STORM WATER MANAGEMENT PLAN

RETREAT AT AMHERST
HENRY STREET, MARKET HILL ROAD & FLAT HILLS ROAD, AMHERST, MA

May 23, 2014

PREPARED FOR:
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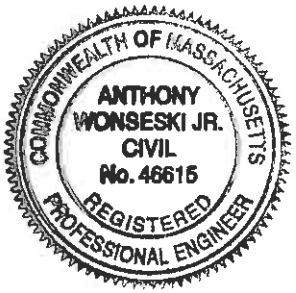

Anthony Wonseski Jr., P.E. — 5-27-14
Anthony Wonseski Jr., P.E. — Date
RCE NO. 46615

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POCKETS

1.0 Introduction

This Storm Water Management Plan (SWMP) documents the design of the storm water facilities associated with the proposed 136 lot residential subdivision proposed by Retreat at Amherst,, LLC. The property is 147.3 acres of forest land located in north Amherst. The property is owned by W.D. Cowls, Inc and was recently removed from Chapter 61 status. The property is located within the ¾ mile center core to Cushman Village. Refer to Vicinity Map on Page 5.

The Retreat at Amherst will be developed as a Cluster Subdivision. The Subdivision consists of 123 residential lots with a mix of single family and two family homes. The ratio of the mix will be consistent with section 4.325 of the Amherst Zoning By-Law. Access to the project will be from Market Hill Road, Henry Street and Flat Hills Road. The Definitive Plan has been revised from the Preliminary Plan based upon recommendations from the Planning Board.

2.0 Existing Conditions

2.1 Site Characteristics

The subject property is a vacant wooded lot. The property has frontage on Henry Street, Market Hill Road and Flat Hills Road. The property is 147.3 acres in size. The westerly portion of the property is traversed by an electrical transmission line and easement. There are numerous wetland areas associated with intermittent streams located on the property. Runoff from the property drains to municipal storm drain facilities at the end of the driveway to the Water Treatment Plant, storm drain facilities in Henry Street, storm drain facilities in Flat Hills Road and naturally within intermittent streams to the south.

The subject property is not located within an area subject NHESP jurisdictional areas. Refer to page 6 for an exhibit showing the location of the closest NHESP designated areas.

2.2 Soil Characteristics

Review of the Hampshire County, web Soils Survey (USDA & NRCS) indicates the property is underlain by primarily gloucester sandy loam soils with hydrologic characteristics of A. There is a portion of Gloucester/Charlton soils which are classified as a B-soil. A copy of the Geotechnical Investigation is with Definitive Plan Submittal. Refer to Appendix B for a copy of a more detailed Soil Resource Report.

