Dracut Senior Housing

40b – Site Plan
Stormwater Analysis

144 Greenmont Avenue
Dracut, Mass.

Permit Set - January 2020

Revised August 14, 2020

Planning
Landscape
Architecture
Civil
Engineering
Surveying

PREPARED FOR:

Common Ground Development Corp.

PLACES Associates, Inc.
256 Great Road, Suite 4, Littleton, MA 01460
(978) 486-0334 www.placesassociates.com

Table of Contents:

Appendix:

Introduction

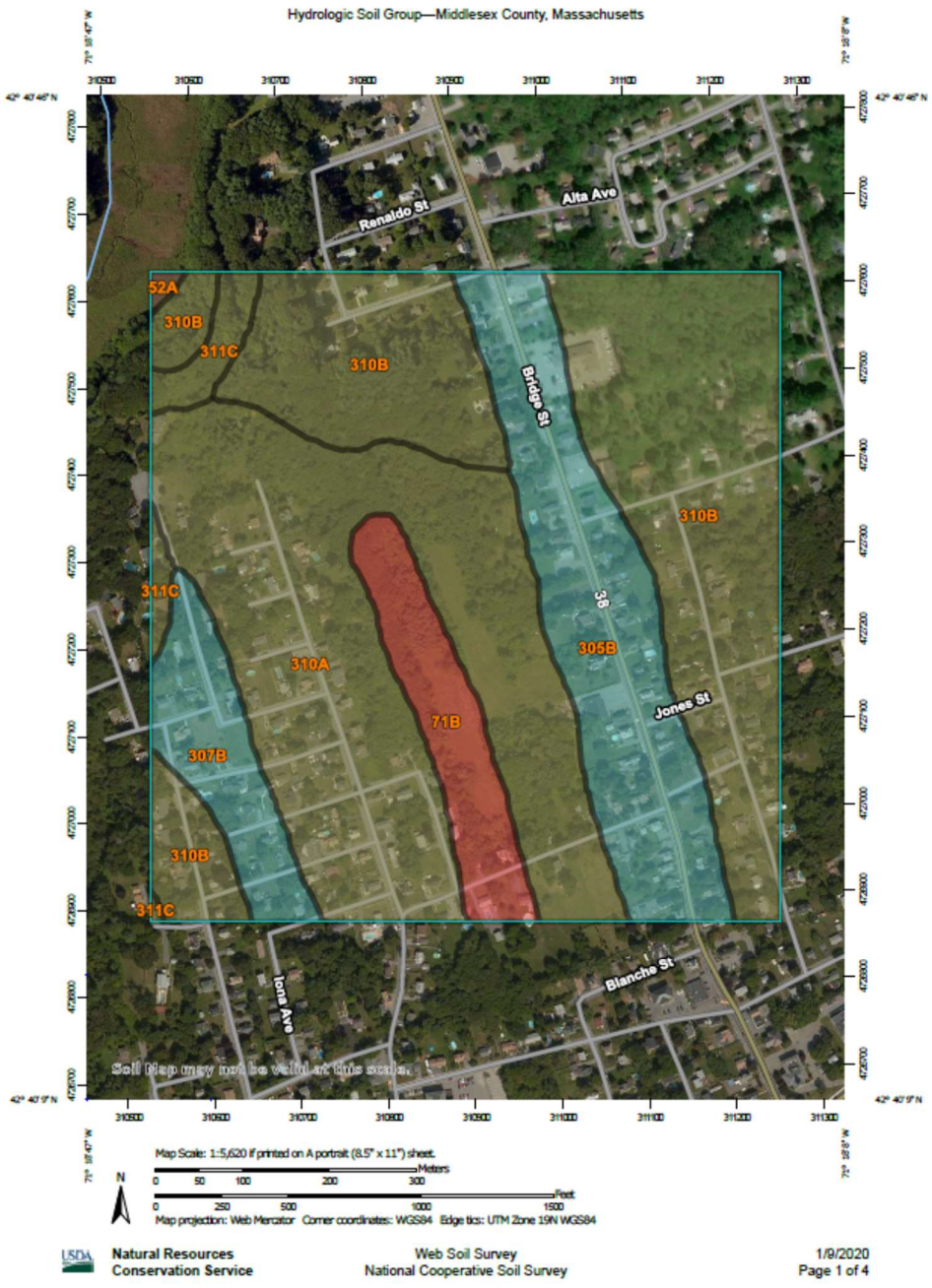
Excerpt from MADEP Stormwater Management Standards Chapter 1:

