DRAINAGE REPORT

SITE REDEVELOPMENT PLAN

107 DODGE STREET
BEVERLY, MASSACHUSETTS
September 23, 2019

SUBMITTED TO:

CITY OF BEVERLY
PLANNING BOARD
191 CABOT STREET
BEVERLY, MA 01919

APPLICANT:

HART'S HILL, LLC
500 CUMMINGS CENTER, SUITE 1550
BEVERLY, MA 01915

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DRAINAGE REPORT NARRATIVE

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Proposed 107 Dodge Street Redevelopment

I. Executive Summary

Hart's Hill LLC, the applicant, proposes to construct a new multifamily redevelopment at 107 Dodge Street in Beverly, Massachusetts. This redevelopment project will consist of relocating the existing historic single family home and constructing two new duplexes and a garage. The project will result in a total of five residential units, and requires Site Plan Review through the Beverly Planning Board. As part of the project permitting, the proponent must demonstrate compliance with applicable stormwater best management practices and regulations. The following drainage narrative contains a description of existing and proposed site conditions, stormwater management design methodology and results summaries and other supplemental information in support of the stormwater best management system design.

II. Existing Site Description

The existing parcel has a land area of 22,969 square feet (SF) and is situated in the Residential 10 zoning district (R-10) with frontage on Dodge Street in Beverly, Massachusetts. The parcel is shown on the City of Beverly Assessor's Map 67 as Lot 94. The parcel currently contains a historic one-story single family home with an addition from 1947 resulting in a total building area of approximately 1,734 SF. The building was last used as a real estate office with a variance obtained in 1967. There are two existing curb cuts on Dodge Street with a paved driveway extending around the building to a parking area in the rear and a paved drive connection in front of the building entrance. The outer edges of the property are undeveloped woods and lawn. The site consists of exclusively uplands, with an offsite wetland behind the property approximately 60 feet from the rear property line. The easterly abutters consist of a multifamily residential parcel and a parking lot, with an undeveloped parcel to the rear. A small strip of land to the west of the site is owned by the City of Beverly and connects to a drainage area further south of the property. Refer to Figure 1: USGS Map and Figure 2: Ortho Map for an illustration of the site and surrounding features.

The property slopes away from the building and is generally flat, with slopes ranging from 1-5%. The site has a high elevation of approximately 102.2 at the front door and a low elevation of approximately 96 on the south west corner of the site bordering the City owned property. The groundcover of the parcel is a mix of grass, roof, pavement and gravel. Storm water from the roof and site drains towards Dodge Street and the offsite wetland. There are no existing stormwater management controls on site. Existing conditions described hereon reflect site conditions as of an on-the-ground survey performed by The Morin-Cameron Group in February of 2019.

Soils on site are considered to be Merrimac – Urban land complex, 0-8 percent slops, Hydrologic Soil Group (HSG) A, (626B) and Freetown muck, 0-1 percent slope, Hydrologic Soils Group (HSG) B/D, as defined in the Soil Resource Report for Essex County, Massachusetts, Southern Part Version 15 dated September 7, 2018 (See Figure 3: SCS Soils Map). Soil testing performed by The Morin-Cameron Group, Inc. on August 27, 2019 confirmed the soil on site to match HSGA, with a groundwater table 7.3 to 7.6 feet below ground surface.

The property is not within the 100 year flood zone according to the FEMA Federal Insurance Rate Map (FIRM) #25009C0409F, dated July 3, 2012 (See Figure 4: FEMA Flood Map).

III. Proposed Site Description

The applicant is proposing to relocate the existing historic single family home from the center of the site to the northwest corner nearest Dodge Street and to construct two additional duplexes and a new 3 car garage. The existing curb cuts will be closed off and a new 20 foot wide curb cut in the middle of the lot will provide access to the driveway for the proposed redevelopment. The northeast building, Building B will have covered porches, walks and surface parking spaces. Building C, located to the southeast will have garage parking within the footprint. The new 3 car garage will serve the existing historic home and duplex B. Each building will have associated landscaping, sidewalks, and parking.

As a result of the reduced driveway width and single access point, the proposed construction will result in a decrease in impervious area of approximately 950 square feet. Stormwater controls on site will include 2 catch basins within the driveway, a drain manhole and an underground infiltration system. The driveways and portions of the roofs will be directed overland toward these catch basins to enter the underground infiltration system. A mini catch basin will serve as an overflow outlet for the system in the 100 year storm event. Other infrastructure associated with the redevelopment of the site will include new water, sewer, electric and gas mains, a new hydrant, and other associated utilities including communications and fiber optic services.

The entire stormwater system was designed in accordance with the Massachusetts Stormwater Management Handbook ("Handbook"), which the City of Beverly references in its regulations. A grading and drainage plan is included in the site redevelopment plan set. The existing watershed characteristics, flow paths and drainage patterns were matched as best as possible in the proposed condition to ensure that there are no adverse impacts to adjacent properties.

IV. Stormwater Management

A. Existing Watershed Characteristics

Stormwater runoff exits the site in the existing condition at two (2) distinct locations. The location where stormwater runoff leaves the site boundary is called the design point ("DP"). DP-2 is located at Dodge Street. DP-1 is located at the rear of the property. The DPs and the tributary watersheds (or subcatchments) are illustrated on Figure 5: Pre-Development Watershed Plan included herein. The table below lists the total area associated with each subcatchment area.

Summary of Existing Subcatchments

Proposed Drainage Area (ES)	Total Area (SF)	% Impervious	Composite Curve Number
E-1	14,009	49.0%	69
E-2	8,960	47.2%	68
TOTAL	**22,969**	**49.5%**	**69**

Description of Existing Subcatchments

The subcatchments analyzed in the existing condition can be described as follows:

- **Subcatchment E-1:** Consists of rear roof, back parking area, landscaping and trees. This area is comprised of grass, trees, pavement and roof and flows overland towards the abutting properties and offsite wetland.
- **Subcatchment E-2:** Consists of the front parking, landscaping and front of the building. This area is comprised of grass, pavement, roof, and grass that flows overland towards the existing closed drainage system in Dodge Street.

B. Proposed Watershed Characteristics

The proposed redevelopment of the site will maintain both design points identified in the existing watershed analysis. The table below provides the total drainage area and the percentage that will be impervious in the post-development condition.

Summary of Proposed Subcatchments

Proposed Drainage Area (PS)	Total Area (SF)	% Impervious	Composite Curve Number
P-1	9,808	84.2%	89
P-2	10,592	19.2%	45
P-3	2,567	3.3%	40
TOTAL	**22,969**	**45.2%**	**66**

Description of Proposed Subcatchments

- **Subcatchment P-1:** Includes the parking area and associated sidewalks and landscape areas, and roof that drain overland to the proposed underground infiltration area.
- **Subcatchment P-2:** Includes the majority of the property edge, mainly grass, sidewalks, and roofs that drain away from the closed systems overland towards the offsite wetland.
- **Subcatchment P-3:** Includes lawn area flowing towards Dodge Street.

C. Hydrologic Analysis:

The purpose of the stormwater analysis is to demonstrate that the proposed redevelopment will not increase the rate of stormwater runoff, will not impact water quality and will provide groundwater recharge. The industry standard for stormwater management design in Massachusetts is governed by the Massachusetts Stormwater Management Handbook published by the Mass Department of Environmental Protection, January 2008. The Beverly Zoning Bylaw and Subdivision Rules and Regulations require applicants to comply with the Handbook standards for redevelopment projects. The Handbook lists 10 standards covering both mitigation and renovation of stormwater runoff. A full discussion on the project compliance with the standards can be found at the end of this report. However, the following section will summarize the projects compliance with the mitigation standards 1 and 2 of the Handbook relating to reducing peak rates of runoff and creating no adverse down gradient impacts.

In order to demonstrate that there will be no downstream impacts as a result of developing the site, a stormwater analysis was performed using the U.S. Soil Conservation Service (S.C.S) method of analysis contained in Technical Release #20 (TR-20) published by the U.S. Conservation Service. The software application HydroCAD was implemented to analyze the pre and post-development watershed conditions. This application is widely used in the civil engineering industry and an accepted means of performing a TR-20 analysis. It is a computer aided design program for analyzing the hydrology and hydraulics of storm water runoff. It

utilizes the latest techniques of both fields to accurately predict the consequences of any given storm event. This analysis allows the engineer to verify that a given drainage system is adequate for the area under consideration, and further allows the engineer to predict where flooding or erosion are most likely to occur. This model was used to analyze the storm drainage system designed for the redevelopment in order to demonstrate that the drainage system is in compliance with the City's Stormwater Management Standards.