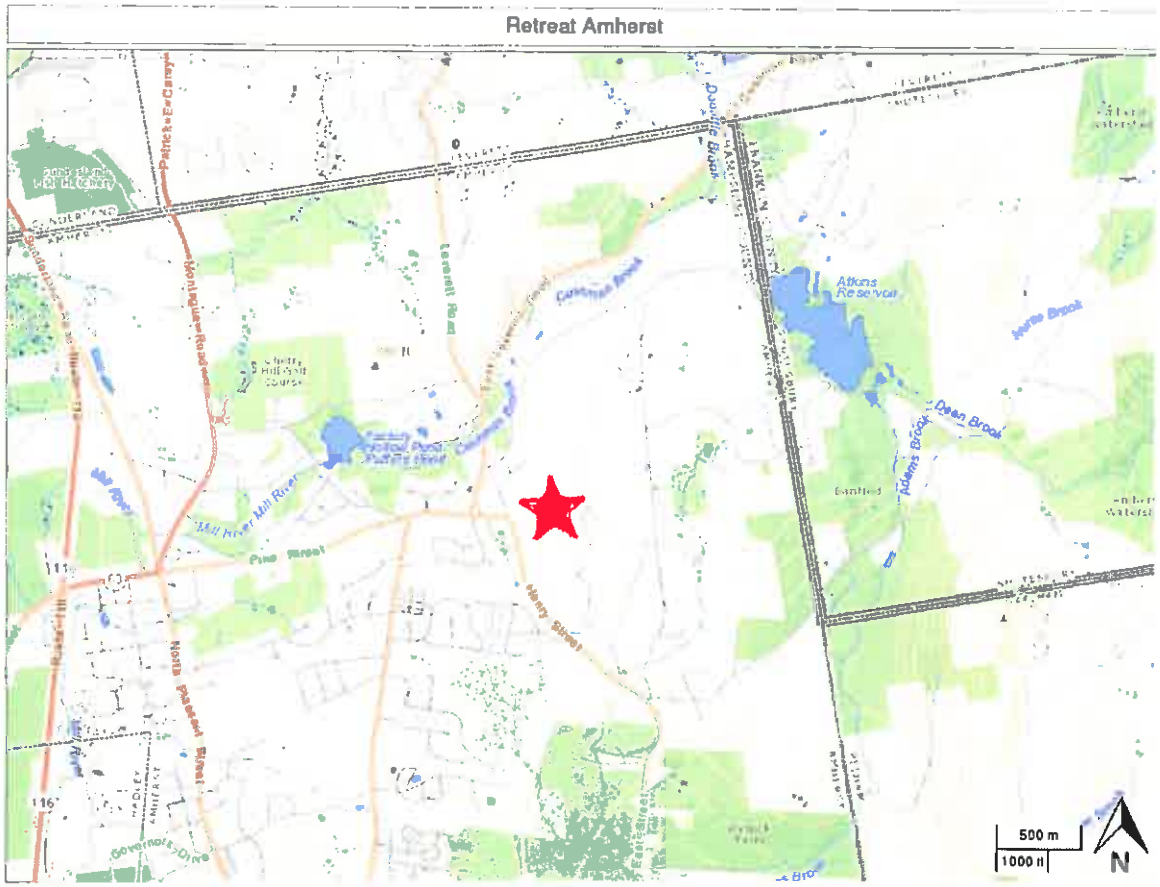
2.3 Floodplain

Review of the Flood Insurance Rate Map (FlRM) for the Town of Amherst, Massachusetts, Community Panel Number 250156-0005C, effective date: December 15, 1983, indicates the subject property falls within one zone.

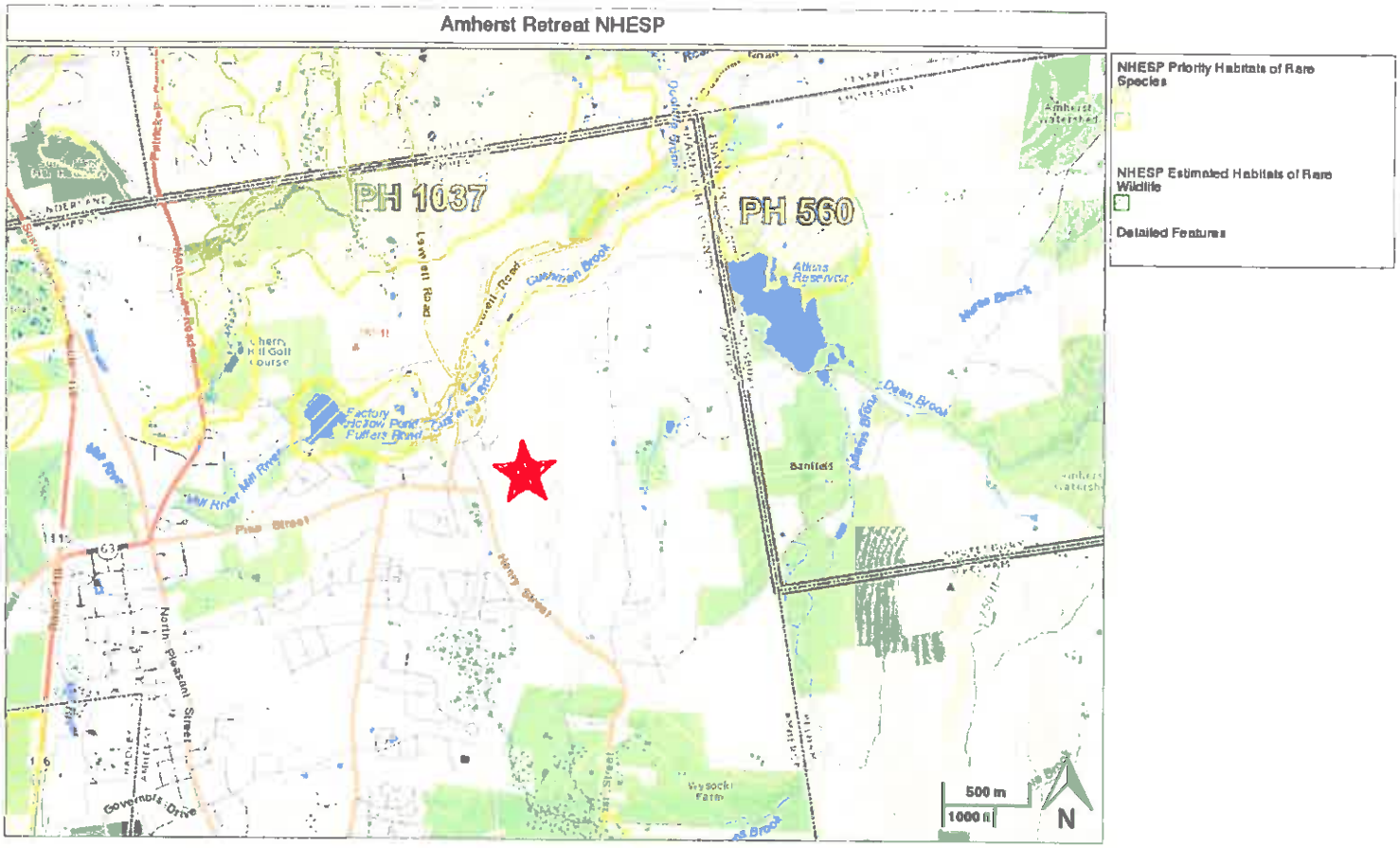
1. Zone C: Areas of minimal flooding.