> *In 1996, the Massachusetts Department of Environmental Protection (the "Department" or "MassDEP") issued the Stormwater Policy that established Stormwater Management Standards aimed at encouraging recharge and preventing stormwater discharges from causing or contributing to the pollution of the surface waters and groundwaters of the Commonwealth. In 1997, MassDEP published the Massachusetts Stormwater Handbook as guidance on the Stormwater Policy. MassDEP has revised the Stormwater Management Standards and Massachusetts Stormwater Handbook to promote increased stormwater recharge, the treatment of more runoff from polluting land uses, low impact development (LID) techniques, pollution prevention, the removal of illicit discharges to stormwater management systems, and improved operation and maintenance of stormwater best management practices (BMPs). MassDEP applies the Stormwater Management Standards pursuant to its authority under the Wetlands Protection Act, M.G.L. c. 131, § 40, and the Massachusetts Clean Waters Act, M.G.L .c. 21, §§ 26-53. The revised Stormwater Management Standards have been incorporated in the Wetlands Protection Act Regulations, 310 CMR 10.05(6)(k) and the Water Quality Certification Regulations, 314 CMR 9.06(6)(a).*
>
> *Stormwater runoff results from rainfall and snow melt and represents the single largest source responsible for water quality impairments in the Commonwealth's rivers, lakes, ponds, and marine waters. New and existing development typically adds impervious surfaces and, if not properly managed, may alter natural drainage features, increase peak discharge rates and volumes, reduce recharge to wetlands and streams, and increase the discharge of pollutants to wetlands and water bodies.*
>
> *The Stormwater Management Standards address water quality (pollutants) and water quantity (flooding, low base flow and recharge) by establishing standards that require the implementation of a wide variety of stormwater management strategies. These strategies include environmentally sensitive site design and LID techniques to minimize impervious surface and land disturbance, source control and pollution prevention, structural BMPs, construction period erosion and sedimentation control, and the long-term operation and maintenance of stormwater management systems.*

Narrative – Existing Conditions

The existing site is located on the north side of Greenmont Avenue. The site is partially wooded with areas of thick vegetation and bordered by wetlands. The area of activity slopes from the center of the site to the perimeter wetland areas. Soils onsite are mapped (USDA) as:

310A Woodbridge – Hydrologic Soil Group Class C/D



Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	B/D	0.3	0.2%
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony	D	8.5	6.3%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	21.8	16.3%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	C	8.0	6.0%
310A	Woodbridge fine sandy loam, 0 to 3 percent slopes	C/D	44.8	33.4%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	47.8	35.6%
311C	Woodbridge fine sandy loam, 8 to 15 percent slopes, very stony	C/D	3.0	2.2%
Totals for Area of Interest			**134.2**	**100.0%**

Hydrologic Soil Group—Middlesex County, Massachusetts

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Narrative – Proposed Conditions

The proposal calls for the construction a 60 unit Senior Housing facility. The units will be served by a town water and sewer.

Construction is proposed in the center of the site while maintaining vegetated buffers around the perimeter. Stormwater will be treated utilizing LID techniques including tree filter boxes and a raingarden.

This design is in full compliance with the MADEP stormwater management standards and incorporates best management practices (BMP's) consistent with low impact development (LID).

BMP's utilized:

- Tree Filter Boxes
- Raingardens

LID/Environmentally Sensitive Design Techniques utilized (Volume 1- Chapter 1):

- *Maintain as much of the pre-development vegetation as possible*
- *Maintain natural buffers and drainage ways*
- *Minimize placement of new structures or roads over porous or erodible soils*

Documenting Compliance

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

All outlets shall be provided with a rip-rap apron to resist erosion.

Standard 2 - Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates…To prevent storm damage and downstream and off-site flooding, Standard 2 requires that the post-development peak discharge rate is equal to or less than the pre-development rate from the 2-year and the 10-year 24-hour storms…Proponents must also evaluate the impact of peak discharges from the 100-year 24-hour storm. If this evaluation shows that increased off-site flooding will result from peak discharges from the 100-year 24-hour storms, BMPs must also be provided to attenuate these discharges.

The site has been designed to have no increase in offsite runoff for the 2-year, 10-year storm and the 100-year storm.

Analysis Point 1

	2-year 24-hour Storm (3.2 inches) cfs	10-year 24-hour Storm (4.5 inches) cfs	25-year 24-hour Storm (5.6 inches) cfs	100-year 24-hour Storm (6.5 inches) cfs
Pre-development (Subcatchment 1s)	2.6	4.4	6.1	7.4
Post-development (Subcatchment 10)	2.5	4.2	5.8	6.8

Analysis Point 2

	2-year 24-hour Storm (3.2 inches) cfs	10-year 24-hour Storm (4.5 inches) cfs	25-year 24-hour Storm (5.6 inches) cfs	100-year 24-hour Storm (6.5 inches) cfs
Pre-development (Subcatchment 2s)	3.8	6.5	8.9	10.8
Post-development (Subcatchment 20)	3.2	5.4	7.3	8.8

