

PRELIMINARY STORMWATER MANAGEMENT REPORT HANNAH'S VIEW ESTATES PRELIMINARY SUBDIVISION

The following preliminary stormwater management report was prepared to describe the anticipated design approach for the stormwater best management practices that are anticipated for this project. A full technical report, calculations and supporting document will be provided with the definitive subdivision application.

I. Executive Summary

Hannah's View Estates, LLC, the applicant, proposes to construct a 14-lot residential subdivision and to reconfigure 2 lots with frontage on Sagamore Place and 2 lots with frontage on Main Street. The site is located at 1414, 1452, 1466 Main Street & 2, 4, & 6 Sagamore Place in Lynnfield, Massachusetts. The properties are shown on the Town of Lynnfield Assessors map 8, lots 783, 1325, 1467, 1468, 1488, & 2113 and are situated entirely within the residential D zoning district (RD). The site is also within the Groundwater Protection District. The project will require Definitive subdivision approval through the town of Lynnfield Planning Board however this preliminary stormwater report has been prepared to accompany the Form B Preliminary Subdivision Application currently before the board. The following narrative contains a description of existing and proposed site conditions and a stormwater management summary.

II. Existing Site Description

The site is mostly wooded except for 3 single-family dwellings and associated driveways and yards located off Main Street. The site is abutted by developed residential lots to the east, undeveloped wooded land to the south and west and by the Sagamore Place subdivision, which is currently under construction. There are no wetlands located on the property although there is a small area that is subject to the 100' buffer zone to an offsite wetland as is depicted on the Sagamore Place Definitive Subdivision Plan.

Soils on site are mapped by the Soils Conservation Services as very stony Montauk fine sandy loam and very stony Paxton fine sandy loam as defined in the Soil Resource Report for Lynnfield, Massachusetts. Field testing performed by Alex Parker of The Morin-Cameron Group, Inc. (MCG) between November 2019 to February 2020 confirmed this soil classification which is a well-drained hydrologic soil group C type soil. A copy of the soil report prepared by MCG is attached hereto.

Generally, the property slopes from Main Street to the west and south. There is a small area that slopes towards Main Street, encompassing a portion of 1414 Main Street driveway, roof and front yard. Accordingly, the hydrology of the site places a design points, or the place where we measure the peak rate of stormwater runoff from a defined area, at the westerly boundary of the site. The areas draining to the design points, referred to as subcatchments, are illustrated on the attached Existing Conditions Watershed Figure. The subcatchments will be evaluated to determine the peak rate of stormwater runoff at the design points based on wooded land surface in good condition with a hydrologic c soil. A small area will be modelled as 1 ½ acre house lots with a hydrologic c soil. Rainfall intensities used for predicting the peak rate of stormwater runoff will be based on Northeast Regional Climate Center (NRCC) data for Lynnfield, Massachusetts.

III. Proposed Site Description

A. Roadway and House Lots

The project proposal is for the construction of a new roadway network to create frontage for 14 new house lots and to reconfigure 2 lots with frontage on Sagamore Place, 1 of which will remain on Sagamore Place and reconfigure 2 lots with frontage on Main Street, both of which will retain frontage on Main Street. The roadway will be designed in accordance with the Lynnfield Subdivision Rules and Regulations and will include 26' of paved roadway, 4' sidewalks on both sides, a 2' grass strip between the road and the sidewalks and a 12" cape cod still bituminous berm. The road will be situated within a 40' layout as depicted in the preliminary subdivision plans previously submitted to the Planning Board. The house lots will be designed for single-family homes, driveways and yard areas.

B. Stormwater Management Overview

The stormwater management system will be designed to account for the construction of the roadway and the house lots as an aggregated stormwater management plan. The same design points will be used in the constructed condition so that the increase in the peak rate of stormwater runoff can be compared to the existing condition. The proposed subcatchments are illustrated on the attached Proposed Watershed Plan. The best management practices (BMP's) anticipated for this project will include:

- Street Sweeping
- Deep Sum-Hooded Catch Basins
- Hydrodynamic Water Quality Separators
- Vegetated swales
- Retention basins
- Subsurface Galley Retention Systems
- Roof Recharge Drywells.

