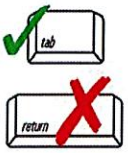
Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

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Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

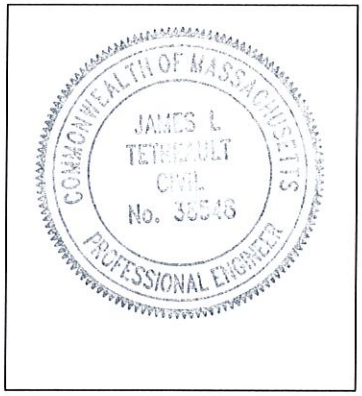
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



9/16/2024
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☒ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

☐ is within the Zone II or Interim Wellhead Protection Area

☐ is near or to other critical areas

☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)

☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☒ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☒ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☒ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☒ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☒ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☒ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

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Stormwater Management Standard #1
Computations to show that discharges will not cause scour or erosion

The project will have two new discharges. One will be a discharge from an 8" hdpe pipe conveying roof runoff onto a 3 foot diameter riprap splash pad. The other is a stone lined swale carrying surface runoff around the proposed garages and a French drain discharge.

From the enclosed Supplemental Drainage Report, the peak 100 year storm flow from that stone swale is 13.38 cfs. And the cross-sectional area of the swale is 3.0 sq.ft. (versus 3.14 sq.ft. for a 24" pipe). Using the Connecticut DOT's drainage manual, table 11.13.1, these characteristics are right at the edge of where the table calls for an 18 foot long riprap splash pad. So, we designed ours to that dimension, being flat and 18 feet long and 18 feet wide at the downstream end with the surface made up of 100 pound pieces. A detail was added to sheet D2.

In the 100 year storm event, the peak flow from the 8"HDPE discharging roof runoff will be 2.81 cfs. That flow and an 8" pipe are off the charts of table 11.13.1 so we are using a preformed scour hole instead. Our stone lined scour hole will be one foot deep so it is type 2 according to figure 11-15 and the hole must be 9 discharge pipe diameters or 6 feet long and 8 pipe diameters or 5.3 feet wide. A detail of the preformed scour hole was added to sheet D2.

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Stormwater Management Standard #2
Peak Rate Attenuation

The Drainage Report dated 9-16-2024 shows that the postdevelopment condition after the installation of the proposed drainage system will result in no abutting property receiving a higher peak rate of flow than it did in the predevelopment condition.

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Stormwater Management Standard #3
65% of impervious surfaces being recharged

Looking only at Lot 4B, on which the proposed apartment building will be located, there will be a total of 77,710 square feet of impervious surface created among roofs, parking spaces, driving aisles and walks.

Runoff from 39,299 square feet of impervious surface from roofs, sidewalks and PICP block surfaces will be infiltrated. This is 50.6% of impervious surfaces. The existing facility has no infiltration. And it is because of the grades of the existing parking area surfaces make collection and infiltration of runoff infeasible that the Applicant cannot reach the 65% standard. It is because this is a redevelopment project.

There are areas of 14,000 square feet due west of the proposed building and 7,000 square feet off the northwest corner of the proposed building, below elevation 266 that we cannot capture and infiltrate due to existing grades.

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Stormwater Management Standard #3
Required Recharge Volume calculation

There will be a total of 77,710 square feet of impervious surface area on Lot 4B in the postdevelopment condition. All of it will lie over Paxton and Woodbridge series soils categorized as hydrologic soil group "C" soils.

So, the required recharge volume is:
77,710 s.f. x (1/12 foot/inch) x (0.25 inches) = 1,619 cubic feet

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Stormwater Management Standard #3
Sizing the Recharge BMP

The required recharge volume at 120 Turnpike Road will be 1,619 cubic feet or 0.037 acre feet. We can see from the Static Method that the proposed infiltration volume within the stone filled reservoirs beneath the permeable interlocking concrete paving (PICP)block covered surface can easily handle this volume.

For instance, in the 2 year storm, the three stone filled reservoirs modeled as ponds 112, 122 and 132 store maximums of 2,975, 251 and 435 cubic feet, respectively or 3,661 total or double the required recharge volume and none of the three are even half full at any time during that storm event.

72 Hour Drawdown

To confirm that the PICP block covered area will completely drain within 72 hours we will apply the entire required recharge volume to just the smallest of the three, pond 122 and show that it will drain in less than 72 hours.

The observed soil texture at all three ponds was a sandy loam.

The formula to confirm this is:

Time = Rv/(K)(Bottom Area)
= (1,619 cubic feet)/((1.02 inches/hour)(3,626 square feet))
= (1,619 cubic feet)/((1.02 inches/hour)(1/12 feet per inch)(3,626 square feet))
= (1,619)/(308)
= 5.3 hours

This is much less than the maximum 72 hour drawdown time and therefore adequate.

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Stormwater Management Standard #4
Water Quality

The water quality volume for this site is based on 1 inch depth.

So, water quality volume = (1/12 feet per inch) * (77,710 s.f. impervious surface)
= 6,476 cubic feet.

The storage volume within the stone layers beneath the PICP block surface will be multiples of this volume. In the 100 year storm event, maximum storage utilized at ponds 112, 122 and 132 will be 13,985 cubic feet, 1,160 cubic feet and 1,918 cubic feet, respectively, for a total of 17,063 cubic feet or more than 2.5 times the water quality volume.

As to the removal of total suspended solids(TSS), the Applicant will improve one existing discharge by installing a model 2015 CDS stormwater filtration unit between an existing structure and its discharge into the pond to improve TSS removal.

For the runoff from that portion of the existing parking lot, the calculation is as follows: First, 25% of TSS is removed by deep sump catch basins leaving 75% of TSS remaining. Then 80% of that is removed by the CDS unit (.75 -(.80x.75) leaving 18.75% which means that 81.25% TSS removal of TSS is achieved in that portion of the runoff.

