Stormwater Management Report

For

Housatonic Street Public Safety
Lenox, MA

March 4, 2024

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Referenced Documents

Plans:

Housatonic Street Public Safety, Lenox, Massachusetts, Site Plan Review & Special Permit Set

I. Introduction

The Town of Lenox is proposing to construct a Safety Complex for their Police and Fire Departments at the corner of Housatonic Street and US Route 20 in Lenox, MA (Map 45, Parcel 54).

The existing property consists of an undeveloped wooded area, which recently had been used as a rock and soil storage yard. There is a certified vernal pool located at the southeastern corner of the property. Additionally, there is a creek running through the northern portion of the property, which has bordering vegetated wetlands along the creek's edge.

The proposed Safety Complex consists of a single-story building that will be split between the Police and Fire Department. Additionally, there will be a smaller building behind the main building, which will be a garage for historic safety equipment. The Safety Complex will have two access drives off Housatonic Street, one to the Police side of the complex, and the other to the Fire side. These drives will wrap around the building and connect at a large parking lot at the back of the complex.

Berkshire Design Group has prepared a Stormwater Management Plan for the site which meets the Massachusetts Department of Environmental Protection (MASSDEP) Stormwater Standards for attenuation, groundwater recharge, water quality, and erosion and sedimentation control.

Soil Data

NRCS Soil Survey

The NRCS Soil Survey reports that the on-site soils consist largely of Farmington Rock outcrop, Hydrologic Soil Group (HSG) D, which is comprised of a thin layer of loam over bedrock. There are, however, areas of Nellis loam (HSG B) and Pittsfield loam (HSG A) around the vernal pool at the southeast corner of the property, and around the creek at the north end of the property. The NRCS Soil Report for the site is attached in **Appendix A**.

Subsurface Exploration

Soil test pits were performed at five locations on October 18, 2022. The report for these test pits is attached in **Appendix B**. The test pits showed sandy soil along the northeastern corner of the project site, approaching the northern creek, as well as along the property's western border, along US Route 20. A test pit at the northwestern corner of the project site confirmed the shallow bedrock identified in the Farmington Rock outcrop by the NRCS Soil Survey.

The single infiltration basin included in the project's stormwater management system is located at the northeastern corner of the project site, where test pits showed sandy soil. Even though this sandy soil likely has a high infiltration rate, the basin was conservatively designed using an infiltration rate of 1.02 inches per hour.

Site Limits

Site limits were based on the limit of disturbance for the project, located at the southwestern corner of the property. Both existing and proposed site conditions consist of three drainage areas that flow to three corresponding control points. The first control point is the rear slope of the project site, which flows toward the bordering vegetated wetlands along the creek's edge. The second control point is the slope at the southeastern corner of the project site, which flows toward the vernal pool. The third and final control point is Housatonic Street.

II. Existing Conditions

The existing site conditions encompass 3.973 acres of mostly woods and some grass cover over HSG D and HSG B soils. 100% of the site is undeveloped, and therefore has no impervious area. The existing site hydrology was analyzed as three drainage areas flowing to three control points. The Existing Drainage Areas are shown on **Fig-1.**

Drainage Area E-1 is the largest area in the analysis (94,994 square-feet) and covers the rear of the site, which flows toward the creek to the north, Existing Control Point 1 (E-CP1). This area is entirely woods over HSG B soil.

Drainage Area E-2 is the smallest area in the analysis (7,520 square-feet) and covers the portion of the site which flows toward the vernal pool to the southeast, Existing Control Point 2 (E-CP2). Surface conditions of this area include both woods and grass over HSG D soil.

Drainage Area E-3 encompasses the site frontage of the project area (70,537 square-feet) along Housatonic Street. This area flows onto Housatonic Street, Existing Control Point 3 (E-CP3). Surface conditions of this area include both woods and grass cover of HSG D soil.

III. Proposed Conditions

The proposed site conditions encompass the same 3.973 acres as the existing site conditions. However, the proposed site will be 49.28% impervious. The proposed site hydrology mirrors the existing, consisting of three drainage areas flowing to the same three control points. The Proposed Drainage Areas are shown on **Fig-2**.