Refer to page 7 for a copy of the Flood Insurance Rate Map (FIRM).

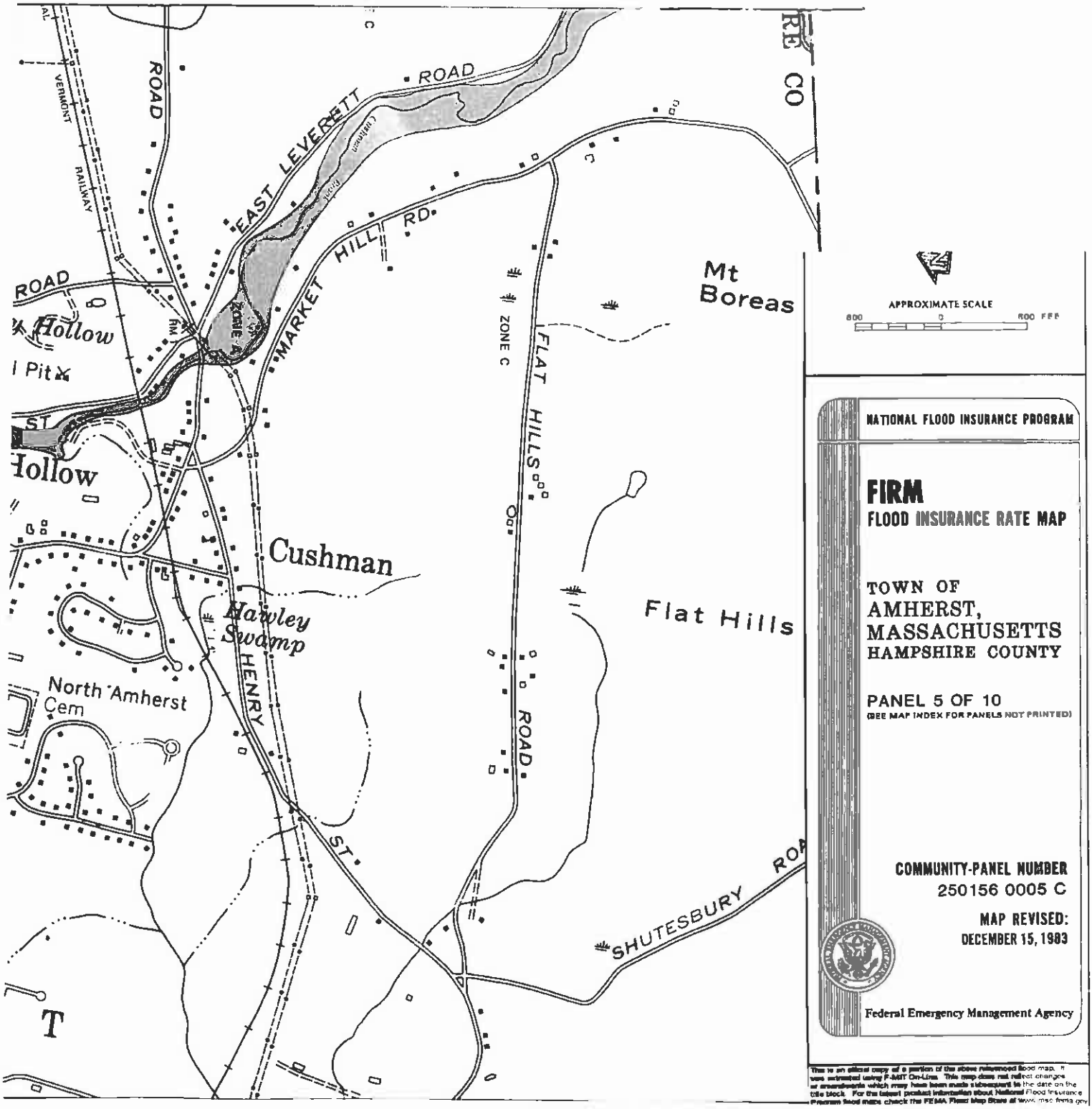
VICINITY MAP



NHESP AREAS


Amherst Retreat NHESP
PH 1037
PH 560
Atkins Reservoir
Cushman Brook
Hobbs Brook
Dean Brook
Factory Hollow Pond
Fuller's Pond
Mill River
Pine Street
Henry Street
North Pleasant Street
Baniels
Wysocki Farm
Governor's Drive
500 m
1000 ft
N
NHESP Priority Habitats of Rare Species
NHESP Estimated Habitats of Rare Wildlife
Detailed Features

FLOOD INSURANCE RATE MAP



2.4 Existing Hydrology

The drainage area studied for this project is approximately 166.8 acres in size and is reflected on the attached hydrology map located in the pockets of this study.

Flows drain primarily from north to south as indicated on the attached drainage plans. There is no expected runoff from offsite areas that will flow onto the property that would impact the construction of the residential development in a significant manner because most of the flow will be within intermittent streams that will not be impacted because they are protected resources.

Refer to Pocket #1 for the existing conditions hydrology map used for the analysis.

The table below summarizes the results of the existing runoff calculations for the property. Flow is represented in cubic feet per second (CFS).

Refer to Appendix A for existing hydrology calculations.

Ex. Hydrology			
(E)	Q2	Q10	Q100
Basin			
1	0.00	0.00	0.08
2	0.00	0.01	0.13
3	0.00	0.00	0.94
4	0.00	0.00	0.46
5	0.00	0.00	0.09
6	0.00	0.22	3.26
7	0.00	0.00	0.06
8	0.00	0.00	0.11
9	0.00	0.00	0.04

Refer to Appendix A for existing hydrology calculations.

3.0 Developed Conditions

3.1 Design Objectives

The objective of this SWMP is to analyze the pre and post development storm water runoff conditions and impacts to downstream property for the proposed residential development.