For the runoff captured by the PICP block surface and flowing into the underlying stone, the New Jersey best management practices manual allows an 80% TSS removal rate if certain design standards are met which we believe our design fulfills.

DEP forms are attached.

CONTECH ENGINEERED SOLUTIONS

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Parameter Brief

Removal of Suspended Solids using the CDS® System – Laboratory Evaluations

The CDS® system is a hydrodynamic separator which uses patented continuous deflective separation (CDS) technology to separate and capture trash, debris, sediment and oil and grease from stormwater runoff. Indirect screening allows for 100% removal of floatables and neutrally buoyant material without blinding the screen. Flow and screening controls separate captured solids and minimize resuspension of previously captured pollutants.

The CDS system can effectively capture 100% of particulate material, including trash and debris, greater than screen aperture size (2400 or 4700 microns). In addition, the CDS can remove medium and coarse sediments. A full-scale laboratory evaluation of the CDS system using test materials with various particle size distributions is summarized here.

Laboratory Study – Full-Scale Evaluation at University of Florida

A full-scale CDS unit (Model CDS2020-5B) was tested at the facility of University of Florida, Gainesville, FL. This full-scale CDS unit was evaluated under controlled laboratory conditions of pumped influent and the controlled addition of sediment.

Two different gradations of silica sand material (UF Sediment & OK-110) were used in the CDS performance evaluation. The particle size distributions (PSD) of the test materials were analyzed using standard method "Gradation ASTM D-422 with Hydrometer" by a certified laboratory. UF Sediment is a mixture of three different U.S. Silica Sand products referred as: "Sil-Co-Sil 106", "#1 DRY" and "20/40 Oil Frac". Particle size distribution analysis shows that the UF Sediment has a very fine gradation (d_{50} = 20 to 30 µm) covering a wide size range (uniform coefficient C_u averaged at 10.6). In comparison with the hypothetical TSS gradation specified in the NJDEP (New Jersey Department of Environmental Protection) and NJCAT (New Jersey Corporation for Advanced Technology) protocol for lab testing, the UF Sediment covers a similar range of particle size but with a finer d_{50} (d_{50} for NJDEP is approximately 50 µm) (NJDEP, 2003). The OK-110 silica sand is a commercial product of U.S. Silica Sand. The particle size distribution analysis of this material, also included in Figure 1, shows that 99.9% of the OK-110 sand is finer than 250 microns, with a mean particle size (d_{50}) of 106 microns. The PSDs for the test material are shown in Figure 1.

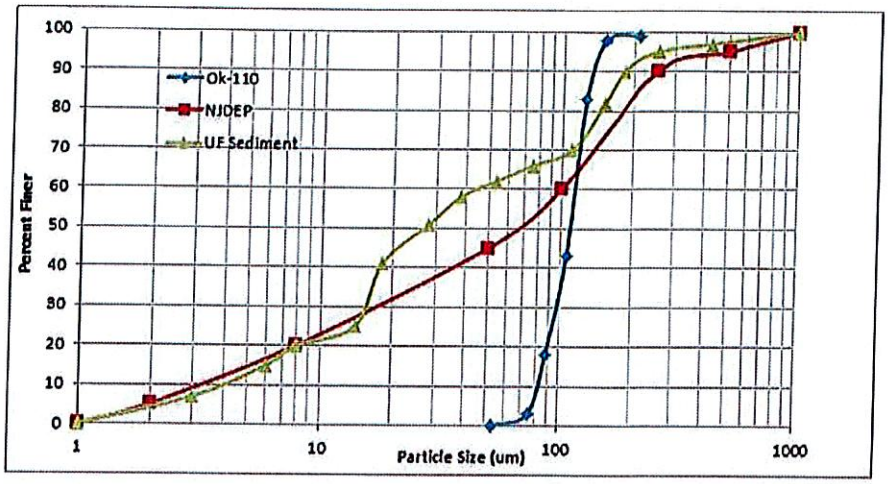

Figure 1. Particle size distributions for the test materials, as compared to the NJCAT/NJDEP theoretical distribution.

Tests were conducted to quantify the CDS unit (1.1 cfs design capacity) performance at various flow rates, ranging from 1% up to 125% of the design capacity of the unit, using the 2400 micron screen. All tests were conducted with controlled influent concentrations approximately 200 mg/L. Effluent samples were taken at equal time intervals across the entire duration of each test run. These samples were then processed with a Dekaport Cone sample splitter to obtain representative sub-samples for Suspended Sediment Concentration (SSC – ASTM Standard Method D3977-97) and particle size distribution analysis.

Results and Modeling

Based on the testing data from the University of Florida, a performance model was developed for the CDS system. A regression analysis was used to develop a fitting curve for the scattered data points at various design flow rates. This model, which demonstrated good agreement with the laboratory data, can then be used to predict CDS system performance with respect to SSC removal for any particle size gradation assuming sandy-silt type of inorganic components of SSC. Figure 2 shows CDS predictive performance for two typical particle size gradations (NJCAT gradation and OK-110 sand).

