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May 14, 2026

Mr. Robert Moore
Environmental Health Technician
4 Summer Street
City Hall Room 300
Haverhill, MA 01830

Response to Peer Review Comment Letter #1
DEP File #: 33-1595
890 North Broadway
Haverhill, MA 01832
CDCI File #: 24-10594

Civil Design Consultants, Inc. (CDCI) has prepared this information and revised plans to address the peer review letter prepared by Comprehensive Environmental Inc., dated April 8, 2026, for the proposed development project located at 890 North Broadway in Haverhill, Massachusetts. The following information is provided for your review and consideration:

Standard 1

1. An infiltration trench has been added along the edge of the cart path at the clubhouse to provide water quality treatment prior to runoff discharging towards the wetland resource area.

Standard 2

1.
   a. Peak discharge rates have been revised to reflect discharge from the wet swale, consistent with the previously approved 2009 drainage report. The drainage report has been revised accordingly.

   b. The revised drainage report now includes HydroCAD modeling using NOAA Atlas 14 rainfall depths. The results demonstrate that the proposed 2026 post-development peak flows are less than the 2009 post-development discharge peak rates.

   c. Since the proposed drainage system has been designed so that the current post-development peak flows are equal or less than the previously approved 2009 conditions, we do not anticipate any adverse impact to the downstream irrigation pond.

2. The pond shown near the 18th green on the 2009 approved plans was intended as a water feature. This feature was not included in the 2009 drainage analysis and was never construction.

Standard 3

1. Attached is the Stormwater Management Compliance Summary provided to the Commission during the 2009 Notice of Intent review process. As detailed in the summary, type C and D soils, high groundwater, and relatively steep slopes presented a significant challenge to meet the minimum recharge volume along Front Nine Drive.

   Chapter 1 – Volume 1 of the Massachusetts Stormwater Handbook specifies that for sites comprised solely of C and D soils…."*proponents are required to infiltrate the required recharge volume only to the maximum extent practicable.*"

   At the time of the original approval, both the Commission and its peer review, Horseley Whitten, agreed that infiltration measures should be provided where site conditions allow. Under the previously approved design, the proposed clubhouse grading allowed portions of the parking area to be filled to allow for a subsurface infiltration system, providing a total recharge volume of 235-CF.

   Under the current proposal, the revised grading results in slight cuts to the existing grade, prohibiting the placement of a subsurface infiltration system while maintaining the required groundwater separation. To compensate, an infiltration basin has been added east of the cart

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barn, providing a total recharge volume of approximately 383-CF, or 148-CF more volume than the previously approved design.

As noted in the original compliance summary, *"Infiltration measures have been implemented where conditions allow, however, existing site conditions including high groundwater and steep slopes preclude the placement of additional measures to completely comply with Standard #3."* We believe the design as shown meets the 'maximum extent practicable' threshold allowed under Standard 3 consistent the with original 2009 design.

Additionally, the drainage system has been designed to allow runoff to reach the irrigation pond for reuse as a water supply for the golf course irrigation system.

2. The HydroCAD model has been updated to represent exfiltration over surface area in accordance with the Massachusetts Stormwater Handbook.

Standard 4

1. A water quality unit has been incorporated into the parking lot treatment train to provide a 90% average annual removal of total suspended solids (TSS). EPA SCM Performance Removal Curves have been provided to demonstrate that the proposed BMPs achieve 60% average annual total phosphorus (TP) removal.

2. Inlet grate capacity calculations have been provided in the revised drainage report to demonstrate that the proposed structures can adequately convey the design flows.

3. Curbing has been added around the cart barn, and an additional deep sump catch basin has been incorporated to provide pretreatment prior to discharge to the infiltration basin.

Standard 5

1. The proposed cart barn will be used solely for golf cart storage. No vehicle or equipment maintenance/service activities are proposed, and therefore, the proposed use is not considered a LUHPPL.

Standard 8

1. A concrete washout area has been added to Sheet C-3.

Standard 9

1. Snow storage areas have been identified on Sheet C-4 and referenced in the Operation and Maintenance Plan.

2. Mosquito breeding mitigation measures have been incorporated into the Operation and Maintenance Plan.

3. The Applicant acknowledges that the referenced operation and maintenance requirements will be included in the Order of Conditions.

Standard 10

1. A signed and dated Illicit Discharge Statement will be provided to the Conservation Commission prior to construction.

Other Comments

1. An inlet capacity analysis for the catch basins has been included in the revised drainage report, under Tab 5.

2. The downstream pipe at PDMH-1 has been upsized to a 24-inch HDPE pipe. Updated pipe sizing calculations have also been provided in the revised drainage report.