Drainage Area P-1 covers the majority of the site (136,318 square-feet) and mirrors Area E-1 by flowing toward the creek to the north, Proposed Control Point 1 (P-CP1). This area is 53% impervious, with the pervious area being grass cover on mostly HSG B soils.

Drainage Area P-2 is the smallest in the analysis (6,675 square-feet) and encompasses the area that runs off toward the vernal pool, Proposed Control Point 2 (P-CP2). This area is 69% impervious, with the pervious area being grass cover on HSG D soil.

Drainage Area P-3 covers the site frontage (30,058 square-feet) that flows onto Housatonic Street. This area is 64% impervious, with the pervious cover being grass over HSG D soil.

IV. Calculations and Design

Attenuation

Drainage calculations were performed in HydroCAD Stormwater Modeling System version 10.20 using Soil Conservation Service (SCS) TR-20 methodology. The SCS method is based on rainfall observations, which were used to develop the Intensity-Duration-Frequency relationship, or IDF curve. The mass curve is a dimensionless distribution of rainfall over time, which indicates the fraction of the rainfall event that occurs at a given time within a 24-hour precipitation event. This synthetic distribution develops peak rates for storms of varying duration and intensities. The SCS distribution provides a cumulative rainfall at any point in time and allows volume-dependent routing runoff calculations to occur. These calculations are included in **Appendix C**. Storm hydrographs are taken from the latest Northeast Regional Climate Center (NRCC) and are listed in Table 1.

The curve numbers (CNs) for the existing and proposed sub-catchment areas are based on the soil type and the existing and proposed cover conditions at the site.

Calculations were performed for the 2-, 10-, and 100-year frequency storms under existing and proposed conditions. The results of the calculations are presented in Table 1 below. **Appendix C** presents the HydroCAD output reports.

Table 1. Runoff Summary Table

Point of Analysis	2-Year Storm 2.81"		10-Year Storm 4.09"		100-Year Storm 7.04"	
	Peak Flow (cfs)	Total Volume (ac-ft)	Peak Flow (cfs)	Total Volume (ac-ft)	Peak Flow (cfs)	Total Volume (ac-ft)
E-CP1	0.42	0.039	2.14	0.124	7.87	0.419
P-CP1	0.42	0.116	1.43	0.364	7.53	1.018
E-CP2	0.29	0.015	0.55	0.029	1.17	0.065
P-CP2	0.08	0.021	0.32	0.036	0.93	0.072
E-CP2	2.57	0.137	4.94	0.264	10.79	0.597
P-CP2	1.64	0.091	2.77	0.156	5.39	0.317

Runoff from the site shows a decrease in peak flow for all storms between existing and proposed conditions.

Groundwater Recharge

The project proposes 85,288 square-feet of impervious area in the post-developed site, while there is no impervious area in the existing condition. Standard 3 of the Stormwater Handbook states that the increase in impervious area must be offset with a required recharge volume, which is a function of the impervious area and a depth factor based on the hydrologic soil group of the subsurface soil. According to the NRCS Soil Survey most of the site consists of HSG D soils, however test pits in select areas showed HSG B soils. Therefore, the required recharge volume was conservatively calculated using a target depth factor of 0.35" for HSG B soil.

The required recharge volume is then calculated to be 2,488 cubic-feet. The project proposes 4,300 cubic-feet of recharge volume, provided by the infiltration basin located at the rear of the site. The recharge volume provided exceeds the recharge volume required.

Water Quality

Standard 4 of the Stormwater Handbook states that a required volume of runoff from new impervious area must be treated for TSS removal. This volume is a function of the impervious area and a depth factor based on site conditions. The depth factor for this site is 0.5". Therefore, the required water quality volume is calculated to be 2,552 cubic-feet. The project proposes 4,300

cubic-feet of water quality volume. The provided water quality volume exceeds the required water quality volume.

Additionally, the project proposes a water quality swale for a small area of pavement that will runoff in the direction of the vernal pool. This swale has been designed according to Volume 3 Chapter 1 of the Stormwater Handbook, and will treat the first 0.1” of runoff from the contributing impervious area.

Erosion & Sedimentation Control

The project plan set includes provisions for erosion control during construction. Erosion control barrier is included around the project site limits to prevent migration of sediment offsite during construction. A construction entrance will be used to prevent sediment from accumulating onto Housatonic Street.