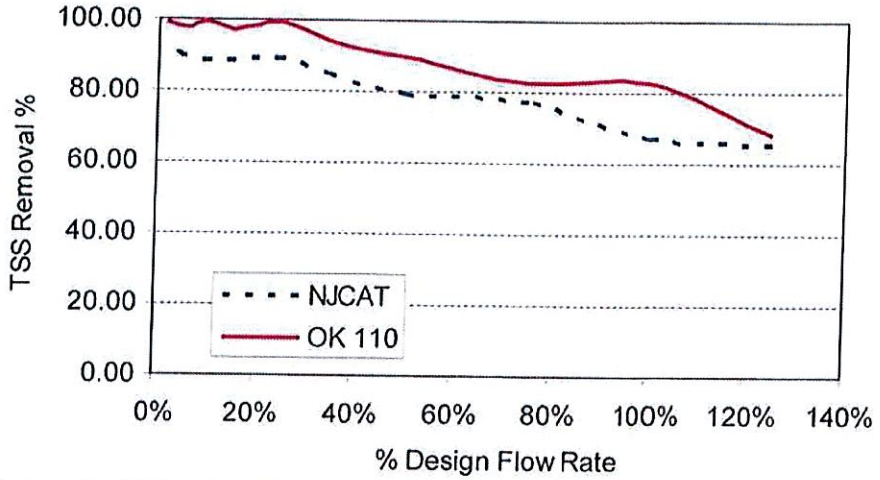

Figure 2. CDS stormwater treatment predictive performance for various particle gradations as a function of operating rate.

Many regulatory jurisdictions set a performance standard for hydrodynamic devices by stating that the devices shall be capable of achieving an 80% removal efficiency for particles having a mean particle size (d_{50}) of 125 microns (WADOE, 2008). The model can be used to calculate the expected performance of such a PSD (shown in Figure 3). Supported by the laboratory data, the model indicates (Figure 4) that the CDS system with 2400 micron screen achieves approximately 80% removal at 100% of design flow rate, for this particle size distribution (d_{50} = 125 µm).

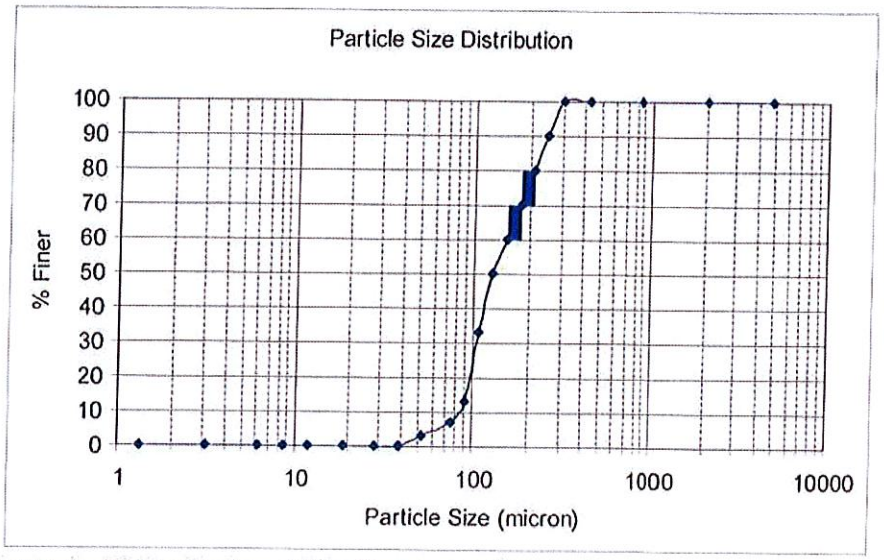

Figure 3. PSD with d_{50} = 125 microns, used to model performance for Ecology submittal.

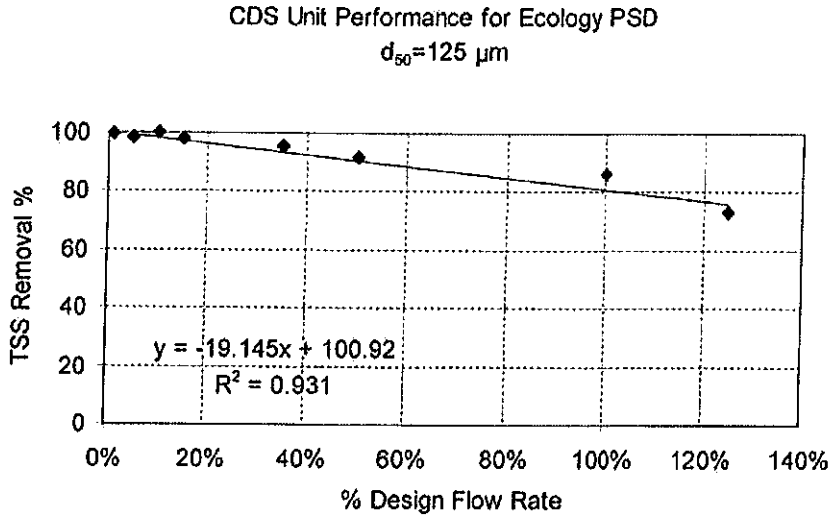

Figure 4. Modeled performance for CDS unit with 2400 microns screen, using Ecology PSD.

References:

New Jersey Department of Environmental Protection (NJDEP). (2003). Total Suspended Solids Laboratory Testing Procedures (December 23, 2003).

Washington State Department of Ecology (WADOE). (2008). Guidance for Evaluating Emerging Stormwater Treatment Technologies: Technology Assessment Protocol—Ecology (TAPE) (Publication Number 02-10-037). Olympia, Washington: Author. Available Online: www.ecy.wa.gov/biblio/0210037.html

INSTRUCTIONS:

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Non-automated: Mar. 4, 2008

TSS Removal Calculation Worksheet

Location: FLOW TO POND FROM EXISTING CB

A BMP[1]	B TSS Removal Rate[1]	C Starting Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
DEEP SUMP CATCH BASIN	25%	1.00	0.25	0.75
CDS MODEL 2015	80%	0.75	0.60	0.15

Total Removal = 85%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 120 TURNPIKE RD

Prepared By: JAMES TETREAULT

Date: 9-16-2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Non-automated: Mar. 4, 2008

Location: PICP SURFACE AT NEW BUILDING

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
PICP SURFACE WITH INFILTRATION POND BELOW	80	1.00	0.80	0.20

Total Removal = 80%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 120 TURNPIKE RD

Prepared By: JAMES TETREAULT

Date: 9-16-2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Non-automated: Mar. 4, 2008

Location: PICP SURFACE AT NEW BUILDING

PHOSPHORUS Removal Calculation Worksheet

A BMP[1]	P ~~TSS~~ B Removal Rate[1]	C Starting Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
INFILTRATION BELOW PICP	0.95	1.00	0.95	0.05

Total Removal = 95%

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 120 TURNPIKE RD

Prepared By: JAMES TETREAULT

Date: 9-16-2024

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

EXPEDITED ENGINEERING, LLC
Civil Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 300, Southborough, Massachusetts 01772
Telephone (508) 399-9993 james@expeditedengineers.com

Stormwater Management Standard #5
Land Uses with Higher Potential Pollutant Loads

The proposed residential use of the site is not considered to constitute a land use with higher potential pollutant loading.