The HydroCAD analysis was analyzing both design points described previously. All runoff from the site was presumed to flow back towards the wetland. For all storm events, the proposed peak rate of runoff is less than or equal to the existing runoff rate. The following is a listing of the total pre and post development rates of stormwater runoff for the proposed redevelopment for the 2, 10, and 100 year rainfall events:

Runoff Comparison (CFS) DP-1			
Storm	Existing Conditions	Proposed Conditions	Change in Peak
2-yr	0.20	0.00	0.19
10-yr	0.36	0.03	0.33
100-yr	1.03	0.79	0.24

Runoff Comparison (CFS) DP-2			
Storm	Existing Conditions	Proposed Conditions	Change in Peak
2-yr	0.17	0.00	0.17
10-yr	0.43	0.00	0.43
100-yr	0.85	0.02	0.83

D. Review of Stormwater Management Standards

The redevelopment of 107 Dodge Street in Beverly, Massachusetts will comply with all Stormwater Management Standards and will improve existing conditions. The drainage system has been designed to attenuate peak rates of stormwater. Furthermore, stormwater will be recharged to groundwater through the use of a subsurface infiltration system (1P). Measures will also be implemented to provide the required total suspended solids (TSS) removal. The following is an assessment of each Standard:

1. No stormwater conveyance system discharges untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. There are no proposed stormwater conveyance systems that discharge untreated stormwater from the parking area to the municipal drain system or the wetland.

   The proposed redevelopment meets this standard.

2. The stormwater management system has been designed such that post-development peak rates of runoff do not exceed pre-development rates for all storm events.

   The proposed redevelopment meets this standard.

3. Loss of annual recharge to groundwater has been significantly reduced through the proposed addition of subsurface infiltration measures. Additionally, the proposed design reduces the impervious area on site. The annual recharge from the post development site exceeds the annual recharge from the pre development site.
   The proposed redevelopment meets this standard.

4. The proposed stormwater management system has been designed to remove a minimum of 80% of the average annual post-construction load of Total Suspended Solids (TSS). The treatment train of catch basins, drain manhole, and underground infiltration system will provide more than 80% removal of TSS. The roof runoff in considered clean and therefore does not need to meet this requirement.
   The proposed redevelopment meets the standard.

5. Land Uses with Higher Potential Pollutant Load.
   This standard does not apply.

6. Discharges to critical areas.
   This standard does not apply.

7. Redevelopment Projects: The development of the building and parking area reduces the impervious area on site. However, the project as designed fully complies with the stormwater standards.
   The proposed redevelopment meets the standard.

8. A Construction Phase Operation and Maintenance Plan: A Stormwater Pollution Prevention Plan following the EPA guidelines under the National Pollutant Discharge Elimination System is not required since the disturbed land is less than an acre.
   The proposed redevelopment meets this standard.

9. A long-term operation and maintenance plan: A long-term O&M has been prepared to provide guidance for future owners to inspect and maintain the stormwater management systems in perpetuity. A copy of this O&M plan is included herein.
   The proposed redevelopment meets this standard.

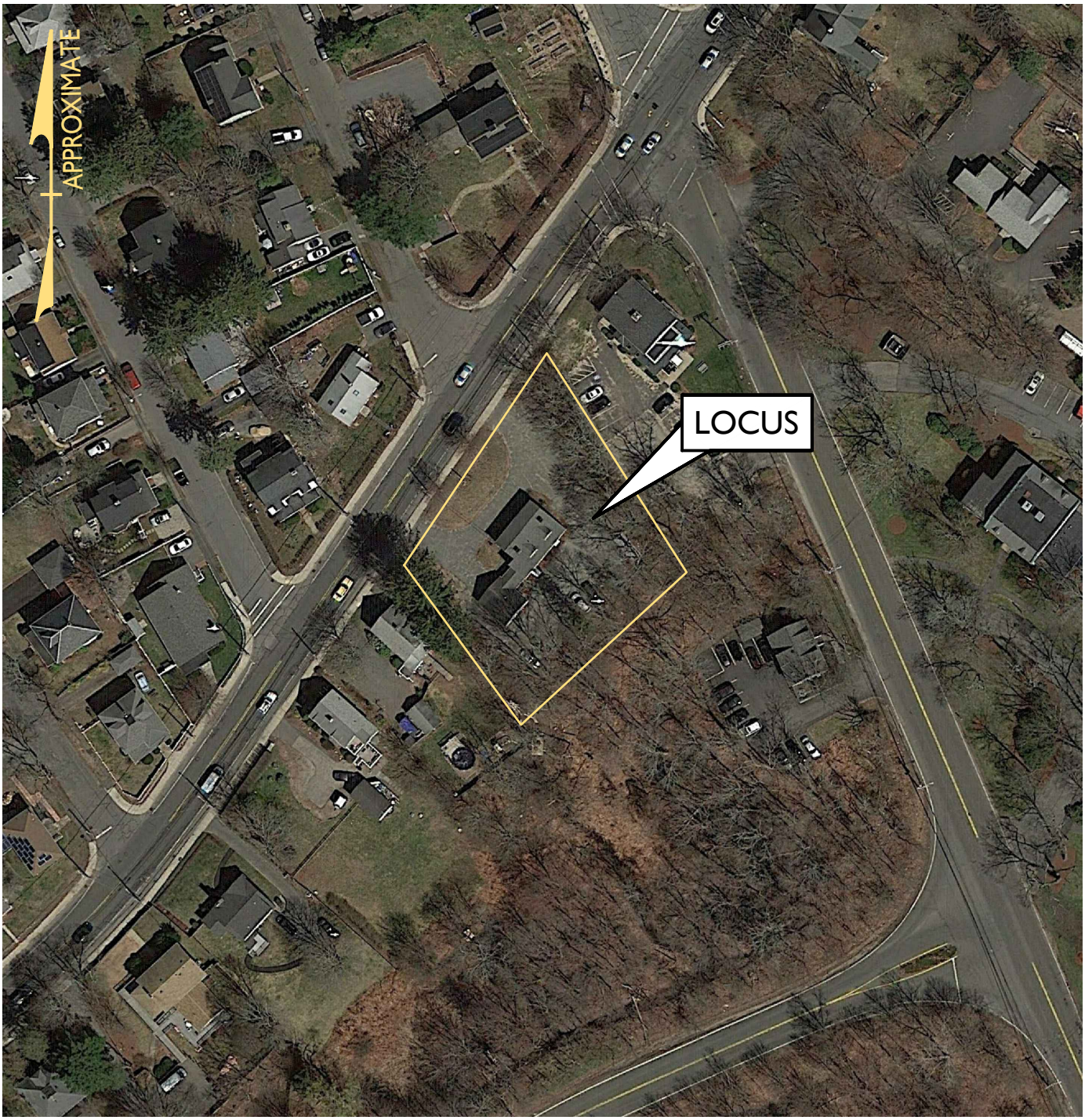
10. Illicit discharges: To the best of our knowledge and belief there are no illicit discharges to the stormwater management system on this site. A certification is included herein.
    The proposed redevelopment meets this standard.

IV. Conclusion

The project at 107 Dodge Street, as proposed, is in full compliance with the City of Beverly Stormwater Standards and the MassDEP Stormwater Management Handbook. Peak rates of stormwater runoff leaving the site under proposed conditions are less than under existing conditions. Recharge to groundwater will be increased by adding an underground infiltration system and reducing impervious cover. There are no illicit discharges to the waters of the Commonwealth. The DEP Checklist for Stormwater Report is attached.

For questions regarding this Drainage Report, please contact The Morin-Cameron Group, Inc. between the hours of 8:30am to 4:30pm at (978) 777-8586.