For instance the project is being developed as cluster development which promotes a preservation of more open spaces versus more traditional subdivision. There is good soil conditions within areas of the project where infiltration of runoff from the cottages, walks and parking areas will be

investigated and utilized as available. Possible infiltration measures may include bioretention, dry wells and porous pavement. Road way drainage will be directed to deep sump catch basins and conveyed by below grade piping to infiltration/detention basins with fore bay areas. The road profiles are somewhat steep in many locations so the use of roadside swales are limited due to erosion concerns. The existing, intermittent streams and associated bordering vegetated wetlands will be preserved to provide wildlife corridors. Some resources will be impacted by the construction of internal roadways in order to access upland areas of the property for development. These crossing will be done in conformance with Massachusetts Steams Crossing Guidelines. Some of the stream crossings will not meet the openness ration guideline because the streams are very small. Impacted Resource areas will be restored onsite.

3.2 Developed Hydrology

Refer to Appendix A for Hydrology Calculations

The table below summarizes the anticipated runoff from the site without Storm Water Management Measures in place.

Developed Hydrology			
Basin	Q2	Q10	Q100
Municipal Storm Drain WTP	0.63	1.46	2.65
8	0.00	0.00	0.10
24' Culvert Henry St.	0.00	0.00	1.22
10	0.00	0.00	0.27
Road "D Henry St.	0.00	0.00	0.00
13	0.00	0.00	0.03
14	0.00	0.00	0.01
21	0.00	0.11	2.41
24	0.00	0.00	0.02
25	0.00	0.00	0.09
Road "A" at Flat Hills	0.00	0.00	0.00
27	0.00	0.00	0.02

Refer to Pocket #2 for Developed Hydrology Map

3.3 Summary of Pre and Post Redevelopment Hydrology (CFS)

The table below highlights the existing conditions versus the proposed development conditions with detention/infiltration areas included.