The retention and drywell BMP's will be designed to manage stormwater runoff and provide groundwater recharge throughout the site so that the peak rate of stormwater runoff is as close to the existing condition as possible. Treatment BMP's will be designed to manage 1" of rainfall runoff, which is the higher volume of runoff used to design projects in critical areas such as the groundwater protection district. The stormwater BMP's are identified on the Proposed Watershed Plan.

The project will not require a connection to any municipal storm sewer. The project will not discharge directly to any waters of the Commonwealth, which include wetland resource areas. This is an important and unique characteristic of this site in that there is no direct hydraulic connection to any waterbody.

The project will incorporate subsurface retention galleys as part of the mitigation, renovation and groundwater recharge design. These systems are tremendously resilient with proper pretreatment, and require far less maintenance than a conventional surface retention pond. They are not subjected to organic buildup (grass, weeds, etc) which can clog open pores in soil and reduce the infiltration capacity plagued by surface ponds. Modern galley systems are accessible with standard manholes, and easily cleaned, should the need arise for this. MCG incorporates subsurface retention systems in almost all commercial and residential roadway designs due to their efficiency in being placed under pavement areas whereas surface detention ponds require clearing of forest and land to

construct. Attached hereto is information on a RetainIt product that MCG has successfully implemented on many projects. The following are photos of a RetainIt system being installed in a 12-lot subdivision in Topsfield, Massachusetts known as Riverwood Estates.



IV. Review of Stormwater Management Standards

The following section describes how the proposed project complies with the Stormwater Management Standards identified in the Lynnfield Stormwater Management Bylaw and Rules and Regulations, Section 6.B:

1. No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or water of the Commonwealth.

All discharge of stormwater leaving the property will be treated and there are no direct discharges to any wetlands or waters of the Commonwealth.

The Stormwater Management Report will document how the project will fully comply with this standard.

2. Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates for the 2 and 10 year 24-hr storm events.

The stormwater management practices being implanted will mitigate peak discharge rates for the 2 and 10-year, 24-hr storm events. Further, the project will be designed to manage the 100-year storm event.

The Stormwater Management Report will document how the project will fully comply with this standard.

3. Loss of annual recharge to groundwater should be avoided through the use of infiltration measures to the maximum extent practicable.

According to the MassDEP Stormwater Management Handbook, Revised February 2008 (the Handbook), groundwater recharge shall be maintained through the development of the site by infiltrating water draining from any new impervious areas. For this project, new impervious areas will include the roadway and associated curbing and sidewalks, driveways, homes and associated site amenities such as pools, patios and accessory structures. The rate of recharge is based on the type of soil found on the site, in this case, the site is entirely hydrologic soil group C. For HSG C Soil, the Handbook requires 0.25" of runoff over the new impervious areas to be infiltrated back into the ground. There are other standards outlined in the Handbook as to how to accomplish this which will be adhered to in the design of the project. In this case, it is anticipated that the roadway runoff will be infiltrated in surface or subsurface retention systems designed in accordance with the Handbook. Throughout the site, and to spread out the recharge around the property, roof runoff will be infiltrated through individual drywells on the house lots.

The Stormwater Management Report will document how the project will fully comply with this standard.

4. For new development, stormwater management systems must be designed to remove 80% of the average annual load (post development conditions) of Total Suspended Solids (TSS). It is presumed that this standard is met when: a. Suitable nonstructural practices for source control and pollution prevention and implemented; b. Stormwater management best management practices (BMPs) are sized to capture the prescribed runoff volume; and c. Stormwater management BMPs are maintained as designed.

The Handbook prescribes a method for calculating Total Suspended Solids (TSS) removal through a cumulative treatment train. The objective is to reach 80% TSS removal prior to discharge from the site. In this case, the water quality BMP's will be increased in capacity to account for 1" of runoff from the site. This is double the standard water quality volume of ½" due to the site being located within the groundwater protection district. The reason why the water quality BMP's are designed for 1" of runoff is that the majority of pollutants in stormwater, are typically contained in the "first flush" of rain that leaves the site. To better describe this, in non-rain periods, dust, emissions from cars and other potential pollutants accumulate on the roadway surface. When it rains, the initial stormwater runoff washes this material off of the paved surface. It is this "first flush" of runoff that contains the highest concentration of pollutants and this is the reason why water quality BMP's are designed for a first flush volume.