FIGURES



ORTHO IMAGERY OBTAINED FROM GOOGLE EARTH

0 50 100 500

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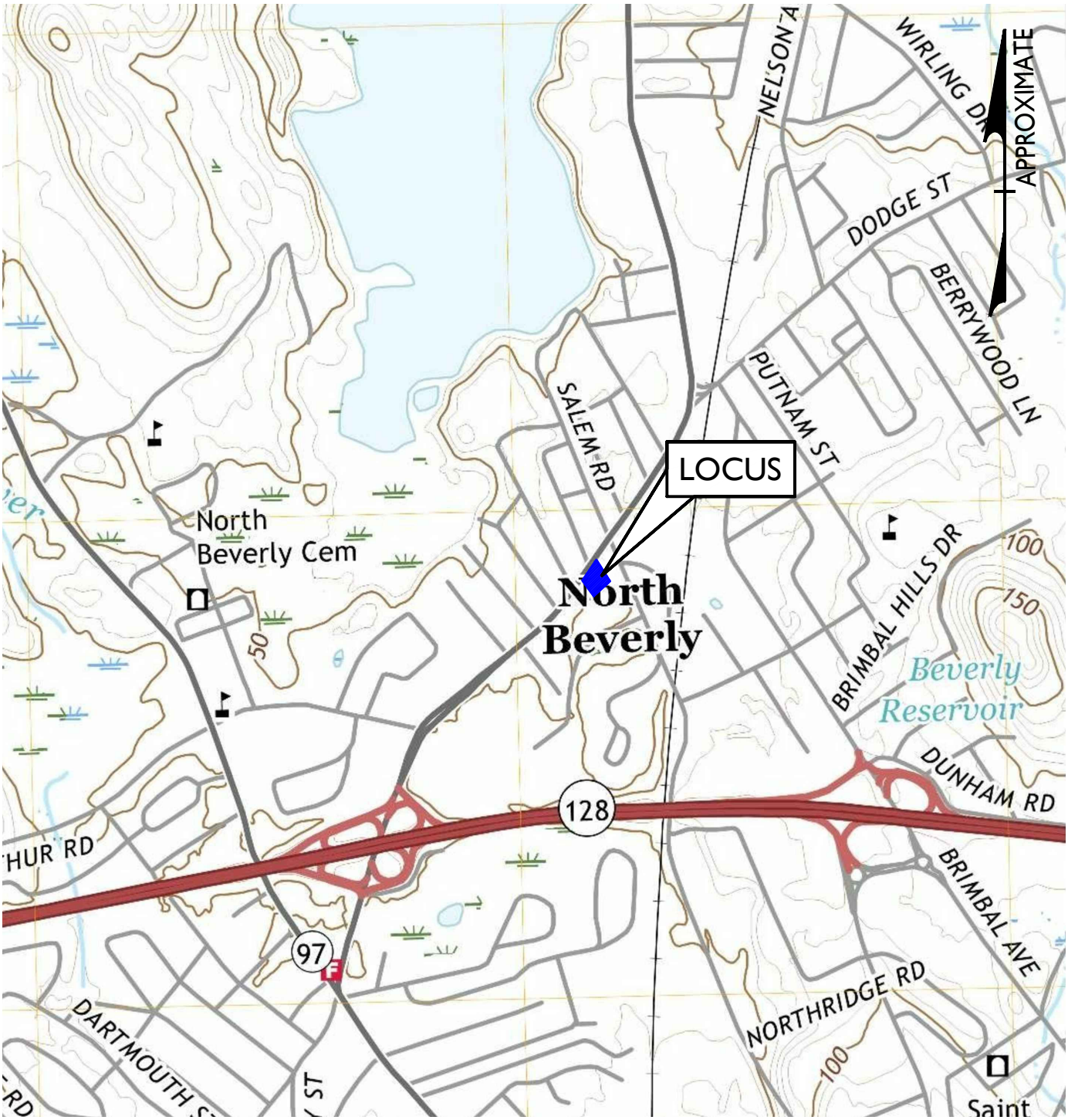
ORTHO MAP
107 DODGE STREET
IN
BEVERLY, MA

DATE: SEPTEMBER 23, 2019

Scale: 1" = 100'

FIGURE #1



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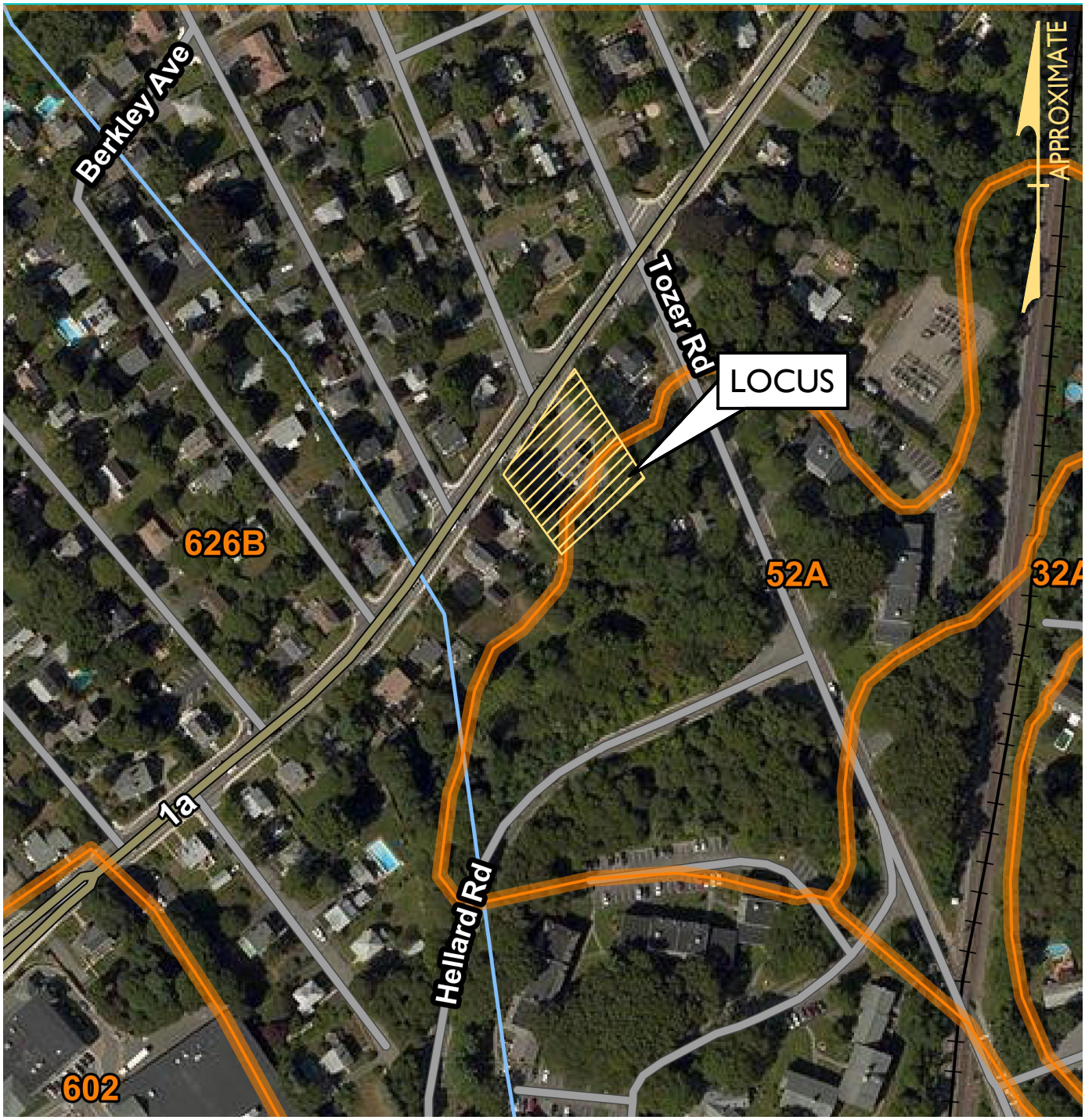
USGS LOCUS MAP
107 DODGE STREET
IN
BEVERLY, MA

DATE: SEPTEMBER 23, 2019

Scale: 1" = 1000'

FIGURE #2



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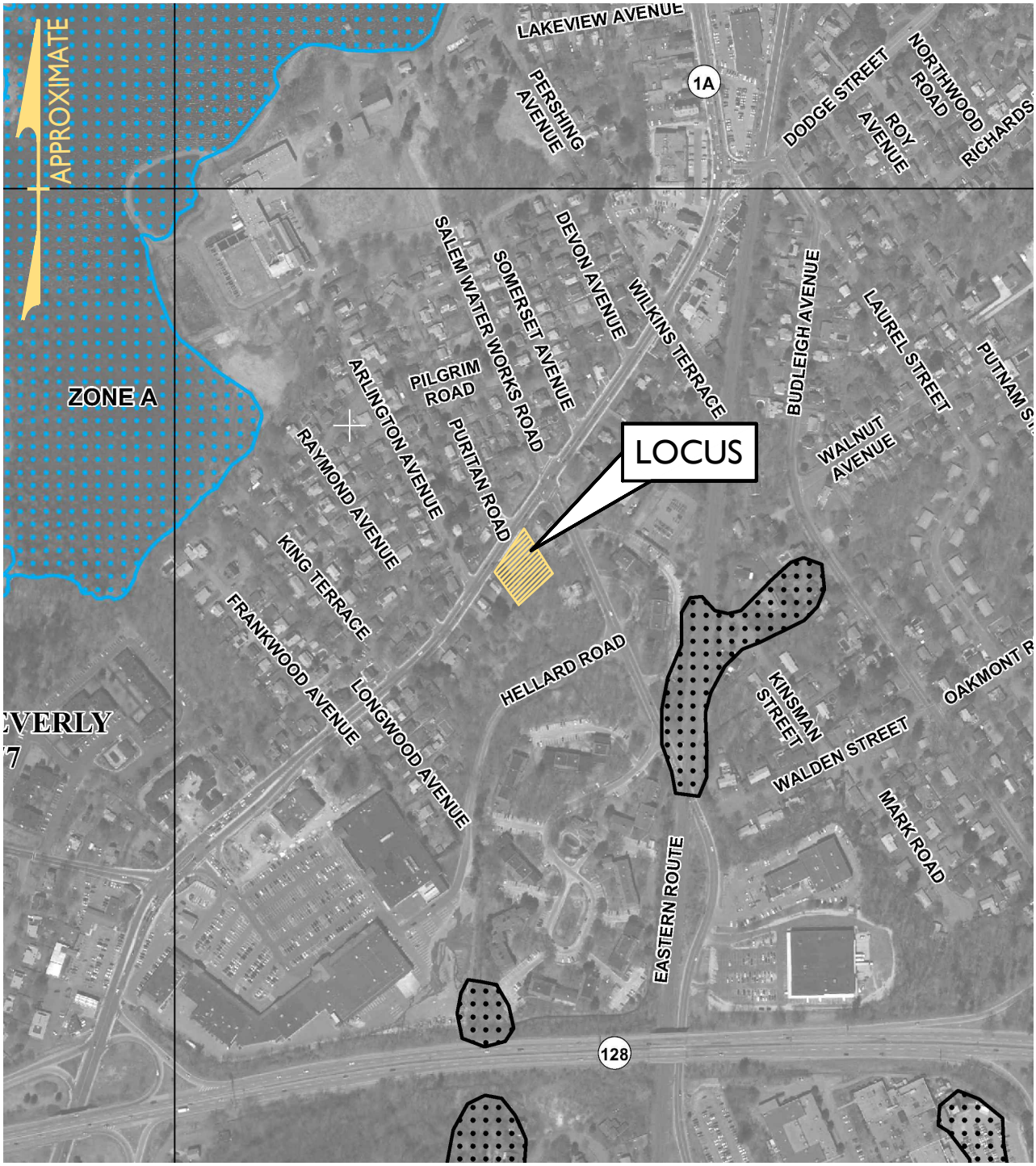
SCS SOILS MAP
107 DODGE STREET
IN
BEVERLY, MA