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3. A cross-section detail of the wet swale and infiltration basin have been added to Sheet D-4.

4. The catch basins near the eastern driveway on Front Nine Drive are existing structures.

5. The proposed wet swale remains in the same location as previously approved under the 2009 design. To provide additional mitigation measures, additional plantings have been added within the 25-FT No Disturb Zone.

We believe that the information provided and plan revisions fully address the review letter referenced above. Should you have further questions, comments, or require additional information, please do not hesitate to contact our office.

Very Truly Yours,

CIVIL DESIGN CONSULTANTS, INC.

Meera A. Cousens
Senior Project Manager

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June 25, 2009

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CDCI File #: 08-0703
Crystal Springs Golf Course
Haverhill, MA 01832

MassDEP Stormwater Management Standards Compliance Summary

Dear Mr. Moore:

Civil Design Consultants, Inc. (CDCI) is pleased to provide the following narrative to address the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards. The Standards address water quality (pollutants) and water quantity (flooding, low base flow and recharge) by establishing standards that require the implementation of a wide variety of stormwater management strategies. The following summary has been prepared to illustrate the project's compliance with these standards.

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.*

Chapter 1 – Volume 3 of the Stormwater Management Handbook specifies a maximum permissible velocity between 2.5 FT/S and 5 FT/S before the use of rock rip-rap is required to prevent erosion. The proposed improvements result in six (6) separate new discharges. The following summary has been prepared to illustrate the maximum anticipated velocities at each of the new discharges during a 10-year, 24-hour storm event.

Table 1.1

Discharge Location	Peak Discharge (CFS)	Anticipated Velocity (FPS)
PFES-3 (From Wet Pond #1)	7.1	8.2
PFES-8 (From Wet Pond #2)	16.9	9.3
PFES-10 (From Wet Swale #1)	6.9	8.1
PFES-11 (From PDMH-6)	1.4	2.8
PFES-12 (From PCB-21)	1.2	3.1
PFES-13 (From Infiltration Pond #1)	2.5	4.9

Each of the proposed outlets will discharge runoff at a velocity in excess of 2.5 FT/S. Therefore, a rock rip rap apron has been provided at each of the outlets to reduce velocities, stabilize ground cover and reduce the potential for erosion. Velocity calculations and rip-rap apron sizing and gradation calculations are provided at the end of this letter.

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

A series of best management practices including infiltration basins, water quality swales and wet ponds are proposed throughout the site to mitigate the increase in impervious surface and reduce the

anticipated peak discharge at each of the project Design Points. A summary of the peak discharge rates is provided below.

Table 2.1: Peak Discharge Comparison – Design Point #1					
	2-YR	10-YR	25-YR	50-YR	100-YR
	(3.1-IN)	(4.5-IN)	(5.4-IN)	(5.9-IN)	(6.5-IN)
Pre-Development	10.0-CFS	20.4-CFS	27.6-CFS	31.7-CFS	36.7-CFS
Post-Development	9.9-CFS	20.2-CFS	27.3-CFS	31.4-CFS	36.4-CFS
Difference:	-0.1-CFS	-0.2-CFS	-0.3-CFS	-0.3-CFS	-0.3-CFS
% Difference	-1.0%	-1.0%	-1.1%	-0.9%	-0.8%

Table 2.2: Peak Discharge Comparison – Design Point #2					
	2-YR	10-YR	25-YR	50-YR	100-YR
	(3.1-IN)	(4.5-IN)	(5.4-IN)	(5.9-IN)	(6.5-IN)
Pre-Development	13.4-CFS	23.4-CFS	99.5-CFS	136.1-CFS	180.3-CFS
Post-Development	12.5-CFS	21.1-CFS	85.0-CFS	123.8-CFS	165.9-CFS
Difference:	-0.9-CFS	-2.3-CFS	-14.5-CFS	-12.3-CFS	-14.4-CFS
% Difference	-6.7 %	-9.8 %	-14.6 %	-9.0 %	-8.0 %

Table 2.3: Peak Discharge Comparison – Design Point #3					
	2-YR	10-YR	25-YR	50-YR	100-YR
	(3.1-IN)	(4.5-IN)	(5.4-IN)	(5.9-IN)	(6.5-IN)
Pre-Development	29.0-CFS	60.5-CFS	82.6-CFS	95.2-CFS	110.7-CFS
Post-Development	24.7-CFS	57.0-CFS	80.4-CFS	93.4-CFS	109.0-CFS
Difference:	-4.3-CFS	-3.5-CFS	-2.2-CFS	-1.8-CFS	-1.7-CFS
% Difference	-14.8 %	-5.8 %	-2.7 %	- 1.9 %	- 1.5 %