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Telephone (508) 399-9993 james@expeditedengineering.com

Stormwater Management Standard #6
Critical Areas

This project will include discharge to the outstanding resource water of the reservoir watershed. The peak rate of flow and quality of discharge will be managed in accordance with DEP's stormwater management standards.

AZIMUTH LAND DESIGN, LLC
Civil Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 200, Southborough, Massachusetts 01772
Telephone (508) 485-0137 jamest@azimuthlanddesign.co

Stormwater Management Standard #7
Redevelopment

The proposed development will constitute a mix of new development, in the areas presently wooded, and redevelopment of this property. Because we are dealing with the existing grades of the parking area south of 120 Turnpike Road, we are unable to meet the 65% infiltration requirement of Standard #3. In addition, we will not be able to meet standard #4's requirement of 80%TSS removal on the existing drainage system.

EXPEDITED ENGINEERING, LLC
Civil Engineers & Erosion Control Specialists
118 Turnpike Road, Suite 300, Southborough, Massachusetts 01772
Telephone (508) 399-9993 james@expeditedengineers.com

Stormwater Management Standard #8
Construction Period Controls

Erosion and sediment control measures are shown on the Site Plans and a construction sequence is outlined on detail sheet D4 as well as descriptions of the proposed application of various bmp's. Construction period and long term operation and maintenance plans are also included in this filing.

Construction Phase Stormwater Inspection Report

General Information			
Project Name	120 Turnpike Road, Southborough, MA		
Date of Inspection		**Start/End Time**	
Inspector's Name(s)			
Inspector's Title(s)			
Inspector's Contact Information			
Inspector's Qualifications			
Describe present status of construction			
Describe crews and work occurring on the site today			

Type of Inspection:
❑ Regular ❑ Pre-storm event ❑ During storm event ☐ Post-storm event

Weather Information

Has there been a storm event since the last inspection? ❑Yes ☐No
If yes, provide:
Storm Start Date & Time: Storm Duration (hrs): Approximate Amount of Precipitation (in):

Weather at time of this inspection?
☐ Clear ❑Cloudy ❑ Rain ❑ Sleet ❑ Fog ❑ Snowing ❑ High Winds
❑ Other: Temperature:

Have any discharges occurred since the last inspection? ❑Yes ☐No
If yes, describe:

Are there any discharges at the time of inspection? ☐❑Yes ❑No
If yes, describe:
Normal detention basin outflow

Site-specific BMPs

- *Number the structural and non-structural BMPs identified in your SWPPP on your site map and list them below (add as many BMPs as necessary). Carry a copy of the numbered site map with you during your inspections. This list will ensure that you are inspecting all required BMPs at your site.*
- *Describe corrective actions initiated, date completed, and note the person that completed the work in the Corrective Action Log.*

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
1	Sedimentation control barrier at perimeter of work area	☐Yes ❑No	❑Yes ☐No	
2	Temporary Sediment Basins	☐Yes ❑No	☐Yes ❑No	

	BMP	BMP Installed?	BMP Maintenance Required?	Corrective Action Needed and Notes
3	Site Entrance Mat(s)	❑Yes ☐No	❑Yes ❑No	
4	Diversion swales	☐Yes ❑No	❑Yes ☐No	
5	Diversion dikes	❑Yes ☐No	❑Yes ❑No	
6	Interior sedimentation control barriers at TSBs	❑Yes ☐No	❑Yes ❑No	
7	Temporary stabilization ground cover	❑Yes ☐No	❑Yes ❑No	
8	Stockpiles (covers and perimeter controls)	❑Yes ☐No	❑Yes ❑No	
9	Temporary settling basin outlet controls	☐Yes ❑No	❑Yes ☐No	
10	Flocculants and jute mesh	☐Yes ❑No	❑Yes ☐No	
11	Infiltration structures	☐Yes ❑No	❑Yes ☐No	
12	Permanent slope stabilization	☐Yes ❑No	☐Yes ❑No	
13	CDS units	☐Yes ❑No	❑Yes ☐No	
14	Catch basins	☐Yes ❑No	☐Yes ❑No	.
15		❑Yes ❑No	❑Yes ❑No	
16		❑Yes ❑No	❑Yes ❑No	
17		❑Yes ❑No	❑Yes ❑No	
18		❑Yes ❑No	❑Yes ❑No	
19		❑Yes ❑No	❑Yes ❑No	
20		❑Yes ❑No	❑Yes ❑No	

Overall Site Issues

Below are some general site issues that should be assessed during inspections. Customize this list as needed for conditions at your site.