Summary of Pre vs. Post							
(E) Basin	(D) Basin	Q2 (E)	Q2 (D)	Q10 (E)	Q10 (D)	Q100 (E)	Q100 (D)
1	6 & 7	0.00	0.63	0.00	1.46	0.08	2.65 *
2	8	0.00	0.00	0.01	0.00	0.13	0.10
3	24" Culvert Henry St.	0.00	0.00	0.00	0.00	0.94	1.22
4	10 + Road "D" Henry St.	0.00	0.00	0.00	0.00	0.46	0.27
5	13 & 14	0.00	0.00	0.00	0.00	0.09	0.04
6	21	0.00	0.00	0.22	0.11	3.26	2.41
7	24	0.00	0.00	0.00	0.00	0.06	0.02
8	25	0.00	0.00	0.00	0.00	0.11	0.09
9	27	0.00	0.00	0.00	0.00	0.04	0.02

Notes:

1. Existing condition runoff accounts for runoff expected to be generated from the site as it is today.
2. Developed condition runoff accounts for runoff with storm water management measures in place.

*. Peak runoff is increased at this location as a result of road extension to the south. The existing municipal storm drain system has the capacity to accommodate the increase in flows due to the road extension and appears to have been designed as such. Runoff will be routed through a hydrodynamic separation unit for treatment. Onsite runoff generated from the Office/Amenity areas will be attenuated and treated through the use of underground infiltration chambers.

4.0 Storm Water Management Standards

Standard No. 1 – There are no new storm water conveyances (e.g. outfalls) discharging untreated storm water directly to or cause erosion in wetlands or waters of the Commonwealth. On-site storm water runoff from the residential development is conveyed to the proposed detention/infiltration areas for recharge and attenuated discharge.

Standard No. 2 – Expected on site runoff will be conveyed to the detention/infiltration areas for storage. This storage will attenuate runoff rates from the proposed improvements to at or below what is calculated for existing runoff from the property as it is today for the 2, and 10 year designs. The 100 year peak runoff may be slightly increased at a few locations but the increase is very small and will not have an adverse impact from current conditions.

Standard No. 3 – Review of the Hampshire Web Soils Survey indicates the subsurface soils at the site are primarily hydrologic classifications of A. Actual test pits and soil evaluations have not been performed at this time for each basin area. These areas will be studied in further detail.

Standard No. 4 – TSS removal requirements are met through the use of various storm water management measures. Refer to the attached Operations and Management Plan for particulars.
According to the Long-Term Maintenance and Operations Plan for the property, the following BMP's are proposed and will be maintained by the owner.

Standard No. 5 – The residential development is not considered a land use with higher potential pollutant loads (LUHPPL). Therefore this Standard is not applicable.

Standard No. 6 – Not Applicable
The property is not within a Zone II or interim Wetland Protection Area of a public water supply or a watershed protection overlay zone.

Standard No. 7 – Not Applicable. This is not a redevelopment project.

Standard No. 8 – A plan to control construction related sediment is provided. Refer to project plans.

Standard No. 9 – A Long-Term Operation and Maintenance Plan is provided. See Appendix C.

Standard No. 10 – There is no known illicit discharges to the storm water management system. Refer to statement attached.

5.0 Conclusion

This Storm Water Management Plan has been prepared to document the storm water impacts associated with the proposed Retreat at Amherst residential development. Analysis was performed for the 2, 10 and 100 year design storms. In order to attenuate those flows to at or below existing runoff conditions detention/infiltration areas will be constructed. The project is designed as a cluster development in order to preserve as much open space as possible and still meet he Town's Zoning Bylaws and recommendations provided by the Planning Board as part of the Preliminary Plan process. As mentioned earlier in the report, there are soils onsite which we consider suitable for infiltration. Areas which have soil and ground water depths acceptable for infiltration the applicant will use bioretention, porous pavement and dry wells which will reduce the amount of runoff from the developed lots. This will also reduce the amount of runoff entering the street storm drain system. Street crossings of intermittent streams will be designed in conformance to Massachusetts Stream Crossing Standards except for some crossings the openness ratio will not be met because it is impractical as a result of the existing stream crossing size and capacity.