



COMPREHENSIVE
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June 5, 2025

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

**Re: Peer Review Services
85 Water Street
Haverhill, MA**

Dear Mr. Moore:

As requested by the City of Haverhill, CEI has completed a technical review of the materials and information listed below for the proposed development project located at 85 Water Street in Haverhill, MA. Our review focuses on elements of the proposed project that pertain to the stormwater management design, based on the following information furnished to the Conservation Commission:

- a. Stormwater Management Report, revised May 2, 2025, prepared by The Morin-Cameron Group, Inc.;
- b. NOI Report, dated March 13, 2025, prepared by LEC Environmental Consultants;
- c. Site Plans, revised June 2, 2025, prepared by The Morin-Cameron Group, Inc.
- d. Response to Comments, dated June 2, 2025, prepared by The Morin-Cameron Group, Inc.
- e. HydroCAD Summary & Analyses, dated June 2, 2025, prepared by The Morin-Cameron Group, Inc.

CEI's original comments are below, followed by The Morin-Cameron Group (MCG) responses in **bold, italic text**, with CEI response comments below that in **bold, blue text**.

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.

1. CEI is concerned that the drop from the vegetated filter strip into the bioretention area will cause erosion and reduce viability of vegetation within the bioretention area reducing its effectiveness. Please show that flow over the retaining wall will not cause erosion within the bioretention basin.

MCG Response: The retaining wall is proposed with a one foot wide crushed stone strip along the top of wall that will capture runoff and direct it through wall drains at the bases of the wall/bottom of basin to prevent runoff from spilling over the wall. The locations of the wall drain pipes were added to the Bioretention Area Detail on Sheet C-8 with rip-rap to prevent erosion.

CEI: Comment addressed. Please provide documentation that shows inflow velocities will be less than 2 feet per second for the newly proposed infiltration chambers.

MCG Response: MCG notes that Standard 1 refers specifically to new stormwater conveyance discharges causing erosion to wetlands or waters of the Commonwealth. The catch basins are discharging runoff into a subsurface storage system. Overflow will flow through a hydrodynamic separator into an existing municipal drainage system prior to discharging to the Merrimack River. Therefore, MCG feels Standard 1 does not apply to this comment. A Rational Method HydroCAD Analysis to show the 100-year pipe capacity calculations is provided with this response. The velocities flowing into the system are 2.65 ft/s from CB-1, 1.16 ft/s from CB-2 and 1.93 ft/s from CB-3. The pipes were lowered so the connection to the chambers is located at the bottom of the system and the slopes are set at 0.010 ft/ft. Additionally, a splash pad block (2' long x 2' wide x 3" deep) is proposed at each pipe inlet in the chambers to provide energy dissipation and reduce potential for scour.

CEI: Comment addressed.

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

The project proposes an infiltration system and reduction in impervious area to attenuate peak discharge rates. The post-development peak discharge rates are at or below existing discharge rates.

1. HydroCAD model should consider the WSEL of the Merrimack River to more accurately depict backwater effects that this system will be subject to.

MCG Response: Tailwater was added at the Design Point (1L) for the existing and proposed conditions analyses. Since there is no published data available for the 1-, 2-, and 5-year flood events the mean annual high water elevation was used for these events. The elevations published by FEMA for the 10-year (15.1'), 50-year (19.0') and 100-year (22.0') were used. While there is no published data for the 25-year flood event the elevation is assumed to be halfway between the 10-year and 50-year storm events (17.05'). Additionally, the pipes and structures present in the existing and proposed conditions were added to their respective HydroCAD analyses.

CEI: With the inclusion of the tailwater conditions for the river there is a significant difference in WSE and primary outflow of the proposed stormwater BMPs, specifically the chambers and the stone trench. It also appears that the rainfall distribution between the pipe analysis and the BMP analysis is different with the BMP analysis using the Type III distribution and the pipe analysis using the NRCC 24hr D distribution. CEI is concerned that with the inclusion of the tailwater, the proposed stormwater BMPs will not meter the discharge rates to pre-development peak discharge rates.