DATE: SEPTEMBER 23, 2019

Scale: 1" = 200'

FIGURE #3



FEMA FLOOD MAP NO. 25009C0409F

0 250 500 1,000

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FEMA FLOOD MAP
107 DODGE STREET
IN
BEVERLY, MA

DATE: SEPTEMBER 23, 2019

Scale: 1" = 500'

FIGURE #4

PLAN

SCALE: 1" = 20'

0 10 20 40

DP-1

#107 DODGE STREET
AREA=22,970± SF
ASSESSOR'S MAP 67 LOT 94

EXISTING BUILDING
#107

E1

E2

DECK

BULKHEAD

WINDOW WELL (TYP.)

GAS METER

BOLLARD

HVAC

ENT. ELEV.=101.6

ENT. ELEV.=102.2

ELEC METER

ROOF DRAIN (TYP.)

RCP DRAIN OUTLET (INV. 93.62)

ALIGNMENT OF EXIST. DRAIN PIPE UNKNOWN

APPROX. MANHOLE LOCATION (RECORD)

ALIGNMENT OF EXIST. DRAIN PIPE UNKNOWN

18" RCP (RECORD)

EMH

CONC SIDEWALK

VGC

CB RIM=99.3

CB RIM=98.2

D

DODGE STREET
(ROUTE 1A)
(PUBLIC - 50' WIDTH)

DP-2

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FIGURE 5
DATE: 9/23/2019
SCALE: 1"=20'

EXISTING WATERSHED PLAN
AT:
107 DODGE STREET
BEVERLY, MASSACHUSETTS

PROJ. #3816

PLAN

SCALE: 1" = 20'

0 10 20 40

#107 DODGE STREET
AREA=22,970± SF
ASSESSOR'S MAP 67 LOT 94

DP-1

DP-2

1P

P-1

P-2

P-3

IS-1

FFE=102.75

FFE=101.25

GARAGE=100.75

FFE=103.25

FFE=102.33

GARAGE=100.4

19-1

19-3

19-4

CB-1 99.4 FG

CB-2 100.02 FG

CB-3 98.6 FG

DMH

100.72 FG

100.89 FG

100.36 FG

100.49 FG

100.15 FG

100.12 FG

100.96 FG

100.64 FG +

100.45 FG

100.85 FG

100.81 FG

HIGH POINT

PROP. FLOW ARROW (TYP.)

APPROX. MANHOLE LOCATION (RECORD)

CONC SIDEWALK

VGC

CB RIM=99.3

CB RIM=98.2

DODGE STREET
(ROUTE 1A)
(PUBLIC - 50' WIDTH)

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FIGURE 6
DATE: 9/23/2019
SCALE: 1"=20'

PROPOSED WATERSHED FIGURE
AT:
107 DODGE STREET
BEVERLY, MASSACHUSETTS

PROJ. #3816

APPENDIX A:

MASSDEP STORMWATER

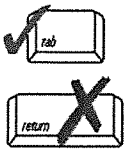
MANAGEMENT REPORT CHECKLIST

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.

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

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.

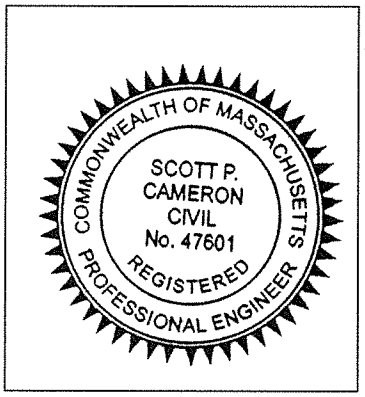
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



9-23-19
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): Subsurface Infiltration System

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;

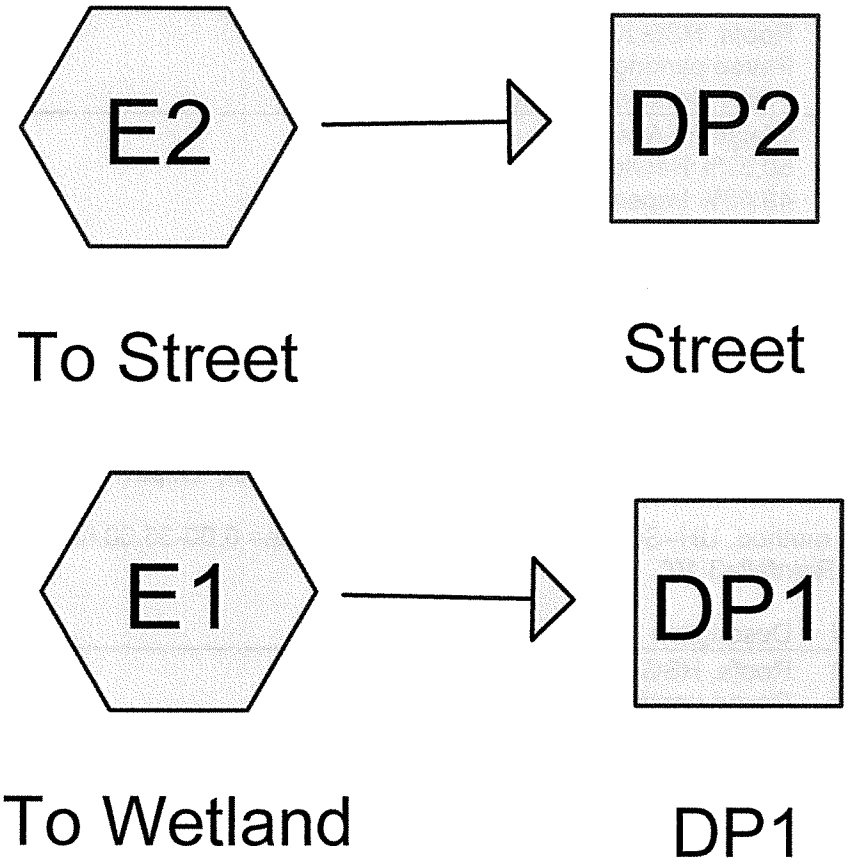
☒ An Illicit Discharge Compliance Statement is attached;

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

APPENDIX B:

EXISTING CONDITIONS

HYDROLOGIC ANALYSIS



Subcat Reach Pond Link

Routing Diagram for 3816 Existing HydroCAD
Prepared by Microsoft, Printed 9/18/2019

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2: Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 10,243 sf, 49.55% Impervious, Inflow Depth = 0.72" for 2-Year event
Inflow = 0.17 cfs @ 12.10 hrs, Volume= 618 cf
Outflow = 0.17 cfs @ 12.10 hrs, Volume= 618 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2: Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 10,243 sf, 49.55% Impervious, Inflow Depth = 1.60" for 10-Year event
Inflow = 0.43 cfs @ 12.09 hrs, Volume= 1,368 cf
Outflow = 0.43 cfs @ 12.09 hrs, Volume= 1,368 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP2: Street

[40] Hint: Not Described (Outflow=Inflow)