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
1	Are all slopes and disturbed areas not actively being worked properly stabilized?	☐Yes ❑No	☐Yes ❑No	
2	Are natural resource areas (e.g., streams, wetlands, mature trees, etc.) protected with barriers or similar BMPs?	☐Yes ❑No	❑Yes ☐No	
3	Are perimeter controls and sediment barriers adequately installed (keyed into substrate) and maintained?	☐Yes ❑No	❑Yes ☐No	

	BMP/activity	Implemented?	Maintenance Required?	Corrective Action Needed and Notes
4	Are the infiltration structures properly protected from receiving silt laden runoff?	☐Yes ☐No	☐Yes ☐No	
5	Is the infiltration trench properly protected from receiving silt laden runoff?	☐Yes ☐No	☐Yes ☐No	
6	Is the construction exit preventing sediment from being tracked into the street?	☐Yes ☐No	☐Yes ☐No	
7	Is trash/litter from work areas collected and placed in covered dumpsters?	☐Yes ☐No	☐Yes ☐No	
8	Are washout facilities (e.g., paint, stucco, concrete) available, clearly marked, and maintained?	☐Yes ☐No	☐Yes ☐No	
9	Are vehicle and equipment fueling, cleaning, and maintenance areas free of spills, leaks, or any other deleterious material?	☐Yes ☐No	☐Yes ☐No	
10	Are materials that are potential stormwater contaminants stored inside or under cover?	☐Yes ☐No	☐Yes ☐No	
11		☐Yes ☐No	☐Yes ☐No	
12	(Other)	☐Yes ☐No	☐Yes ☐No	

Non-Compliance

Describe any incidents of non-compliance not described above or areas needing attention:

CERTIFICATION STATEMENT

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Print name and title: _____

Signature: _____ **Date:** _____

CONSTRUCTION PERIOD (SHORT TERM)
STORMWATER OPERATION & MAINTENANCE PROGRAM
September 16, 2024

120 Turnpike Road, Southborough, Massachusetts

Currently Owned by:
FD 120 Turnpike, LLC

During Construction the contractor is responsible for the following inspection and maintenance. Inspections and resulting maintenance tasks shall be recorded in an Inspection Log that is kept on site and available for inspection by Town, State, and Federal officials.

Contractor Information:

Contractor/Operator: TBD

Address: _____

Contact Name and Phone Number: Chris Champagne (508)523-4003

1. Water tightness of moved or replace catch basin sumps shall be tested and assured after installation.

2. Nearby catch basins on Lot 4A shall be protected from sedimentation through haybale filter dikes, filter fabric sacks, or other approved methods. At all times, sedimentation of the infiltration system shall be prohibited and prevented.

3. Catch basin grates shall be inspected monthly. Debris, sand, and accumulated trash shall be removed from inlets.

4. Catch basins shall be inspected bi-weekly and shall be cleaned out as necessary, when the siltsacks or sumps have accumulated one half (1/2) the original depth. If excessive oil, gasoline, or sediment is present, remove all liquid and solids from the sumps. If catch basins are regularly observed to have a sheen of petroleum product, install oil adsorbent materials that float on the surface Dispose of waste properly. Catch basin sumps shall be cleaned out quarterly. Catch basin traps shall be inspected after each cleaning, and any damage shall be repaired.

5. The CDS unit and the PICP block paved area shall be inspected at least monthly and shall be cleaned out as necessary. Cleanout shall be recorded in the maintenance log. Dispose of waste properly.

6. The area that shall eventually be covered with a PICP block surface must be kept free of sediment and shall not be used as a temporary settling area or for discharge of excavation dewatering.

7. The stone layers beneath the PICP block surface area shall be observed through inspection ports monthly for any sign of sediment laden water, backup, or contamination. The Engineer shall be notified if any of these conditions are observed.

8. The owner's designee shall inspect the systems, and the contractor shall clean all components as necessary (e.g. by removing the siltsacks, sediment, and sand) in order to turn over to the owner a clean and functioning system.

George Bahnan

_____ Owner, FD 120 Turnpike, LLC

POST CONSTRUCTION (LONG TERM)
STORMWATER OPERATION & MAINTENANCE PROGRAM
September 16, 2024

120 Turnpike Road, Southborough, Massachusetts

Owner and Applicant:

FD 120 Turnpike, LLC
118 Turnpike Road, Suite 300, Southborough, MA 01772
Contact: Chris Champagne Phone: 508-523-4003

Upon completion of the project, the Lot 4B drainage system will be maintained by the owner. Once the construction site has been fully stabilized, the owner should establish a schedule and keep a log of inspection and maintenance activities for the measures described below:

Landscape Maintenance:

Vegetated areas in the landscape will reduce erosion, encourage infiltration of rainwater, and keep stormwater clean. It is important to maintain the vegetated areas of the site.

1. Proper mowing is one of the most important ways to maintain a healthy lawn. Mow only when the grass is dry to get a clean cut and minimize the spread of disease. Mow grass to a height of 3". Mow frequently, cutting no more than 1/3 of the height of the grass at a time. Sharpen your mower blades after every 10 hours of mowing.

2. Grass clippings contain high amounts of nitrogen, a key ingredient in fertilizer. Make all attempts to use your grass clippings by leaving them on your lawn. If the grass clippings are not used, do not dispose of them near any wetlands and or water bodies and designate a place to compost them in an upland area.

3. If your lawn areas and plant material demand fertilizer then use only low phosphorous fertilizers. Fertilize in the fall, but in coordination with weather patterns.

4. The best defense against pests within the grass is to use an Integrated Pest Management system which consists of beneficial insects (lady bugs, spiders, certain nemetodes and bacteria.)

5. Minimize watering the lawn areas. If needed water in the early morning and water deeply and infrequently.

6. If needed, the trees and shrubs shall be pruned but at a minimum of once a year.

Impervious Surface Maintenance:

Particles that collect on paved surfaces can contain materials that can inhibit water quality. Sweeping sand and debris from the parking lot is a good housekeeping measure that will remove gross pollutants, and should be undertaken a minimum of twice per year. DEP recommends frequent sweeping of parking lots in high traffic areas as an integral part of stormwater management.