The treatment train of BMP's for this project will include street sweeping, deep sump hooded catch basins, hydrodynamic water quality separators and retention basins. This treatment train will ensure that the 80% TSS is met and exceeded.

The Stormwater Management Report will document how the project will fully comply with this standard.

This link will direct you to information on hydrodynamic separation:

<https://www.conteches.com/stormwater-management/treatment/cds>

A picture of an uninstalled catch basin hood is below.



5. Stormwater discharges from areas with higher potential pollutant loads require the use of specific stormwater management BMPs (see Stormwater Management Volume I: Stormwater Policy Handbook). The use of infiltration practices without pretreatment is prohibited.

This standard does not apply.

6. Stormwater discharges to critical areas must utilize certain stormwater management BMPs approved for critical areas (see Stormwater Management Volume I: Stormwater Policy Handbook). Critical areas are Outstanding Resource Waters (ORWs), shellfish beds, swimming beaches, cold-water fisheries and recharge areas for public water supplies.

The site will be designed to the higher level of treatment described above, complying with this standard.

7. Redevelopment of previously developed sites must meet the Stormwater Management Standards to the maximum extent practicable. However, if it is not practicable to meet all the Standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions.

This standard does not apply.

8. Erosion and sediment controls must be implemented to prevent impacts during disturbance and construction activities.

A construction phase stormwater pollution prevention plan will be included with the definitive subdivision application to document how this project will fully comply with this standard.

9. All stormwater management systems must have an operation and maintenance plan to ensure that systems function as designed.

A Long Term Best Management Practices Operation and Maintenance Plan will be included with the definitive subdivision application to document how this project will fully comply with this standard.

10. Capacity of drainage systems shall be designed to handle all stormwater runoff from the site including run-off generated from the 100 year storm event using the following methods: a. All piping and grate inlets shall be designed to handle flow up to a 25-year 24-hr storm event; b. Detention facilities shall be designed to accommodate all run-off generated by the 100- yr, 24-hr storm. c. Culverts shall be designed to accommodate the 50-yr, 24-hr storm. Stormwater Rules and Regulations Page 12

As mentioned in 1 above, the project will be designed to mitigate the peak rate of stormwater runoff for the 100-year storm event. Conveyance pipes will be designed for at least the 25-year storm event. Culverts, if needed, will be designed for the 50-year storm event.

The Stormwater Management Report will document how the project will fully comply with this standard.

11. Drainage pipe systems shall be designed to provide self-cleaning flow velocities.

The drainage pipe systems for this site are being designed to provide self-cleaning flow velocities between 2 to 8 feet per second. The design horizon will ensure proper flushing while not creating scouring velocities.

12. An emergency overflow shall be provided to all detention/retention facilities in the event of a storm in excess of the 100-year, 24-hr storm.

An emergency overflow will be provided for both above and below ground detention structures.

13. Stormwater discharge to the Town's drainage system may be permitted if the Applicant can demonstrate that the proposed flow during a 25-yr, 24-hr storm event can adequately handle the increased flow. When one or more of the Standards cannot be met, an applicant may demonstrate that an equivalent level of environmental protection will be provided.

This standard does not apply as the project will not discharge to a town drainage system.

This report was prepared by Scott P. Cameron, PE of The Morin-Cameron Group, Inc.

The following references were used in preparing this report:

1. Massachusetts Department of Environmental Protection Stormwater Management Handbook, Revised February 2008 <https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards>
2. Northeast Regional Climate Center <http://www.nrcc.cornell.edu/>
3. Lynnfield Stormwater Regulations https://www.town.lynnfield.ma.us/sites/lynnfieldma/files/uploads/final_rules_regulations_11-9-10.pdf