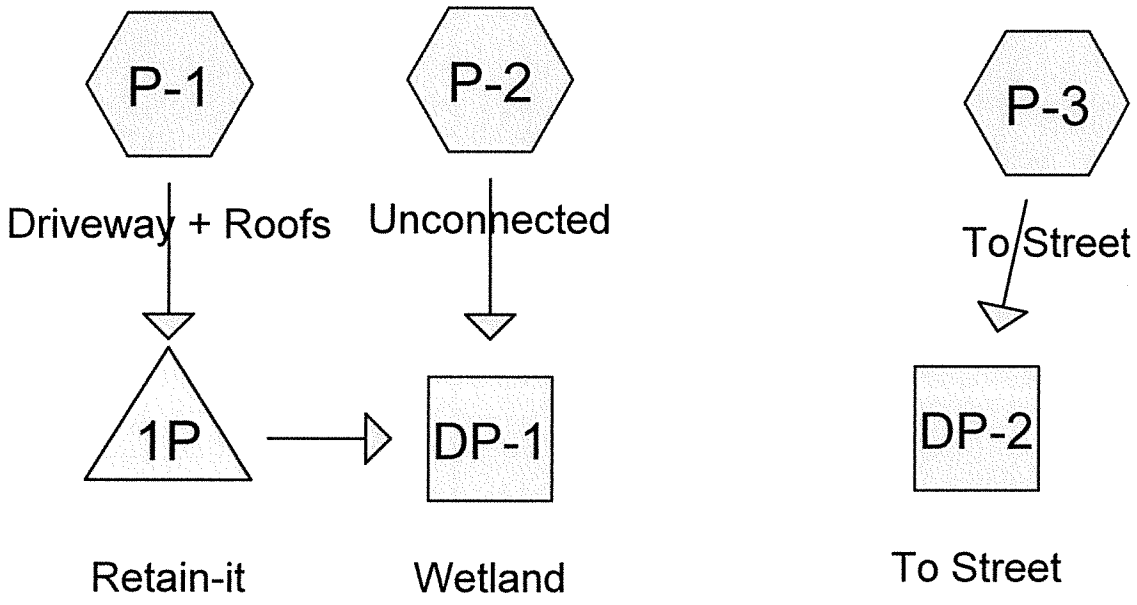
Inflow Area = 10,243 sf, 49.55% Impervious, Inflow Depth = 3.11" for 100-Year event
Inflow = 0.85 cfs @ 12.09 hrs, Volume= 2,653 cf
Outflow = 0.85 cfs @ 12.09 hrs, Volume= 2,653 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

APPENDIX C:

PROPOSED CONDITIONS

HYDROLOGIC ANALYSIS



Subcat Reach Pond Link

Routing Diagram for 3816 Proposed HydroCAD
Prepared by Microsoft, Printed 9/20/2019

Summary for Subcatchment P-1: Driveway + Roofs

Runoff = 0.52 cfs @ 12.09 hrs, Volume= 1,627 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
1,552	39	>75% Grass cover, Good, HSG A
4,682	98	Paved parking, HSG A
752	98	Paved parking, HSG A
2,822	98	Unconnected roofs, HSG A
9,808	89	Weighted Average
1,552		15.82% Pervious Area
8,256		84.18% Impervious Area
2,822		34.18% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Summary for Subcatchment P-2: Unconnected

Runoff = 0.00 cfs @ 15.62 hrs, Volume= 29 cf, Depth= 0.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Adj	Description
8,557	39		>75% Grass cover, Good, HSG A
2,035	98		Unconnected roofs, HSG A
10,592	50	45	Weighted Average, UI Adjusted
8,557			80.79% Pervious Area
2,035			19.21% Impervious Area
2,035			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Summary for Subcatchment P-3: To Street

Runoff = 0.00 cfs @ 24.01 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Adj	Description
2,483	39		>75% Grass cover, Good, HSG A
84	98		Unconnected pavement, HSG A
2,567	41	40	Weighted Average, UI Adjusted
2,483			96.73% Pervious Area
84			3.27% Impervious Area
84			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Summary for Reach DP-1: Wetland

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 20,400 sf, 50.45% Impervious, Inflow Depth = 0.02" for 2-Year event
Inflow = 0.00 cfs @ 15.62 hrs, Volume= 29 cf
Outflow = 0.00 cfs @ 15.62 hrs, Volume= 29 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP-2: To Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,567 sf, 3.27% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.01 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 24.01 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Retain-it

Inflow Area = 9,808 sf, 84.18% Impervious, Inflow Depth = 1.99" for 2-Year event
Inflow = 0.52 cfs @ 12.09 hrs, Volume= 1,627 cf
Outflow = 0.08 cfs @ 11.71 hrs, Volume= 1,627 cf, Atten= 85%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.71 hrs, Volume= 1,627 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 95.82' @ 12.59 hrs Surf.Area= 420 sf Storage= 487 cf

Plug-Flow detention time= 40.0 min calculated for 1,627 cf (100% of inflow)
Center-of-Mass det. time= 40.0 min (852.3 - 812.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.00'	251 cf	**10.00'W x 42.00'L x 4.67'H Field A** 1,960 cf Overall - 1,333 cf Embedded = 627 cf x 40.0% Voids
#2A	94.50'	930 cf	**retain_it 3.5'** x 5 Inside #1 Inside= 84.0"W x 42.0"H => 25.10 sf x 8.00'L = 200.8 cf Outside= 96.0"W x 50.0"H => 33.33 sf x 8.00'L = 266.7 cf 1 Rows adjusted for 73.7 cf perimeter wall
#3	98.00'	50 cf	**4.00'D x 2.00'H Vertical Cone/Cylinder** x 2 -Impervious
		1,231 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	94.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	98.60'	**24.0" Horiz. Mini Catch Basin** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 11.71 hrs HW=94.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=94.00' (Free Discharge)
↑—**2=Mini Catch Basin** (Controls 0.00 cfs)

Summary for Subcatchment P-1: Driveway + Roofs

Runoff = 0.85 cfs @ 12.09 hrs, Volume= 2,693 cf, Depth= 3.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Description
1,552	39	>75% Grass cover, Good, HSG A
4,682	98	Paved parking, HSG A
752	98	Paved parking, HSG A
2,822	98	Unconnected roofs, HSG A
9,808	89	Weighted Average
1,552		15.82% Pervious Area
8,256		84.18% Impervious Area
2,822		34.18% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Summary for Subcatchment P-2: Unconnected

Runoff = 0.03 cfs @ 12.37 hrs, Volume= 261 cf, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Adj	Description
8,557	39		>75% Grass cover, Good, HSG A
2,035	98		Unconnected roofs, HSG A
10,592	50	45	Weighted Average, UI Adjusted
8,557			80.79% Pervious Area
2,035			19.21% Impervious Area
2,035			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Summary for Subcatchment P-3: To Street

Runoff = 0.00 cfs @ 13.78 hrs, Volume= 29 cf, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (sf)	CN	Adj	Description
2,483	39		>75% Grass cover, Good, HSG A
84	98		Unconnected pavement, HSG A
2,567	41	40	Weighted Average, UI Adjusted
2,483			96.73% Pervious Area
84			3.27% Impervious Area
84			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Summary for Reach DP-1: Wetland

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 20,400 sf, 50.45% Impervious, Inflow Depth = 0.15" for 10-Year event
Inflow = 0.03 cfs @ 12.37 hrs, Volume= 261 cf
Outflow = 0.03 cfs @ 12.37 hrs, Volume= 261 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP-2: To Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,567 sf, 3.27% Impervious, Inflow Depth = 0.14" for 10-Year event
Inflow = 0.00 cfs @ 13.78 hrs, Volume= 29 cf
Outflow = 0.00 cfs @ 13.78 hrs, Volume= 29 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Retain-it

Inflow Area = 9,808 sf, 84.18% Impervious, Inflow Depth = 3.30" for 10-Year event
Inflow = 0.85 cfs @ 12.09 hrs, Volume= 2,693 cf
Outflow = 0.08 cfs @ 11.55 hrs, Volume= 2,693 cf, Atten= 91%, Lag= 0.0 min
Discarded = 0.08 cfs @ 11.55 hrs, Volume= 2,693 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 97.47' @ 12.95 hrs Surf.Area= 420 sf Storage= 992 cf

Plug-Flow detention time= 95.0 min calculated for 2,692 cf (100% of inflow)
Center-of-Mass det. time= 95.0 min (893.1 - 798.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.00'	251 cf	**10.00'W x 42.00'L x 4.67'H Field A** 1,960 cf Overall - 1,333 cf Embedded = 627 cf x 40.0% Voids
#2A	94.50'	930 cf	**retain_it 3.5'** x 5 Inside #1 Inside= 84.0"W x 42.0"H => 25.10 sf x 8.00'L = 200.8 cf Outside= 96.0"W x 50.0"H => 33.33 sf x 8.00'L = 266.7 cf 1 Rows adjusted for 73.7 cf perimeter wall
#3	98.00'	50 cf	**4.00'D x 2.00'H Vertical Cone/Cylinder** x 2 -Impervious
		1,231 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	94.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	98.60'	**24.0" Horiz. Mini Catch Basin** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 11.55 hrs HW=94.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=94.00' (Free Discharge)
↑—**2=Mini Catch Basin** (Controls 0.00 cfs)

Summary for Subcatchment P-1: Driveway + Roofs

Runoff = 1.32 cfs @ 12.08 hrs, Volume= 4,267 cf, Depth= 5.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Description
1,552	39	>75% Grass cover, Good, HSG A
4,682	98	Paved parking, HSG A
752	98	Paved parking, HSG A
2,822	98	Unconnected roofs, HSG A
9,808	89	Weighted Average
1,552		15.82% Pervious Area
8,256		84.18% Impervious Area
2,822		34.18% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Summary for Subcatchment P-2: Unconnected

Runoff = 0.20 cfs @ 12.12 hrs, Volume= 892 cf, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Adj	Description
8,557	39		>75% Grass cover, Good, HSG A
2,035	98		Unconnected roofs, HSG A
10,592	50	45	Weighted Average, UI Adjusted
8,557			80.79% Pervious Area
2,035			19.21% Impervious Area
2,035			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Summary for Subcatchment P-3: To Street