MCG Response: All HydroCAD models were checked and updated to use Type III distribution as needed. The subsurface chambers and stone trench systems are designed to retain the runoff volume required to meet the Total Phosphorus Removal requirements by the Haverhill Stormwater Ordinance. Since these two systems are not designed to provide any mitigation for peak flow rates, they were removed from the two proposed HydroCAD analyses. The updated analyses are included with this letter with an exhibit showing summary tables for peak flow rates and runoff volumes for all considered design storms. In order to more accurately depict the tailwater effects on the proposed redevelopment, the 36" pipe models were modified to use the pipe run between the manhole in Wall Street and the seawall for the primary outlet. A secondary outlet is used to model

the flow backing up through the catch basins on Wall Street connected to the drain manhole during flood events. The updated analyses are included with this letter with an exhibit showing summary tables for peak flow rates and runoff volumes for all considered design storms. While the 36" pipe models show minor increases in peak flow rates and water surface elevation for all storms, the peak flow rates for the 1-year and 2-year storm events are below the total capacity of the pipe. Beginning in the 5-year storm event, the pipe begins to back up and flow out through the catch basins in Wall Street in both the existing and proposed condition, which continues in the remainder of the design storms considered. While there is an increase in the peak water surface elevation for these events between 0.06' and 0.37', the impact is limited to the pipe flow and would have no noticeable impact on the flood elevation of the Merrimack River. It should be noted that the site development will result in a 59,765 cubic foot increase in flood storage volume, which is not modeled in this analysis and considered conservative.

CEI: Comment addressed.

2. Although the culvert outlet will be below the flood elevation for the 10-year storm event this should be accounted for to determine where flooding upstream will occur and if flooding will increase upstream of the site due to the proposed connection.

MCG Response: Flooding in the existing municipal stormwater system is anticipated to back up and rise with the water surface elevation of the Merrimack at the flood elevations determined by FEMA. Since the proposed system is equipped with a check valve, which will have an invert of approximately elevation 9.43, that will prevent backflow into the water quality unit when flood waters reach that elevation. At this point runoff flowing into the catch basins will fill in the proposed drain structures and pipes until it reaches the lowest catch basin grate at elevation 13.95. Stormwater will the flow out of the structure to Wall Street, which will already be inundated by flood waters since there are multiple catch basins between elevations 12.41 and 13.57 along the site. Flooding in this area will not be increased since the total volume of runoff for the 2-, 10- and 100-year storm events are decreasing as shown in the narrative of the Stormwater Management Report. Additionally, the project proposes to increase the available flood storage volume on site between elevations 13 and 22 as shown on sheet C-5 of the Site Redevelopment Plans.

CEI: The check valve will prevent water from backing into the system during smaller storm events but due to CB-3, the entire drainage system will receive flood water during the 10-year storm event. This would reduce the capacity of any of the chamber system to attenuate the peak discharge rates.

MCG Response: As previously stated, the subsurface chambers and stone trench systems are designed to retain the runoff volume required to meet the Total Phosphorus Removal requirements by the Haverhill Stormwater Ordinance. Since these two systems are not designed to provide any mitigation for peak flow rates, they were removed from the two proposed HydroCAD analyses. The updated analyses are included with this letter with an exhibit showing summary tables for peak flow rates and runoff volumes for all considered design storms.

CEI: Comment addressed. Post-development peak discharge rates are shown to not exceed pre-development peak discharge rates.

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

The development proposes the reduction of impervious surface and an infiltration basin.

1. Soil samples are required at the actual location and soil layer where stormwater infiltration is proposed. Soil samples provided were taken from the western side of the site and were not taken where the proposed BMP is situated.