1. The parking lots shall be swept at least twice a year.

2. Accumulated leaves and grass clippings shall also be removed from the impervious surfaces at a minimum of twice a year

3. In the winter months, CaCl application shall be limited to the amount necessary to prevent sand from freezing. Sand shall be used sparingly but in sufficient quantity to maintain the parking and loading surface in a safe condition.

Catch Basins:

Catch basins with oil traps and deep sumps are the first line of defense to prevent pollutants from reaching water resources. Regular maintenance and cleaning of the catch basins is key to protecting water quality and can reduce the more expensive maintenance of other devices in the treatment train.

1. If excessive oil, gasoline, or sediment is present, remove all liquid and solids from the sumps. Absorbent products are available to attach to the interior of catch basins in order to absorb floatable petroleum products from sumps. If floatables are noted on a regular basis, these measures should be added to the catch basin sumps. Dispose of waste properly.

2. Catch basin grates shall be inspected on a monthly basis. Debris, sand, vegetation, and accumulated trash shall be removed and disposed of properly.

3. Catch Basin sumps shall be inspected on a monthly basis for the first year and quarterly thereafter, and will be cleaned upon the observance of spill of observable petroleum products, such as oil, coolant, or fuel. Dispose of waste properly.

4. If a spill of any harmful substance occurs on the surface of the parking area, the catch basin shall be protected against contamination by the use of a dike or absorbent material. Adequate quantities of absorbent material shall be stored in an accessible location. An emergency spill kit containing absorbent material should be kept in an area accessible to the parking lot.

5. In any case Catch Basin sumps shall be cleaned of sand and liquid at least twice per. Dispose of waste properly.

6. Catch basin traps shall be inspected after each cleaning, and any damaged shall be repaired.

Hydrodynamic Separator (CDS Unit):

The CDS unit removes floatable trash, petroleum products, and sediments from the stormwater in order to prevent them from reaching the water supply. They must be inspected and cleaned periodically to be sure they are operating properly.

1. The separator shall be inspected at a minimum of two times a year (i.e. spring and fall).

2. The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions to the inlet and or separation screen.

3. If during the inspection, it is noticed that any of the internal components are damaged or missing, contact CONTECH 1-800-338-2211.

4. The inspection should also identify evidence of vector infestation (mosquito larvae, for example) and accumulation of hydrocarbons, trash, and sediment in the system and the screen.

5. The screen shall be power washed and the unit's internal components cleaned when the level of sediment reached 75% of capacity in the isolated sump and/or when an appreciable level of hydrocarbons and trash has accumulated.

6. A vactor truck is recommended for cleanout of the CDS unit. Disposal of the material from the CDS unit should be in accordance with the local municipality's requirements.

7. Clean the treatment units during dry weather conditions when no flow is entering the system. Remove debris, sand, and accumulated trash from the units' interiors and remove fines from the screens.

8. The CDS Unit is a confined spaces and only properly trained personnel possessing the proper training and possess the necessary safety equipment should enter the units. Confined spaces can contain odorless, colorless poison gas.

In Ground Detention/Infiltration System

The stone beneath the PICP block surface constitutes an infiltration system. It will keep the peak rate of flow of runoff from this project from exceeding the peak rate of flow of runoff to abutting properties in the predevelopment condition. It must be

inspected to make sure that debris has not entered the stone beneath the PICP blocks and also that the spaces between the blocks are not clogged and preventing runoff from infiltrating through to stone layers below.

1. The in ground detention system shall be inspected at least two times per year at the inspection ports. Look for debris, hydrocarbons or signs that runoff is not infiltrating down from the stone layers.
2. The inspection should also include looking for any signs of damage to or deformation of the blocks or their upheaval or being excessively affected by freeze thaw action. precast concrete modules. If water, trash, sediment or other material has visibly entered into the system, report this to the owner or property manager so that maintenance can be scheduled.
3. The PICP surface should be inspected at least twice per year with each inspection including viewing the surface during or immediately after a rain event to determine if the interstitial spaces between blocks are clogged in any area. Standing water for 15 minutes after a rain event shall constitute evidence that the interstitial spaces are clogged. Cleaning shall include manual removal of sediment with a wire brush and manual sweeping and/or use of various vacuuming methods. Jointing stones between blocks shall be replenished ASAP.
4. The PICP surface shall also be inspected if landscaping and vegetation maintenance activities have brought mulch, soil or sand onto the site and if fall shedding of leaves from trees is at its peak.
5. If, during the inspection, it is noticed that any components of the in ground detention systems are damaged or missing, contact the owner, property manager and the manufacturer.

There will be no on site storage of waste products. Waste generated on site will be normal residential waste and will be disposed of in dumpsters.

The apartment management will prohibit vehicle washing on site.

The management company will not use sodium based de-icing agents. The application of sand in winter will be

George Bahnan
---------- Owner, FD 120 Turnpike, LLC

EXPEDITED ENGINEERING, LLC
Civil Engineers & Erosion Control Specialists
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Telephone (508) 399-9993 james@expeditedengineers.com

Stormwater Management Standard #9
Construction Period Controls

A post construction Operation and Maintenance Plan is included in this filing.

EXPEDITED ENGINEERING, LLC
Civil Engineers & Erosion Control Specialists
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Telephone (508) 399-9993 james@expeditedengineers.com

Stormwater Management Standard #10
Prevention of illicit discharges

The applicant will have a prohibition against residents making illicit discharges into the site's drainage system written into leases.

