator row, through the header pipe, could impact stormwater infiltration rates by clogging stone voids. Cleanouts should be added to provide long-term access for flushing sediment from the infiltration chambers connected to the isolator row header pipe.

21. Plans indicate parking spaces are included under Proposed Building #2 and a 1st Floor Garage for Proposed Building #3.

- a. Are drainage structures proposed for either parking garage?

Comment Addressed

Proposed drainage structures included in the parking garage will connect to an oil/grit separator and discharge to the City’s sewer system.

22. CEI recommends installation of erosion control fabric to better stabilize the embankment adjacent to the wetland area.

Comment Addressed

Slope stabilization fabric is proposed along the embankment.

23. The Infiltration Pond #1 Detail (Sheet C.12) is not consistent with the Proposed Infiltration Basin shown on the plans.



Comment Addressed

24. A detail of the Infiltration Basin outlet control structure (OCS-1) should be added to the plans.
- a. A steel mesh grate or basket, covering the 8" orifice, should be proposed to help prevent debris from clogging the outlet.

Comments Addressed

25. A detail of the Infiltration Basin emergency overflow is needed with supporting sizing calculations.

Comment Addressed

26. One foot of freeboard is not provided for the proposed Infiltration Basin.

Comment Addressed

27. Subcatchment areas that drain to CB-1 and CB-13 include impervious surfaces that are greater than ¼ acre. MassDEP Stormwater handbook design guidelines for deep sump catch basins state contributing drainage areas to any deep sump catch basin should not exceed ¼ acre of impervious surface.

Comment Addressed

Revisions were made to the plan, including the addition of a double catch basin (DCB-16) to address the subcatchment areas. The impervious surface for DCB-16 subcatchment remains above ¼ acres, however it is anticipated this drainage area will be reduced once the adjacent property is developed by a separate owner.

If you have any questions or comments regarding this report, please contact me at 508-281-5160.

Sincerely,

COMPREHENSIVE ENVIRONMENTAL, INC.

Curt Busto
Project Engineer