Runoff = 0.02 cfs @ 12.15 hrs, Volume= 142 cf, Depth= 0.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (sf)	CN	Adj	Description
2,483	39		>75% Grass cover, Good, HSG A
84	98		Unconnected pavement, HSG A
2,567	41	40	Weighted Average, UI Adjusted
2,483			96.73% Pervious Area
84			3.27% Impervious Area
84			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct**

Summary for Reach DP-1: Wetland

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 20,400 sf, 50.45% Impervious, Inflow Depth = 0.90" for 100-Year event
Inflow = 0.79 cfs @ 12.20 hrs, Volume= 1,536 cf
Outflow = 0.79 cfs @ 12.20 hrs, Volume= 1,536 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Reach DP-2: To Street

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,567 sf, 3.27% Impervious, Inflow Depth = 0.66" for 100-Year event
Inflow = 0.02 cfs @ 12.15 hrs, Volume= 142 cf
Outflow = 0.02 cfs @ 12.15 hrs, Volume= 142 cf, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs

Summary for Pond 1P: Retain-it

Inflow Area = 9,808 sf, 84.18% Impervious, Inflow Depth = 5.22" for 100-Year event
Inflow = 1.32 cfs @ 12.08 hrs, Volume= 4,267 cf
Outflow = 0.71 cfs @ 12.20 hrs, Volume= 4,254 cf, Atten= 46%, Lag= 7.0 min
Discarded = 0.08 cfs @ 11.04 hrs, Volume= 3,610 cf
Primary = 0.63 cfs @ 12.20 hrs, Volume= 644 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 98.70' @ 12.20 hrs Surf.Area= 420 sf Storage= 1,198 cf

Plug-Flow detention time= 105.9 min calculated for 4,254 cf (100% of inflow)
Center-of-Mass det. time= 103.9 min (889.5 - 785.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	94.00'	251 cf	**10.00'W x 42.00'L x 4.67'H Field A** 1,960 cf Overall - 1,333 cf Embedded = 627 cf x 40.0% Voids
#2A	94.50'	930 cf	**retain_it 3.5'** x 5 Inside #1 Inside= 84.0"W x 42.0"H => 25.10 sf x 8.00'L = 200.8 cf Outside= 96.0"W x 50.0"H => 33.33 sf x 8.00'L = 266.7 cf 1 Rows adjusted for 73.7 cf perimeter wall
#3	98.00'	50 cf	**4.00'D x 2.00'H Vertical Cone/Cylinder** x 2 -Impervious
		1,231 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	94.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	98.60'	**24.0" Horiz. Mini Catch Basin** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.08 cfs @ 11.04 hrs HW=94.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.61 cfs @ 12.20 hrs HW=98.70' (Free Discharge)
↑—**2=Mini Catch Basin** (Weir Controls 0.61 cfs @ 1.01 fps)

APPENDIX D:

SUPPLEMENTAL STORMWATER MANAGEMENT CALCULATIONS

Stormwater Management Calculations

STANDARD 3: Recharge To Groundwater: Static Method

(On site only)

- Calculate Impervious Area
  (From HydroCAD Model)

  Existing Impervious Area HSG D Soil = 11,371 SF
  Proposed Impervious Area HSG D Soil = 10,323 SF
  Increase in Impervious Area= 10,323 – 11,371 = -1,048 = 0

- Determine Rainfall Depth to be Recharged
  (MassDEP Stormwater Management Handbook: Table 2.3.2)

Hydrologic Soil Group	Recharge Rainfall Depth
A	0.60"

- Calculate Recharge Volume Required
  'Rv' = [0.60" x 0 SF] = 0 SF
  'Rv' = [0 SF] / 12 SF-In =0 CF
  'Rv' **= 0 CF**

- Capture Area Adjustment
  Schedule of Areas Tributary to Recharge Systems

HCAD System ID	Tributary Impervious Area
IS-1	11,371
Total:	**11,371 sf**

Total Impervious Area = 11,371 SF

- Calculate Provided Recharge
  Schedule of Proposed Recharge System Volumes

HCAD System ID	Bottom of System	Lowest System Outlet or Top of Galley	Total Recharge Volume Provided
1P	94.0	98.60	1,193
		Total Volume: 1,193 CF	

Recharge volume provided measured to lowest system outlet.

Required Recharge Volume Summary of Results

Total Volume Provided Below Outlet = 1,192 CF
Total Volume Required = 0 CF

Verify Drawdown, Maximum 72-Hours: Static Method

HCAD System ID	Recharge Volume (CF)	Bottom Surface Area (SF)	Rawls Rate Inches/Hour	Drawdown Time Rv / (K x A) - Hours	Description
1P	1,193	420	8.27	4.12	Infiltration System

Design Complies with Recharge Volume Standard*

Weighted Runoff Coefficients "C" for Rational Method

THE MORIN-CAMERON GROUP, INC.

66 Elm Street
Danvers, MA 01923
P: (978) 777-8586
F: (978) 774-3488
W: www.morincameron.com

C'- Coefficients

Pervious Soil	0.35
Impervious	0.9

Description of Area CB-1	Area (acres)	Runoff Coefficient	A x C
Pervious	0.030	0.35	0.01
Impervious	0.047	0.90	0.04
Totals =	**0.077**		0.05

Weighted Runoff Coefficient = **S(AxC) / SA = 0.69**

Description of Area CB-2	Area (acres)	Runoff Coefficient	A x C
Pervious	0.030	0.35	0.01
Impervious	0.118	0.90	0.11
Totals =	**0.148**		0.12

Weighted Runoff Coefficient = **S(AxC) / SA = 0.79**

VERIFY PIPE CAPACITY-10 YEAR STORM

Pipe Sizing Calculation Spreadsheet:

THE MORIN-CAMERON GROUP, INC.
66 Elm Street
Danvers, MA 01923
P: (978) 777-8586
F: (978) 774-3488
W: www.morincameron.com

Name: 107 Dodge Street
Location: 107 Dodge Street
Beverly, MA
County: Essex County
Owner: Harts Hill, LLC

Proj. No.: 3816
Date: 9/23/2019
Revised:
Computed by: Annie Raftery
Checked by: Scott P, Cameron, P.E.

Design Parameters:
IDF Curve
100 **Year Storm** Boston, MA
k_e= **0.2**

DESCRIPTION	LOCATION		AREA (AC.)	C	C x A	SUM C x A	FLOW TIME (MIN)		i*	DESIGN					CAPACITY		PIPE PROFILE				
	FROM	TO					PIPE	CONC. TIME		Q cfs	V fps	n	PIPE SIZE	SLOPE	Q full ft^3/s	V full ft/s	LENGTH ft	FALL ft	RIM	INV UPPER	INV LOWER
CB-1	CB-1	DMH-1	0.08	0.69	0.05	0.05	0.43	6.0	5.0	0.3	3.0	0.012	8	0.018	1.7	5.0	77	1.37	99.40	96.10	94.73
CB-2	CB-2	DMH-1	0.15	0.79	0.12	0.12	0.01	6.0	5.0	0.6	4.7	0.012	8	0.033	2.4	6.8	3	0.10	100.02	94.83	94.73
DMH-1	DMH-1	IS-1	0.22	0.75	0.17	0.17	0.02	6.0	5.0	0.9	3.7	0.012	8	0.012	1.5	4.2	4	0.05	100.12	94.63	94.58

APPENDIX E:

CONSTRUCTION PHASE

BEST MANAGEMENT PRACTICES PLAN

Construction Phase Best Management Practices (BMP's)

Erosion and Sedimentation will be controlled at the site by utilizing Structural Practices, Stabilization Practices, and Dust Control. These practices correspond with plans entitled "Site Redevelopment Plans for 107 Dodge Street" prepared by The Morin-Cameron Group, Inc. dated September 23, 2019 as revised and approved by the Beverly Planning Board, hereinafter referred to as the Site Plans.

Responsible Party Contact Information:

Stormwater Management System Owner:	Harts Hill, LLC 500 Cummings Center, Suite 1550 Beverly, MA 01915 P: (978) 979-1275
General Contractor:	TBD
Site Contractor:	TBD

City Contact Information:

Beverly Engineering Division:	191 Cabot Street Beverly, MA 01915 P: (978) 921-6029
Beverly Planning Board:	City Hall 191 Cabot Street Beverly, MA 01915 P: (978) 921-6000
Site Design Engineer Information:	The Morin-Cameron Group, Inc. 66 Elm Street Danvers, MA 01923 Phone: (978) 777-8586
Other Contacts:	TBD

Structural Practices:

1) **Hay-Bales/Silt Fence** – Hay-bales and siltation fence shall be installed in accordance with the approved plans where high rates of stormwater runoff are anticipated.
   a) Installation Schedule: Prior to Start of land disturbance

   b) Maintenance and Inspection: The site supervisor shall inspect the silt fence at least once per week and shall repair any damaged or affected areas of the fence at the time they are noted.

2) **Inlet Protection** – Inlet Protection will be utilized around the catch basin grates in the street layout along the frontage of the property and in the municipal parking lot. The inlet protection will allow the storm drain inlets to be used before final stabilization. This structural practice will allow early use of the drainage system. Siltsack or equivalent will be utilized for the inlet protection. Siltsack is manufactured by ACF Environmental. The telephone number is 800-448-3636. Regular flow siltsack will be utilized, and if it does not allow enough storm water flow, hi-flow siltsack will be utilized.