Standard 3: *Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.*

Soil types on site consist of HSG "C" and "D" soils. Chapter 1 – Volume 1 of the Stormwater Management Handbook specifies that *for sites comprised soley of C and D soils… proponents are required to infiltrate the required recharge volume only to the maximum extent practical.* To meet the *Maximum Extent Practical* threshold of the standards the Applicant shall demonstrate the following:

1. *The Applicant has made all reasonable efforts to meet the standard.*

2. *The Applicant has made a complete evaluation of all possible applicable infiltration measures, including environmentally sensitive site design that minimizes land disturbance and impervious surface, low impact development techniques and structural stormwater best management practices, and*

3. *If the post-development recharge does not at least approximate the annual recharge from the pre-development conditions, the Applicant shall demonstrate that highest practicable method for infiltrating stormwater has been implemented.*

Typical infiltration measures require a minimum 2-FT separation to estimated seasonal high groundwater elevation (ESHGE) and a minimum 50-FT separation from slopes in excess of 15%. Test pits were performed at each of the proposed outlet locations during May and June of 2009. Average estimated seasonal high groundwater elevations are approximately 28-IN below existing grade. Copies of the test pit logs are included in the Drainage Report prepared by this office dated June 10th, 2009. In addition,

existing slopes within the developed portion of the property range from 3% to 20% making infiltration difficult to achieve.
To comply with the maximum extent practicable threshold, infiltration measures have been provided where conditions allow. The following summary has been prepared to illustrate the required and provided Recharge Volumes for both Back Nine Drive and Front Nine Drive:

Back Nine Drive

Total Impervious Surface:	1.75-Acres
Adjusted Minimum Required Recharge Volume:	1,985-CF
Storage Volume Provided at Infiltration Basin #1:	2,322-CF
Draw Down:	37-Hours

As illustrated above, the storage volume provided in Infiltration Pond #1 of 2,322-CF exceeds the adjusted minimum required recharge volume of 1,985-CF and completely drains within 72-HRS. Therefore, Infiltration Pond #1 provides adequate storage volume to accommodate the required recharge volume, and Standard 3 is fully met for Back Nine Drive.

Front Nine Drive

Total Impervious Surface:	6.80-Acres
Adjusted Minimum Required Recharge Volume:	22,847-CF
Storage Volume Provided at Infiltration Basin at PFES-4:	649-CF
Storage Volume Provided at Sub-Surface Infiltration System in parking area:	235-CF
Cumulative Storage Volume Provided by Proposed Drywells for Lots 1-27:	1,809-CF
Total Storage Volume Provided by Front Nine Drive BMP's:	2,693-CF

As illustrated above, the storage volume provided by the proposed Front Nine Drive BMP's do not meet the adjusted minimum required recharge volume of 22,847-CF. Infiltration measures have been implemented where conditions allow, however, existing site conditions including high ground water and steep slopes preclude the placement of additional measures to completely comply with Standard #3.

Standard 4: *For new development, stormwater management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS). It is presumed that this standard is met when:*

A. Suitable nonstructural practices for source control and pollution prevention are identified in a Long Term Pollution Prevention Plan, and thereafter and are implemented and maintained;

Seekamp Environmental Consultants has prepared and provided a Stormwater Pollution Prevention Plan (SWPPP) with this letter to address the requirements of the anticipated Construction General Permit to be issued by the EPA, as well as this portion of Standard 4 and Standard 8 as specified below.

B. Structural stormwater management best management practices (BMP's) are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook,

The following summary has been prepared to illustrate the required and provided Water Quality Volumes for both Back Nine Drive and Front Nine Drive:

Back Nine Drive

Total Impervious Surface:	1.40-Acres
Water Quality Volume Required:	2,541-CF
Water Quality Volume Provided:	2,812-CF

It should be noted that a small portion of Back Nine Drive drains toward North Broadway. This sub-catchment area includes approximately 0.35-Acres of impervious area which drain through a *Stormceptor* 450i prior to discharge to the wetland area, and therefore, has been excluded from the total impervious area specified above. As illustrated, the water quality volume provided by proposed infiltration pond 1

exceeds the required water quality volume generated by the proposed improvements associated with Back Nine Drive.

Front Nine Drive

Total Impervious Surface:	6.45-Acres
Water Quality Volume Required:	11,707-CF
Water Quality Volume at Proposed Wet Pond #1:	11,332-CF
Water Quality Volume at Proposed Wet Pond #2:	18,584-CF
Water Quality Volume at Proposed Wet Swale #1:	2,880-CF
Total Water Quality Volume Provided by Front Nine Drive BMP's:	32,796-CF

It should be noted that a small portion of Front Nine Drive drains toward North Broadway. This sub-catchment area includes approximately 0.25-Acres of impervious area which drains through a *Stormceptor* 450i prior to discharge to the wetland area, and therefore, has been excluded from the total impervious area specified above. As illustrated, the water quality volume provided by the proposed Front Nine Drive BMP's exceeds the required water quality volume generated by the proposed improvements.

