

**Stamski And McNary, Inc.**

**Engineering - Planning – Surveying**

1000 Main Street, Acton, MA 01720 (978) 263-8585

[www.stamskiandmcnary.com](http://www.stamskiandmcnary.com)

# **Stormwater Operation and Maintenance Manual**

For

## **The Residences at Constitution Drive**

Acton, MA

**June 13, 2013**

### **Responsible Party:**

Owner:            Lexington Holding, LLC  
6 Open Space Drive  
Sandwich, MA 02563

SM-4993

## **Table of Contents**

Drainage Narrative

Long Term Operation and Maintenance Plan

Operation and Maintenance Sample Inspection Log

Operation and Maintenance Sketches



## Stormwater Management

The proposed project is to develop a five lot residential compound subdivision from an existing residential parcel. An existing single family dwelling will be relocated on site and four new single family dwellings will be constructed with all five lots being served by the same private way. As part of the Definitive Subdivision application for the residential compound, this Report has been prepared which analyzes the proposed stormwater management system designed for the site and demonstrates its control of peak rate of runoff from pre to post-development conditions.

### Pre-Development

The site is approximately 4.0 acres that has previously been developed. Existing structures onsite include a single family dwelling and an attached garage. A paved drive runs from Jackson Drive up to the garage. Vegetated wetlands border an intermittent stream which runs along the Eastern property line. This stream conveys runoff from this site and the neighborhood into Conant Brook off-site. The existing runoff from the site is sent in two directions. The runoff from the majority of the site including the existing dwelling, driveway, and two abutting lots is sent directly to the BVW. The remaining runoff is sent towards the Western property line towards Madison Lane. Runoff from the site flowing to the BVW has been analyzed as Subcatchment E1. The runoff flowing offsite towards Madison Lane has been analyzed as Subcatchment E2.

### Post-Development

A stormwater management system that controls the peak rate of runoff has been designed for the proposed project in accordance with local subdivision rules and regulations. The existing house will be relocated and four additional new single family dwellings will be constructed. The existing paved drive will be removed and replaced with a new private paved drive that will serve all five lots. For the post development runoff, the site has been broken into fourteen subcatchments. Subcatchment P1 consists of the uncontrolled runoff from below the proposed way which drains to the edge of the BVW. This subcatchment is comprised of primarily existing conditions to remain undisturbed along the eastern side of the site along with the runoff collected by CB-1 and the sheet flow from the rear lots of Lot 4 and Lot 5. Subcatchment P2 allows for uncontrolled runoff to be sent off the Western lot line towards Madison Lane. P2 is a small area of open grass and woods on the western side of the property on Lot 2 and Lot 3. Subcatchment P3 includes the up-gradient overland flow onto the site from the abutter's lots (#29 & #31 Jackson Drive) and the area to the west of the proposed drive on Lot 1. Runoff from Subcatchment P3 is collected by Stormwater Management Area 1 in order to control the peak rate, with an outlet control structure provided to the level spreader. Subcatchment P4 includes the runoff from the Cul-de-Sac area including portions of the individual driveways and front yards of Lot 3, Lot 4 and Lot 5. The runoff will be collected by two catch basins (CB-3 & CB-4) and conveyed to Stormwater Management Area 2 where the runoff will be treated and stored for recharge. Subcatchment P5 includes runoff from the

front of Lots 2 and 3. The runoff will be collected by two drop inlet catch basins and will be directed into the level spreader. Subcatchments 6 thru 10 are the runoff area from each individual roof. The roof runoff for each lot is sent into its own drywell to be stored and recharged within each lot in a decentralized manner throughout the site.

Subcatchments 11 and 12 are comprised of the runoff from the driveway turnouts from Lot 2 and 3 respectively. The runoff will be collected by a stone infiltration trench located along each driveway edge. Subcatchments 13 and 14 consist of runoff from the back yard area of Lots 2 and 3 respectively. Runoff from Subcatchments 13 and 14 will be collected by a stone infiltration trench on each lot. Runoff from the 14 Post-Development Subcatchments have a reduced peak flow rate and peak volume from Pre-Development conditions.

