



COMPREHENSIVE
ENVIRONMENTAL
INCORPORATED

June 2, 2021

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

**Re: Peer Review Services
Haverhill Solar Project
139 Amesbury Line Road
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 Haverhill Solar Project at 139 Amesbury Line 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. Notice of Intent Haverhill Solar Project, dated April, 2021, prepared by GPR Inc.;
2. Stormwater Management Report, dated April, 2021, prepared by GPR Inc.;
3. Site Plan Haverhill Solar Project, dated April, 2021, prepared by GPR Inc.

The proposed work includes construction of a large scale ground-mounted solar energy system, maintenance access road, walking trail, educational observation platforms and apiary with special seeding areas. The stormwater management design includes stone and grass swales with check dams, water quality swales with outlet control structures to collect and attenuate runoff, level spreaders at outlet pipes and stone diaphragms with underdrain pipes.

The project Site primarily wooded and includes two bordering vegetated wetlands (BVW) that are located along the northwest property boundary. A natural drainage divide at the Site is identified on the Site Plans with the majority of stormwater runoff flowing west, toward the wetlands and Whittier School driveway. This portion of the site is tributary to the City of Haverhill Water Supply Protection District (WSPD) for the Millvale Reservoir. Runoff from the remaining area of the Site flows to the east, toward Amesbury Line Road.

Proposed grading at the Site is limited due the nature of the proposed use and restrictions caused by shallow depth to groundwater throughout the project area. Site grading is primarily needed for



construction of the maintenance road, turnaround areas and water quality swales. Proposed site work is located within the 100-foot wetland buffer area, with 14.6 acres of tree clearing outside of the 25-foot No Disturbance. A portion of the tree clearing area, between 35-feet and 75-feet, along the wetland area located on the western side of the site will not include stump removal to help maintain moisture retention and stabilize soils.

Soils at the Site are predominantly classified as HSG C, which have low infiltration rates. Soil test pit observations found shallow groundwater conditions that present a challenge for infiltrating and attenuating stormwater runoff.

CEI offers the following comments based on our review of the design drawings and NOI 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.

1. Proposed check dams along the stone and grass swales should be shown in bold, black lines to better identify the locations.
2. Elevations for all stone overflows should be indicated on the plans.
3. Widths for stone emergency spillways should be labelled.

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

4. The HydroCAD model indicates post-development total runoff volume for the 2 year storm at AP1 (located at Amesbury Line Road) is greater than the pre-development volume. The Subcatchment (P2) area for AP1 includes the access driveway from Amesbury Line Road to the Vehicular Turnaround Area #1, wooded land to the northeast of the driveway, Water Quality Swale #4 (WQS4) and a Stone Diaphragm (a stone trench with an underdrain pipe).

The stormwater runoff from Subcatchment P2 is primarily collected by a swale on the north side of the access driveway and turnaround area, conveyed to WQS4 and discharged through an outlet control structure which then discharges to the Stone Diaphragm between the north edge of the driveway and abutting property (Lot 430-11-2A). The drainage system is designed to infiltrate runoff in WQS4 and the Stone Diaphragm. Promoting infiltration in this area may cause groundwater levels to rise above existing conditions during storm events and potentially impact abutting properties and existing on-site septic systems.

CEI recommends completing additional stormwater and groundwater evaluations, such as a mounding analysis and soil test pits, to better assess potential impacts to abutting



properties. The Applicant's Engineer may also want to consider reducing stormwater flow toward Amesbury Line Road by grading the turnaround area to convey runoff to the west of the access driveway.

5. HydroCAD analysis points should be located at each of the school driveway culvert crossings to better isolate and compare each wetland drainage area under pre and post-development conditions.

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

6. Calculations were provided to demonstrate the proposed Water Quality Swales are designed to provide infiltration for required recharge volumes below low flow orifices. The bottom elevations at Water Quality Swales 2, 3 and 4 do not appear to maintain a minimum 2-foot separation to estimated high groundwater elevations. The Applicant's Engineer may consider maintaining the existing grades at each water quality swale to establish a bottom elevation that would provide a 2-foot separation to groundwater.
7. Backup calculations should be provided to demonstrate all BMPs designed to provide stormwater storage completely drain within 72 hours. Calculations should include the grass swales that are proposed along the slopes leading down to the Water Quality Swales.
 - a. Consideration should be given to the potential for swales located on the upper slope to influence the groundwater elevation and dewatering capabilities of the swales located toward the bottom of the slope.