C. Pre-treatment is provided in accordance with the Massachusetts Stormwater Handbook. Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

The following treatment train calculations are provided for each of the proposed discharge locations:

From Wet Pond #1 & Wet Pond #2

Parking Lot Sweeping:	5%		
Deep Sump Catch Basin:	25%		
Sediment Forebay & Wet Pond #1:	80%		
Parking Lot Sweeping:	1.00 x 5% = 0.050	→	1.00 – 0.05 = 0.950
Deep Sump Catch Basin:	0.95 x 25% = 0.238	→	0.95 – 0.238 = 0.713
Sediment Forebay & Wet Pond #1:	0.713 x 80% = 0.570	→	0.713 – 0.570 = 0.143

The total suspended solids remaining after treatment is 14.3%. Therefore, 85.7% of the total suspended solids will be removed after discharge from Wet Pond #1 & #2.

From Wet Swale #1

Parking Lot Sweeping:	5%		
Deep Sump Catch Basin:	25%		
Sediment Forebay & Wet Swale #1:	70%		
Vegetated Filter Strip:	10%		
Parking Lot Sweeping:	1.00 x 5% = 0.050	→	1.00 – 0.05 = 0.950
Deep Sump Catch Basin:	0.95 x 25% = 0.238	→	0.95 – 0.238 = 0.713
Sediment Forebay & Wet Swale #1:	0.713 x 70% = 0.499	→	0.713 – 0.499 = 0.214
Vegetated Filter Strip:	0.214 x 10% = 0.021	→	0.214 – 0.021 = 0.193

The total suspended solids remaining after treatment is 19.3%. Therefore, 80.7% of the total suspended solids will be removed after discharge from Wet Swale #1.

From PFES-11 & PFES-12

Parking Lot Sweeping:	5%		
Deep Sump Catch Basin:	25%		
Stormceptor 450I:	80%		
Parking Lot Sweeping:	1.00 x 5% = 0.050	→	1.00 – 0.05 = 0.950
Deep Sump Catch Basin:	0.95 x 25% = 0.238	→	0.95 – 0.238 = 0.713
Stormceptor 450I:	0.713 x 80% = 0.570	→	0.713 – 0.570 = 0.143

The total suspended solids remaining after treatment is 14.3%. Therefore, 85.7% of the total suspended solids will be removed after discharge from PFES-11 & PFES-12.

From Infiltration Basin #1

Parking Lot Sweeping:	5%		
Deep Sump Catch Basin:	25%		
Sediment Forebay & Infiltration Basin #1:	80%		
Parking Lot Sweeping:	1.00 x 5% = 0.050	→	1.00 – 0.05 = 0.950
Deep Sump Catch Basin:	0.95 x 25% = 0.238	→	0.95 – 0.238 = 0.713
Sediment Forebay & Infiltration Basin #1:	0.713 x 80% = 0.570	→	0.713 – 0.570 = 0.143

The total suspended solids remaining after treatment is 14.3%. Therefore, 85.7% of the total suspended solids will be removed after discharge from Infiltration Basin #1.

As illustrated above, a SWPPP has been prepared and is included with this letter to address the long term source control and pollution prevention, the BMP's have been appropriately sized to address the prescribed Water Quality Volumes and the stormwater management system has been designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS), and therefore, the system complies with Standard 4.

Standard 5: *For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.*

Not Applicable.

Standard 6: *Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors.*

Not Applicable.

Standard 7: *A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

Not Applicable.

Standard 8: *A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.*

Seekamp Environmental Consultants has prepared and provided a Stormwater Pollution Prevention Plan (SWPPP) with this letter to address the requirements of the anticipated Construction General Permit to be issued by the EPA, as well as Standard 8 and a portion of Standard 4.

Standard 9: *A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.*

A Long-Term Operation and Maintenance Plan has been prepared by this office and is included with this letter to address Standard 9.

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

No illicit discharges are proposed to the stormwater management system.

Supporting calculations of the summaries provided above, the Long Term Operations and Maintenance Plan and the Stormwater Report Checklist are provided on the following pages. If you have any questions or comments, or would like to discuss this information in further detail, please do not hesitate to contact me at (603) 275-5369.

Very Truly Yours,

CIVIL DESIGN CONSULTANTS, INC.

James E. Hanley, PE
President