**Compliance with MA DEP Stormwater Management Standards**

Compliance with the Stormwater Management Standards is as follows:

**Standard 1: No Untreated Discharges**

Currently there is 2,586 square feet of untreated runoff going directly to the BVW over vegetated areas within the 100’ buffer zone. There is also 95 square feet of untreated runoff going directly to the BVW over vegetated areas within 50’ of the BVW. The proposed drive reduces the direct runoff from 2,586 square feet to 530 square feet of runoff within the 100’ buffer zone and reducing the runoff going directly to the BVW within 50’ from 95 square feet to 0. Drywell units, an infiltration basin with a sediment forebay, a level spreader, and road drywell will treat impervious runoff before it reaches the wetlands. Roof runoff will be treated by individual drywells located on each lot. This will be an improvement over existing conditions which has no treatment for the paved driveway or roof runoff.

**Standard 2: Peak Rate Attenuation**

The Post-Development peak discharge rates must not be increased from pre-development rates for the 2-year, 10-year, 25-year, and 100-year storm events. Also, offsite flood impact from the 100-year storm must not be increased. With a combination of infiltration and detention, the peak runoff rate and volume have been decreased. The peak runoff rates have been summarized in the following tables.

**Discharge Summary Tables**

**Subcatchment E1 to P1, SMA1, SMA 2, P5 (Direct to BVW): Peak Rate**

2-year Storm		10-year Storm		100-year Storm	
Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
1.504	1.288	4.565	3.306	9.735	9.160

**Subcatchment E2 and P2 (Off western lot line towards Madison Lane): Peak Rate**

2-year Storm	10-year Storm	100-year Storm

Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
0.022	0.017	0.138	0.095	0.405	0.249

**Standard 3: Stormwater Recharge**

The basin and road drywell have been sized to infiltrate the required recharge volume as specified in the Massachusetts Stormwater Handbook. The “Simple Dynamic” method was used with a Rawls Rate of 1.02 in/hr in sizing the required storage volume to infiltrate the recharging runoff. Calculations were performed to insure drawdown within 72 hours to provide storage for the next storm event. Mounding calculations were performed to insure the required recharge volume will not form a mound that breaks out above the ground surface. Detailed calculations showing compliance with Standard 3 have been attached to this report.

**Standard 4: Water Quality**

The required water quality volume for this project is 0.5” of runoff over the impervious area since the infiltration rate is less than 2.4 inches per hour. This volume will be treated to meet the 80% TSS removal requirement of Standard 4. For this development, the combination of an infiltration basin, a water quality swale, and a road drywell will treat the impervious runoff area. Calculations showing treatment levels are attached.

**Standard 5: Land Uses with Higher Potential Pollutant Loads**

The site is will not contain “land uses with higher potential pollutant loads.”

**Standard 6: Critical Areas**

The site does not discharge runoff to critical areas.

**Standard 7: Redevelopment**

The proposed project is new development.

**Standard 8: Construction Period Controls**

The erosion and sedimentation control measures will be followed in accordance with the Erosion and Sedimentation Control Plan, Sheet 7 of 7, and will be consistent with the requirements of the NPDES Construction General Permit. The project will require coverage under the NPDES Construction General Permit.

**Standard 9: Operation and Maintenance Plan**

An Operation and Maintenance Plan is included in this report.

**Standard 10: Illicit Discharges to Drainage System**

An Illicit Discharge Compliance will be provided prior to the discharge of stormwater runoff to the post-construction stormwater BMP’s.

## **Design Basis**

1. The United States Department of Agriculture Natural Resource Conservation Service (N.R.C.S.) TR55 methodology was used to determine offsite rates of runoff.
2. The twenty-four hour rainfall, taken from N.R.C.S. publications, is 6.4 inches for the 100-year storm, 4.5 inches for the 10-year storm, and 3.1 inches for the 2-year storm event.
3. The hydrologic calculations were performed using the computer program: "Hydraflow Hydrographs 2007" by Intelisolve.
4. The soil types of the site were taken from the N.R.C.S. Soil Survey Map for Concord.
5. Soil conditions and estimated seasonal high groundwater table were based on on-site soil evaluations.

## **Long Term Operation and Maintenance Plan**



## **Schedule for Inspection and Maintenance:**

### **Street Sweeping:**

The pavement shall be swept of all sediment once in the spring and once in the fall.