Silt Sack (or equivalent) Inlet Protection Inspection/Maintenance Requirements *

a) The silt sack trapping device and the catch basin should be inspected after every rain storm and repairs made as necessary.

b) Sediment should be removed from the silt sack after the sediment has reached a maximum depth of one-half the depth of the trap.

c) Sediment should be disposed of in a suitable area and protected from erosion by either structural or vegetative means. Sediment material removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

d) The silt sack must be replaced if it is ripped or torn in any way.

e) Temporary traps should be removed and the area repaired as soon as the contributing drainage area to the inlet has been completely stabilized.

3) **Sediment Track-Out:** Stabilized Construction Exit: Prior to the commencement of site work, crushed stone anti-tracking pads will be installed at the entrance to the site. This will prevent trucks from tracking material onto the road from the construction site. If, at any point during the project, the tracking pad becomes ineffective due to accumulation of soil, the crushed stone shall be replaced. Details for construction of the stabilized entrance can be found in the Erosion Control Details sheet that is part of the comprehensive permit plan set associated with the project. The site supervisor will inspect the tracking pads weekly to ensure that they are properly limiting the tracking of soil onto the road. If tracking onto the roadway is noted, it shall be removed immediately via a mechanical street sweeper.

Stabilization Practices:

Stabilization measures shall be implemented as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased, with the following exceptions.

- Where the initiation of stabilization measures by the 14th day after construction activity temporary or permanently cease is precluded by snow cover, stabilization measures shall be initiated as soon as practicable.

- Where construction activity will resume on a portion of the site within 21 days from when activities ceased, (e.g. the total time period that construction activity is temporarily ceased is less than 21 days) then stabilization measures do not have to be initiated on that portion of the site by the 14th day after construction activity temporarily ceased.

1) **Land Grading** – Grading on fill slopes, cut slopes, and stockpile areas will be done with full siltation controls in place.

   Land Grading Design/Installation Requirements

   a) Areas to be graded should be cleared and grubbed of all timber, logs, brush, rubbish, and vegetated matter that will interfere with the grading operation. Topsoil should be stripped and stockpiled for use on critical disturbed areas for establishment of vegetation. Cut slopes to be topsoiled should be thoroughly scarified to a minimum depth of 3-inches prior to placement of topsoil.

   b) Fill materials should be generally free of brush, rubbish, rocks, and stumps. Frozen materials or soft and easily compressible materials should not be used in fills intended to support buildings, parking lots, roads, conduits, or other structures.

   c) Earth fill intended to support structural measures should be compacted to a minimum of 90 percent of Standard Proctor Test density with proper moisture control, or as otherwise specified by the engineer responsible for the design. Compaction of other fills should be to the density required to control sloughing,

erosion or excessive moisture content. Maximum thickness of fill layers prior to compaction should not exceed 9 inches.

d) The uppermost one foot of fill slopes should be compacted to at least 85 percent of the maximum unit weight (based on the modified AASHTO compaction test). This is usually accomplished by running heavy equipment over the fill.

e) Fill should consist of material from borrow areas and excess cut will be stockpiled in areas shown on the Site Plans. All disturbed areas should be free draining, left with a neat and finished appearance, and should be protected from erosion.

Land Grading Stabilization Inspection/Maintenance *

a) All slopes should be checked periodically to see that vegetation is in good condition. Any rills or damage from erosion and animal burrowing should be repaired immediately to avoid further damage.

b) If seeps develop on the slopes, the area should be evaluated to determine if the seep will cause an unstable condition. Subsurface drains or a gravel mulch may be required to solve seep problems. However, no seeps are anticipated.

c) Areas requiring revegetation should be repaired immediately. Control undesirable vegetation such as weeds and woody growth to avoid bank stability problems in the future.

2) **Topsoiling *** – Topsoiling will help establish vegetation on all disturbed areas throughout the site during the seeding process. The soil texture of the topsoil to be used will be a sandy loam to a silt loam texture with 15% to 20% organic content.

Topsoiling Placement

a) Topsoil should not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or when conditions exist that may otherwise be detrimental to proper grading or proposed seeding.

b) Do not place topsoil on slopes steeper than 2.5:1, as it will tend to erode.

c) If topsoil and subsoil are not properly bonded, water will not infiltrate the soil profile evenly and it will be difficult to establish vegetation. The best method is to actually work the topsoil into the layer below for a depth of at least 6 inches.

3) **Permanent Seeding** – Permanent Seeding should be done immediately after the final design grades are achieved. Native species of plants should be used to establish perennial vegetative cover on disturbed areas. The revegetation should be done early enough in the fall so that a good cover is established before cold weather comes and growth stops until the spring. A good cover is defined as vegetation covering 75 percent or more of the ground surface.

Permanent Seeding Seedbed Preparation

a) In infertile or coarse-textured subsoil, it is best to stockpile topsoil and re-spread it over the finished slope at a minimum 2 to 6-inch depth and roll it to provide a firm seedbed. The topsoil must have a sandy loam to silt loam texture with 15% to 20% organic content. If construction fill operations have left soil exposed with a loose, rough, or irregular surface, smooth with blade and roll.

b) Loosen the soil to a depth of 3-5 inches with suitable agricultural or construction equipment.

c) Areas not to receive topsoil shall be treated to firm the seedbed after incorporation of the lime and fertilizer so that it is depressed no more than ½ - 1 inch when stepped on with a shoe. Areas to receive topsoil shall not be firmed until after topsoiling and lime and fertilizer is applied and incorporated, at which time it shall be treated to firm the seedbed as described above.

Permanent Seeding Grass Selection/Application

a) Select an appropriate cool or warm season grass based on site conditions and seeding date. Apply the seed uniformly by hydro-seeding, broadcasting, or by hand. Uniform seed distribution is essential. On steep slopes, hydroseeding may be the most effective seeding method. Surface roughening is particularly important when preparing slopes for hydroseeding.

b) Lime and fertilize. Organic fertilizer shall be utilized in areas within the 100-foot buffer zone to a wetland resource area.

c) Mulch the seedings with straw applied at the rate of ½ tons per acre. Anchor the mulch with erosion control netting or fabric on sloping areas. Amoco supergro or equivalent should be utilized.

Permanent Seeding Inspection/Maintenance *

a) Frequently inspect seeded areas for failure and make necessary repairs and reseed immediately. Conduct or follow-up survey after one year and replace failed plants where necessary.

b) If vegetative cover is inadequate to prevent rill erosion, overseed and fertilize in accordance with soil test results.

c) If a stand has less than 40% cover, reevaluate choice of plant materials and quantities of lime and fertilizer. Re-establish the stand following seedbed preparation and seeding recommendations, omitting lime and fertilizer in the absence of soil test results. If the season prevents resowing, mulch or jute netting is an effective temporary cover.

d) Seeded areas should be fertilized during the second growing season. Lime and fertilize thereafter at periodic intervals, as needed. Organic fertilizer shall be utilized in areas within the 100-foot buffer zone to a wetland resource area.

Dust Control:

Dust control will be utilized throughout the entire construction process of the site. For example, keeping disturbed surfaces moist during windy periods will be an effective control measure, especially for construction access roads. The use of dust control will prevent the movement of soil to offsite areas. However, care must be taken to not create runoff from excessive use of water to control dust. The following are methods of Dust Control that may be used on-site:

- Vegetative Cover – The most practical method for disturbed areas not subject to traffic.
- Calcium Chloride – Calcium chloride may be applied by mechanical spreader as loose, dry granules or flakes at a rate that keeps the surface moist but not so high as to cause water pollution or plant damage.
- Sprinkling – The site may be sprinkled until the surface is wet. Sprinkling will be effective for dust control on haul roads and other traffic routes.
- Stone – Stone will be used to stabilize construction roads; will also be effective for dust control.

The general contractor shall employ an on-site water vehicle for the control of dust as necessary.

Non-Stormwater Discharges:

The construction de-watering and all non-stormwater discharges will be directed into a sediment dirt bag (or equivalent inlet protection) or a sediment basin. Sediment material removed shall be disposed of in accordance with all applicable local, state, and federal regulations.

The developer and site general contractor will comply with the E.P.A.'s Final General Permit for Construction De-watering Discharges, (N.P.D.E.S., Section 402 and 40 C.F.R. 122.26(b) (14) (x).

Inspection/Maintenance:

Operator personnel must inspect the construction site at least once every 14 calendar days and within 24 hours of a storm event of ½-inch or greater. The applicant shall be responsible to secure the services of a design professional or similar professional (inspector) on an on-going basis throughout all phases of the project. Refer to the Inspection/Maintenance Requirements presented earlier in the "Structural and Stabilization Practices." The inspector should review the erosion and sediment controls with respect to the following:

- Whether or not the measure was installed/performed correctly.
- Whether or not there has been damage to the measure since it was installed or performed.
- What should be done to correct any problems with the measure.