Analysis Point 3

	2-year 24-hour Storm (3.2 inches) cfs	10-year 24-hour Storm (4.5 inches) cfs	25-year 24-hour Storm (5.6 inches) cfs	100-year 24-hour Storm (6.5 inches) cfs
Pre-development (Subcatchment 3s)	4.8	8.2	11.3	13.7
Post-development (Summary Point 30R)	4.5	7.2	9.5	12.5

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

*Volume 1, Chapter 1, page 6 states: "**For sites comprised solely of C and D soils and bedrock at the land surface, proponents are required to infiltrate the required recharge volume only to the maximum extent practicable.**"*

*Volume 1, Chapter 1, page 7 states: "**Infiltration systems must be installed in soils capable of absorbing the recharge volume (i.e. not D soils)."***

The proposed development is located in an area of D soils and infiltration is not practicable. By maintaining overland flows and large natural buffers the site promotes infiltration where possible.

Standard 4 - Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

For purposes of Standards 3 and 4, impervious surfaces include roads, rooftops, parking lots, and sidewalks, when they are paved with concrete, asphalt, or brick pavers. (Volume 3, Chapter 1, Page 15)

Raingarden

		Removal Rate	Remains	
Pretreatment	Grass and Gravel			
Treatment	Raingarden	90 %	10%	
Final Rate			**90%**	removal

Tree Box Filter

		Removal Rate	Remains	
Treatment	Tree Filter Box	80%	20 %	
Final Rate			**80.0%**	removal

BMP Sizing

Tree Filter Box

Sizing based on *LID Urban Design Tool – Tree Box Filters*

Optimal filter surface area / contributing impervious area = 0.33%

Surface area provided = 25 sq.ft. / 0.0033 = **7,565 sq.ft**. maximum impervious area allowed per tree box filter.

Raingarden

Size bioretention area to be 5-7% of area draining to it - *Structural BMPs - Volume 2 | Chapter 2 page 26*

Size the cells (based on void space and ponding area) at a minimum to capture and treat the required water quality volume (the first 0.5 inch or 1 inch of runoff) if intended to be used for water quality treatment - *Structural BMPs - Volume 2 | Chapter 2 page 26*

Tributary Area = 1.6 acres = 69,696sq.ft.
Raingarden Area = 4,200sq.ft.
4,200 / 69,696 = 6%

Tributary Impervious = 1.0 acres x 0.5 inches = 1,815 cubic feet required
7,200 cubic feet provided, see HydroCAD data

Standard 5 - For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

The site does not qualify as a land uses with higher potential pollutant loads.

Standard 6 - Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

This site does not discharge near a critical area.

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

The site is not being proposed as a redevelopment project.

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

A Stormwater Pollution Prevention Plan will be required prior to the start of construction.

Standard 9 - A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

See the Operation and Maintenance Plan included in this document.

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

Illicit Discharge Compliance Statement

To the best of my knowledge no illicit discharges currently exist on the site and no future illicit discharge will be allowed, including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease.

_____

Signature of Owner Date

To be completed and submitted prior to the start of construction.

Stormwater Operation and Maintenance Plan - Long Term Pollution Prevention

Ongoing maintenance is required for the proper function of the stormwater management system allowing the system prevent pollution for the long term. This document provides a guideline for this work and allows for record keeping.

Stormwater Management System Owner: To be determined

Party Responsible for Maintenance: To be determined

Snow Removal

Snow removal from the driveway will be the responsibility of the property owner.

Public Safety Features

The site has been designed with internal sidewalks and lighting to allow for safe movement throughout the site.

Preliminary Stormwater O&M Maintenance Budget

Inspection and maintenance = $1,000 x 4 times per year = $4,000±

Site Specific BMP Maintenance Plans

(Reference MADEP Volume 2, Chapter – Structural BMP Specifications for the Massachusetts Stormwater Handbook)

Street Sweeping

Street sweeping shall occur with spring and fall cleanup, twice a year at a minimum or when accumulated debris is 50% accumulated in the basin.

Tree Filter Box

- Inspect annually and replace tree and media if tree dies.
- Rake media surface twice per year.
- Remove trash/debris as needed.

Bioretention Areas/Raingarden

- Inspect for sediment build-up, structural damage, and standing water in the spring and fall. Sediment shall be removed and any damage repaired.
- Inspect soil and repair eroded areas monthly. Re-mulch void areas with triple shredded hardwood mulch (no dye) as needed. Remove litter and debris monthly.
- Treat diseased vegetation as needed.
- Remove and replace dead vegetation twice per year (spring and fall).
- Vegetation shall be trimmed biannually as appropriate.
- When replacing mulch, remove existing mulch and 1-2” of bioretention mix (see design plans for details) and replace.

Stormwater BMP Inspection and Maintenance Log

(print a log for each BMP and maintain a log book for the project)

BMP:_____

Date	Inspector	Issues Observed	Corrective Action Taken	Notes