Commonwealth of Massachusetts
City/Town of Southborough

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

FD 120 Turnpike, LLC
Owner Name

120 Turnpike Road
Street Address

37/0120
Map/Lot #

Southborough
City

MA
State

01772
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

DH's 12&13
August 7, 2024

2. Soil Survey Available? ☒ Yes ☐ No If yes: Web soil survey (Source) 310B (Soil Map Unit)

Woodbridge
Soil Name

severe
Soil Limitations

Till
Soil Parent material

uncertain
Landform

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes: _____ (Year Published/Source) _____ (Map Unit)

Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer: _____ (Wetland Type)

7. Current Water Resource Conditions (USGS): 8/7/24 (Month/Day/ Year) Range: ☐ Above Normal ☐ Normal ☒ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Southborough

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 12 (Hole #) 8/7/2024 (Date) 8:30 AM (Time) 60° SUNNY (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use LANDSCAPED ISLAND (e.g., woodland, agricultural field, vacant lot, etc.) SOME WEEDS (Vegetation) NONE (Surface Stones (e.g., cobbles, stones, boulders, etc.)) ≈3% (Slope (%))

   Description of Location: OFF SW CORNER OF PROPOSED BUILDING

2. Soil Parent Material: TILL UNCERTAIN (Landform) UNCERTAIN (Position on Landscape (SU, SH, BS, FS, TS))

3. Distances from: Open Water Body 125' feet; Property Line 350' feet; Drainage Way = feet; Drinking Water Well = feet; Wetlands ≈122 feet; Other ____ feet

4. Unsuitable Materials Present: ☑ Yes ☐ No If Yes: ☐ Disturbed Soil ☑ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 96" Depth Weeping from Pit 100" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12"	A FILL	SANDY LOAM	10YR3/2								
12"-102"	FILL	SANDY LOAM	7.5YR8/4				10	5			

Additional Notes:
- NO REFUSAL, STOPPED DUE TO RECOGNIZING SLIGHT WEEPING
- FAIRLY CONSISTENT COLOR BUT CLEARLY FILL
- NO MOTTLING

Commonwealth of Massachusetts
City/Town of Southborough

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 13 (Hole #) 8/7/24 (Date) 8:50 AM (Time) 60° SUNNY (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use: EDGE OF PARKING AREA (e.g., woodland, agricultural field, vacant lot, etc.) GRASS AND BRUSH (Vegetation) SOME COBBLES (Surface Stones (e.g., cobbles, stones, boulders, etc.) 30% AT SOUTH END OF HOLE (Slope (%)

Description of Location: AT SE CORNER OF PARKING AREA

2. Soil Parent Material: TILL UNCERTAIN (Landform) UNCERTAIN (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body 165' feet; Property Line 160' feet; Drainage Way ____ feet; Drinking Water Well ____ feet; Wetlands ≈160 feet; Other ____ feet

4. Unsuitable Materials Present: ☑ Yes ☐ No If Yes: ☐ Disturbed Soil ☑ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 120" Depth Weeping from Pit; 123" Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10"	A FILL	SANDY LOAM	10YR3/2								
10"-127"	FILL	SANDY LOAM	7.5YR8/4				10	5			

Additional Notes: – NO REFUSAL, STOPPED DUE TO RECOGNIZING SLIGHT WEEPING
– COLOR TAB SAME AS DH 12
– NO MOTTLING

Commonwealth of Massachusetts
City/Town of Southborough

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 12	Obs. Hole # 13
☑ Depth observed standing water in observation hole	100" inches	123" inches
☑ Depth weeping from side of observation hole	96" inches	120" inches
☑ Depth to soil redoximorphic features (mottles)	NOT OBSERVED inches	NOT OBSERVED inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	____ inches	____ inches

Index Well Number _____ Reading Date _____

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☑ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: 96", 120" inches Lower boundary: _____ inches

Commonwealth of Massachusetts
City/Town of Southborough

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

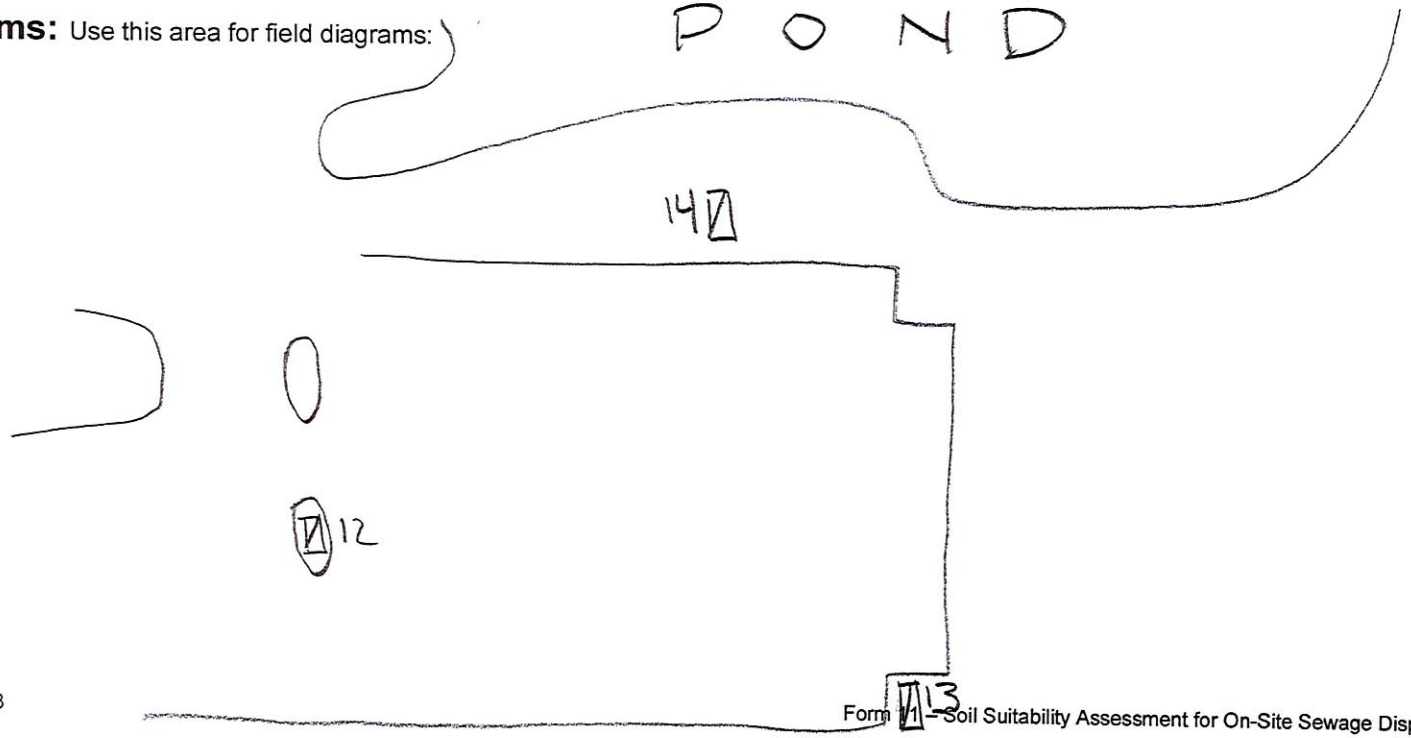
Signature of Soil Evaluator — Date: 8/7/2024