Construction of the grassed swales require a cut in the slope to form the swale which will further reduce depth to groundwater.

8. The City of Haverhill WSPD Ordinance (Section 9.2.9.4) includes a design standard that requires all increase in runoff generated on the site shall be recharged on-site in a manner demonstrated to assure full protection of the water quality and quantity in the WSPD". CEI recommends the City of Haverhill make a determination on the proposed drainage design for compliance with this design standard.

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

The proposed stormwater management design provides the required TSS removal.



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 proposed stormwater management system includes four discharge locations within the WSPD. Each location is located outside of the 25-foot No Disturbance zone and includes upstream BMPs that provide suitable treatment for managing discharges. The proposed land use does not appear to include equipment or activities that would pose a threat for an emergency spill or unexpected event which would require shutdown or containment.

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

This 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.

9. A Turf Reinforcement Mat detail is included on the plans but the proposed installation areas are not shown. Plans should include labels and shaded areas where the Mat is being proposed.
10. The Construction Entrance detail should be revised to require a minimum length of 50 feet.
11. Catch basin inlet protection should be required for all proposed catch basins during the construction period and removed once the site has been fully stabilized.
12. Erosion and Sediment Control Notes (Sheet C3.4) should include silt sock installation, inspection and maintenance notes.
13. Erosion and Sediment Control should include inspection requirements with minimum weekly inspections and after every ½” storm event.
14. The Applicant has acknowledged a SWPPP will be submitted as part of the 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.

The Applicant shall obtain authorization from the Conservation Commission or its agent prior to filing a Notice of Termination under the EPA permit.

15. A phased Construction Plan is recommended to limit the area of disturbance, especially within the WSPD. Proposed water quality swales, outlet control structures and drainage swales should be stabilized and prepared to contain potential sediment runoff from upstream phased areas during the construction period. Any sediment that is collected in the BMPs shall be removed upon completion of work and re-stabilized as needed.

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

The Applicant has provided an Operation and Maintenance Plan for the Site and associated stormwater BMPs that are included in the facility design.

16. Designated snow storage and disposal requirements should be added in the O&M Plan and areas should be identified on the BMP Locus Plan.
17. Access driveway maintenance should be added in the O&M Plan to include requirements for regrading or repairing the gravel surface in order to maintain grading and properly convey runoff without causing channeling or erosion of slopes and drainage swales.
18. Long-term water resource pollution prevention strategies should strongly prohibit herbicide, pesticide and fertilizer application in any area of the property.

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

The Applicant has acknowledged an Illicit Discharge Compliance Statement is required and will be submitted prior to the discharge of any stormwater to post-construction BMPs.



General Comments:

19. Inspection and maintenance access ports should be included for all level spreader and underdrain pipes. Access ports should be indicated on the plans and details at both ends of each pipe.
20. Outlet Control Structures should include screens or cages for each orifice to help prevent clogging.
21. Typical Detail of the Solar Field Array Racking System should provide information for the proposed surface (i.e. grass) beneath the rows of panels and specifically along the drip line.
22. Proposed check dams and stone overflow weirs should be shown as black, bold line type to better identify the proposed locations.
23. Spot elevations at each stone overflow weir should be labelled.
24. Design plans indicate a 195' stone diaphragm with a 6" underdrain pipe is proposed. The HydroCAD model includes a 100' long trench with an 8" underdrain pipe. Plans and model should be revised and consistent.
25. Staging area and stock pile locations are needed on the Erosion and Sediment Control Plan.
26. All proposed catch basins should require silt sack installation during the construction period. A silt sack detail should be added to the plans.
27. A proposed 22 foot wide access driveway may be excessive for the intended use. Decreasing the driveway width and replacing it with additional vegetated cover would help reduce stormwater runoff.

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