MCG Response: The site is mapped in an area mapped as Urban Land (fill) on the NRCS Soil maps, which is confirmed by the soil borings performed in 2003 (Appendix H of the Stormwater Management Report). These soil borings showed bedrock 18 feet to 20 feet below existing grade and the report notes ground water between 8.5 feet and 14.9 feet below existing grade. MCG proposes to condition the requirement for a test pit to be performed in the vicinity of each stormwater BMP prior to construction. The test pit results will be provided to the design engineer for review to determine if changes would be required to the system prior to construction.

CEI: Standard 3 could be met with this condition. Permit conditions are determined by the Commission.

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

The project is proposing deep sump catch basins, a hydrodynamic separator, and a subsurface infiltration system for water quality treatment.

1. CEI is concerned that with the check valve at the outlet of the WQU-1 and the WSEL in the outlet pipe during the larger storm events, that water will back up in the WQU-1 reducing effective treatment and possibly resuspending pollutants.

MCG Response: It is anticipated that the majority of the TSS and other pollutants will enter the proposed drainage system during the "first flush" or ½" of rain during a storm event. The CDS unit will treat the runoff following this, which would be expected to occur prior to floodwaters reaching and closing off the check valve. Per the manufacturer, solids captured in the sump will not resuspend during flood events. While floatable pollutants could escape the system, routine inspections and maintenance would reduce the amount of these pollutants in the system at a given time. Additionally, the system services a relatively small driveway with only 5 proposed parking spaces. This reduces the potential for floatable pollutants, such as oil and gas to be introduced to the system.

CEI: We agree that the WQU-1 will be able to provide water quality treatment for the contributing areas. Please provide manufacturer correspondence stating that solids will not be resuspended during flood events.

MCG Response: An email from David Adams of Contech Engineered Solutions LLC is provided with this letter stating that flooding does not cause resuspension of settled solids in the sump during flood events.

CEI: Comment addressed.

2. It appears the CB-3 will be under water during the 10-year storm event from the Merrimack River directing floodwaters to WQU-1. CEI is concerned that this will short circuit and damage WQU-1. Please confirm that the unit will not be damaged per the manufacturer.

MCG Response: Since there is a check valve included in the proposed drainage system at elevation 9.43, flow through the system will shut off when the floodwaters from the Merrimack River reach that elevation. Runoff flowing over the driveway will continue to enter and fill the system (pipes and structures) until it reaches the grate of CB-3 (elevation 13.85). At this point water in the

system will flow out of CB-3, which will prevent floodwater from entering the system. Additionally, MCG reached out to the manufacturer and confirmed that WQU-1 would not damage the system if floodwater submerged the structure.

CEI: Please attach correspondence from manufacturer that states the WQU-1 will not be damaged when submerged during flooding events.

MCG Response: An email from David Adams of Contech Engineered Solutions LLC is provided with this letter stating that flooding does not cause resuspension of settled solids in the sump during flood events.

CEI: Comment addressed.

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

The project is considered redevelopment and must meet standards 2, 3, 4, 5, and 6 to the Maximum Extent Practicable (MEP).

1. CEI has provided comments for standards 2, 3, and 4 that should be addressed before we believe that the standards are being met to the MEP

MCG Response: The project is required to meet Standards 2, 3, 4, 5 and 6 to the maximum extent practicable, which MCG feels it has done given the space and site constraints and considering the project will reduce both total impervious area and pavement area typically requiring pollutant removal.

CEI: Comments have been provided for standards 2, 3, and 4 that should be addressed prior to MEP determination.

MCG Response: MCG feels that the project meets the Stormwater Management Standards to the maximum extent practicable given the project is considered a redevelopment project located within an area subject to flooding in the 10- and 100-year storm events.

CEI: Comment addressed.

We appreciate the opportunity to provide the City with peer review services. If you have any questions or comments regarding this report, please contact me at 774-843-2007 or cosullivan@ceiengineers.com.

Sincerely,

COMPREHENSIVE ENVIRONMENTAL, INC.



Conor O'Sullivan
Project Review Engineer



Matthew Lundsted, P.E.
Principal Engineer