JAMES TETREAULT SE 2421
Typed or Printed Name of Soil Evaluator / License # — Expiration Date of License: JULY 2025

N/A
Name of Approving Authority Witness — Approving Authority: N/A

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:



Commonwealth of Massachusetts
City/Town of Southborough

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

FD 120 Turnpike, LLC
Owner Name

120 Turnpike Road
Street Address

37/0120
Map/Lot #

Southborough
City

MA
State

01772
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

DH 14
8-7-24

2. Soil Survey Available? ☒ Yes ☐ No If yes:

Web soil survey
Source

310B
Soil Map Unit

Woodbridge
Soil Name

severe
Soil Limitations

Till
Soil Parent material

uncertain
Landform

3. Surficial Geological Report Available? ☐ Yes ☒ No If yes:

Year Published/Source

Map Unit

Description of Geologic Map Unit:

4. Flood Rate Insurance Map Within a regulatory floodway? ☐ Yes ☒ No

5. Within a velocity zone? ☐ Yes ☒ No

6. Within a Mapped Wetland Area? ☐ Yes ☒ No If yes, MassGIS Wetland Data Layer:

Wetland Type

7. Current Water Resource Conditions (USGS): 8/7/24
Month/Day/ Year
Range: ☐ Above Normal ☐ Normal ☒ Below Normal

8. Other references reviewed:

Commonwealth of Massachusetts
City/Town of Southborough

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: 14 (Hole #) 8/7/2024 (Date) 9:20 (Time) 62° SUNNY (Weather) ____ (Latitude) ____ (Longitude:)

1. Land Use LAWN OFF PARKING NEAR POND (e.g., woodland, agricultural field, vacant lot, etc.) GRASS (Vegetation) NO (Surface Stones (e.g., cobbles, stones, boulders, etc.) ≈10 (Slope (%)

Description of Location: NORTH OF PARKING NEAR POND

2. Soil Parent Material: TILL UNCERTAIN (Landform) UNCERTAIN (Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body 15' feet; Property Line 250' feet; Drainage Way ____ feet; Drinking Water Well ____ feet; Wetlands 12' feet; Other ____ feet

4. Unsuitable Materials Present: ☑ Yes ☐ No If Yes: ☐ Disturbed Soil ☑ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☑ Yes ☐ No If yes: 36" Depth Weeping from Pit 38' Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-10"	A FILL	SANDY LOAM	10YR 3/2								
10"-48"	FILL	SANDY LOAM	7.5YR 8/4				10	5			

Additional Notes:
- NO REFUSAL, STOPPED UPON RECOGNIZING WEEPING
- SAME COLOR, TEXTURE FILL AS DH'S 12 & 13
- NO MOTTLING

Commonwealth of Massachusetts
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C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: _____ Hole # _____ Date _____ Time _____ Weather _____ Latitude _____ Longitude:

1. Land Use: _____ (e.g., woodland, agricultural field, vacant lot, etc.) _____ Vegetation _____ Surface Stones (e.g., cobbles, stones, boulders, etc.) _____ Slope (%)

   Description of Location: _____

2. Soil Parent Material: _____ _____ Landform _____ Position on Landscape (SU, SH, BS, FS, TS)

3. Distances from: Open Water Body _____ feet Drainage Way _____ feet Wetlands _____ feet
   Property Line _____ feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: _____ Depth Weeping from Pit _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			

Additional Notes: _____

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

D. Determination of High Groundwater Elevation

1. Method Used:

	Obs. Hole # 14	Obs. Hole # _____
☑ Depth observed standing water in observation hole	38" inches	_____ inches
☑ Depth weeping from side of observation hole	36" inches	_____ inches
☑ Depth to soil redoximorphic features (mottles)	NOT OBSERVED inches	_____ inches
☐ Depth to adjusted seasonal high groundwater (S_h) (USGS methodology)	_____ inches	_____ inches

_____ Index Well Number _____ Reading Date

$S_h = S_c - [S_r \times (OW_c - OW_{max})/OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

2. Estimated Depth to High Groundwater: _____ inches

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material

a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?

☐ Yes ☑ No

b. If yes, at what depth was it observed (exclude A and O Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches

c. If no, at what depth was impervious material observed? Upper boundary: 36" inches Lower boundary: _____ inches

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Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107

Signature of Soil Evaluator — Date: 8/7/24

JAMES TETREAULT SE 2421 — Expiration Date of License: JULY 2025

Typed or Printed Name of Soil Evaluator / License #

N/A — Approving Authority: N/A

Name of Approving Authority Witness

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Field Diagrams: Use this area for field diagrams:

SEE SKETCH FOR DIA'S 12&13