The inspector should complete a Stormwater Management Construction Phase BMP Inspection Schedule and Evaluation Checklist for documenting the findings and should request the required maintenance or repair for the pollution prevention measures when the inspector finds that it is necessary for the measure to be effective. The inspector should notify the appropriate person to make the changes and submit copies of the form to the Beverly Engineering Department.

It is essential that the inspector document the inspection of the pollution prevention measures. These records will be used to request maintenance and repair and to prove that the inspection and maintenance were performed. The forms list each of the measures to be inspected on the site, the inspector's name, the date of the inspection, the condition of the measure/area inspected, maintenance or repair performed and any changes which should be made to the Operation and Maintenance Plan to control or eliminate unforeseen pollution of storm water.

APPENDIX F:

LONG TERM BEST MANAGEMENT PRACTICES O&M PLAN

Long Term Stormwater Best Management Practices
Operation and Maintenance Plan
for
107 Dodge Street
Beverly, Massachusetts
Issued September 23, 2019

The following operation and maintenance plan has been provided to satisfy the requirements of Standard 9 of the Mass DEP Stormwater Management Handbook associated with development of the site and associated infrastructure. The success of the Stormwater Management Plan depends on the proper implementation, operation and maintenance of several management components. The following procedures shall be implemented to ensure success of the Stormwater Management Plan:

1. The contractor shall comply with the details of construction of the site as shown on the approved plans.
2. The area drain and subsurface infiltration systems shall be inspected and maintained as indicated below.
3. Effective erosion control measurers during and after construction shall be maintained until a stable turf is established on all altered areas.
4. A Stormwater Management Maintenance Log is included at the end of this Appendix.

Basic Information

Stormwater Management System Owner:	Hart's Hill, LLC 500 Cummings Center, Suite 1550 Beverly, MA 01915 P: (978) 979-1275
Beverly Engineering Division:	191 Cabot Street Beverly, MA 01915 P: (978) 921-6029
Beverly Planning Board:	City Hall 191 Cabot Street Beverly, MA 01915 P: (978) 921-6000

Erosion and Sedimentation Controls during Construction:

The site and drainage construction contractor shall be responsible for maintaining the stormwater system during construction. Routine maintenance of all items shall be performed to ensure adequate runoff and pollution control during construction.

A proposed silt fence will be placed as shown on the Demolition and Erosion Control Plan prior to the commencement of any clearing, grubbing, and earth removal or construction activity. The integrity of the erosion control barrier will be maintained by periodic inspection and replacement as necessary. The erosion control barrier will remain in place until the first course of pavement has been placed and all side slopes have been loamed and seeded and vegetation has been established. A silt sack will also be placed over the new catch basins once constructed.

Operations and maintenance plans for the Stormwater Management construction phase and long term operation of the system have been attached to this report.

General Conditions

1. The developer shall be responsible for scheduling regular inspections and maintenance of the stormwater BMP's until such time as the subdivision is accepted by the City of Beverly at which time the City shall become the responsible party. The BMP maintenance shall be conducted as detailed in the following long-term pollution prevention plan and illustrated on the approved design plans:
   "Site Redevelopment Plans for 107 Dodge Street", prepared by The Morin-Cameron Group, Inc. dated September 23, 2019 as revised and approved by the Beverly Planning Board.
2. All Stormwater BMP's shall be operated and maintained in accordance with the design plans and the following Long-Term Pollution Prevention Plan.
3. The owner shall:
   a. Maintain an Operation and Maintenance Log for the last three years. The Log shall include all BMP inspections, repairs, replacement activities and disposal activities (disposal material and disposal location shall be included in the Log);
   b. Make the log available to the Beverly Engineering Division and Planning Board upon request;
   c. Allow members and agents of the Beverly Engineering Division and Planning Board to enter the premises and ensure that the Owner has complied with the Operation and Maintenance Plan requirements for each BMP.
4. A recommended inspection and maintenance schedule is outlined below based on statewide averages. This inspection and maintenance schedule shall be adhered to at a minimum for the first year of service of all BMP's referenced in this document. At the commencement of the first year of service, a more accurate inspection/maintenance schedule shall be determined based on the level of service for this site.

Long-Term Pollution Prevention Plan (LTPPP)

Vegetated Areas:

Immediately after construction, monitoring of the erosion control systems shall occur until establishment of natural vegetation. Afterwards, vegetated areas shall be maintained as such. Vegetation shall be replaced as necessary to ensure proper stabilization of the site.

Cost: Included with annual landscaping budget. Consult with local landscape contractors.

Deep Sump Hooded Catch Basins:

The catch basin grates shall be checked quarterly and following heavy rainfalls to verify that the inlet openings are not clogged by debris. Debris shall be removed from the grates and disposed of properly. Deep sump catch basins shall be inspected twice per year and cleaned as needed when accumulated sediments exceeds 2' from the bottom of the sump (approximately 1/2 of the sump capacity). Catch basins with hoods shall be inspected annually to check oil build-up and outlet obstructions. Material shall be removed from catch basins and disposed of in accordance with all applicable regulations

Cost: The Owner shall consult local vacuum cleaning contractors for detailed cost estimates.

Public Safety Concerns: Catch basins shall not be left open and unattended at any time during inspection, cleaning or otherwise. Broken or missing grates or frames shall be replaced immediately. At no time shall any person enter the basin structure unless measures have been taken to ensure safe access in accordance with OSHA enclosed space regulations.

Subsurface Infiltration and System:

The subsurface infiltration system shall be checked for debris accumulation twice per year. The system is equipped with an inspection manhole with an access cover in the pavement. Additional inspections should be scheduled during the first few months to make sure that the facility is functioning as intended. Silt, sand and sediment, if significant accumulation occurs, shall be removed annually. Material removed from the system shall be disposed of in accordance with all applicable local, state, and federal regulations. In the case that water remains in the infiltration system for greater than three (3) days after a storm event, an inspection is warranted and maintenance or repairs should be addressed as necessary.

Cost: $500-$2,500 per cleaning depending on the volume of material/liquids that need to be removed.

Public Safety Concerns: The manhole covers shall not be left open and unattended at any time during inspection, cleaning or otherwise. Broken covers or frames shall be replaced immediately. At no time shall any person enter the subsurface structure unless measures have been taken to ensure safe access in accordance with OSHA enclosed space regulations.

Overall Site Grading and Stormwater Management:

After construction, and during the initial vegetation establishment period, the site should be inspected after every rainfall. Litter removal, and spot vegetation repair should be performed on a regular basis.

Pesticides, Herbicides, and Fertilizers:

Pesticides and herbicides shall be used sparingly. Fertilizers shall be restricted to the use of organic fertilizers only. All fertilizers, herbicides, pesticides, sand and salt for deicing and the like shall be stored in dry area that is protected from weather.

Cost: Included in the routine landscaping maintenance schedule. The Owner shall consult local landscaping contractors for details.

Public Safety Concerns: Chemicals shall be stored in a secure area to prevent children from obtaining access to them. Any major spills shall be reported to municipal officials.

Prevention of Illicit Discharges:

Illicit discharges to the stormwater management system are not allowed. Illicit discharges are discharges that are not comprised entirely of stormwater. Pursuant to Mass DEP Stormwater Standards the following activities or facilities are not considered illicit discharges: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, DE chlorinated water from swimming pools, water used for street washing and water used to clean residential building without detergents.

To prevent illicit discharges to the stormwater management system the following policies should be implemented:

1. Provisions For Storing Materials And Waste Products Inside Or Under Cover
2. Vehicle Maintenance And Washing Controls
3. Requirements for Routine Inspections of the Stormwater Management System (i.e.: catch basins, proprietary treatment unit & subsurface infiltration system.)
4. Spill Prevention and Response Plans.

Stormwater System Maintenance Log

107 Dodge Street
Beverly, MA

BMP STRUCTURE	INSPECTION DATE	WORK PERFORMED	DATE WORK PERFORMED	COMMENTS
CB-1				
CB-2				
DMH				
IS-1				
CB-3				
Additional Comments:				

NOTE: All structures to be inspected at least two times per year. Refer to O&M plan dated 9/23/19.

APPENDIX H:

ILLICIT DISCHARGE

COMPLIANCE STATEMENT

Illicit Discharge Compliance Statement

I, Scott P. Cameron, P.E., hereby notify the Beverly Planning Board that I have not witnessed, nor am aware of any existing illicit discharges at the site known as 107 Dodge Street in Beverly, Massachusetts. I also hereby certify that the development of said property as illustrated on the final plans entitled "Site Redevelopment Plans at 107 Dodge Street," prepared by The Morin-Cameron Group, Inc. dated September 23, 2019 and as revised and approved by the Beverly Planning Board and maintenance thereof in accordance with the "Construction Period Pollution Prevention Plan" and "Long-Term Pollution Prevention Plan" prepared by The Morin-Cameron Group, Inc dated September 23, 2019 and as revised and approved by the Beverly Planning Board will not create any new illicit discharges. There is no warranty implied regarding future illicit discharges that may occur as a result of improper construction or maintenance of the stormwater management system or unforeseen accidents.

Name: Scott P. Cameron, P.E.

Company: The Morin-Cameron Group, Inc.

Title: Owner's Representative

Signature:

Date: 9-23-19