### **Deep Sump and Hooded Catch Basins, Manholes and Drop Inlets:**

The deep sump for the catch basins shall be inspected and cleaned annually. The catch basins shall have a four foot deep sump and the water level is maintained by the discharged pipe at four feet. The discharge pipe is hidden from view by a hooded outlet. The depth of the sediment in a basin shall not exceed a depth of 18 inches as determined by probing with a stick. If the stick hits the bottom within 30 inches of the water level, more than 18 inches of sediment has accumulated and must be removed. Licensed persons should remove and dispose of the contents of the sump in accordance with applicable regulations.

### **Drainage Basins:**

In each of the first three years after construction, two inspections are required in both the growing and non-growing seasons. After successful establishment of all required vegetation and surfaces withstand erosion, inspection and maintenance should continue on a yearly basis. The following observations and corrective measures should be made during each inspection:

- Side slopes of the channel shall be inspected for erosion. All eroded areas shall receive 6" of loam and be reseeded per original design plan. Areas of continued erosion shall be stabilized with 3" minus riprap.
- Remove all sediment from the channel once the sediment reaches 10% of channel volume of 3-inch depth.

### **Subsurface Drainage Structures:**

The subsurface drainage system will drain completely following a storm event. The inspection ports shall be opened and inspected annually. If water is observed in the clean out riser, the check the weir in outlet structure DMH-1 for clogging. Remove any debris that may be present. If no debris is present then the system may need to be replaced. The inspection should not be done within 72 hours of a rain event.

### **Roof Drain Drywells (Responsibility of each lot owner):**

Inspect the drywell after every storm for the first few months to ensure proper stabilization and function. Thereafter, inspect and clean it at least once per year. Water levels should be recorded over several days to check the drywell drainage.

### **Sediment Forebays:**

The floor and sidewalls of the sediment forebay must be stabilized before use. Sediment forebays shall be inspected monthly and cleaned a minimum of four times per year and when sediment depth is between 3-6 inches. After sediment removal, any damaged vegetation must be replaced. Grass in the forebay shall not exceed 6 inches in length and any rilling and gullying shall be repaired as necessary.

**Infiltration Trenches** (Responsibility of each lot owner)

Inspect the infiltration trench after the first several rainfall events, after all major storms, and on regularly scheduled dates every six months. If the top of the trench is grassed, it must be mowed on a seasonal basis. Grass height must be no more than four inches. Routinely remove debris from the top of the trench.

**Emergency Contacts:**

In the event of a hazardous materials spill on the site the following parties shall be contacted:

Fire Department: ph: 978-264-9645

**Records:**

The Owner shall maintain an inspection log of all elements of the storm water management plan. The owner shall maintain a maintenance log documenting the inspection and maintenance of the drainage structures under his control. A copy of the erosion control and storm water maintenance plan and inspection logs shall be kept onsite at all times.

**Responsibility Party:**

The current Owner shall be responsible for all inspection and maintenance of the items included in the Manual.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## **Operation and Maintenance Sample Inspection Log**



**27 Jackson Drive**  
**Operation and Maintenance Inspection Log**

Year: \_\_\_\_\_

<u>Inspection Items:</u>	<u>Frequency:</u>
Street Sweeping	Two times per year
Catch Basins	Four times per year
Drywells	Once per year
Sediment Forebay	Monthly
Drainage Basin	Once per year

**Street Sweeping:**

Previous Inspection Date: \_\_\_\_\_

Inspection Date: \_\_\_\_\_

Inspector Name: \_\_\_\_\_

Comments:

Action Required:

**Catch Basins:**

Previous Inspection Date: \_\_\_\_\_

Inspection Date: \_\_\_\_\_

Inspector Name: \_\_\_\_\_

Sediment Depth: \_\_\_\_\_ (Remove if depth greater than 18")

Comments:

Action Required:

**Drywells:**

Previous Inspection Date: \_\_\_\_\_

Inspection Date: \_\_\_\_\_

Inspector Name: \_\_\_\_\_

Comments: \_\_\_\_\_

Action Required:

**Sediment Forebay:**

Previous Inspection Date: \_\_\_\_\_

Inspection Date: \_\_\_\_\_

Inspector Name: \_\_\_\_\_

Erosion in Forebay: \_\_\_\_\_

Comments: \_\_\_\_\_

Action Required:

**Drainage Basin:**

Previous Inspection Date: \_\_\_\_\_

Inspection Date: \_\_\_\_\_

Inspector Name: \_\_\_\_\_

Sediment Forebay: \_\_\_\_\_

Erosion in Basin: \_\_\_\_\_

Outlet Structure: \_\_\_\_\_

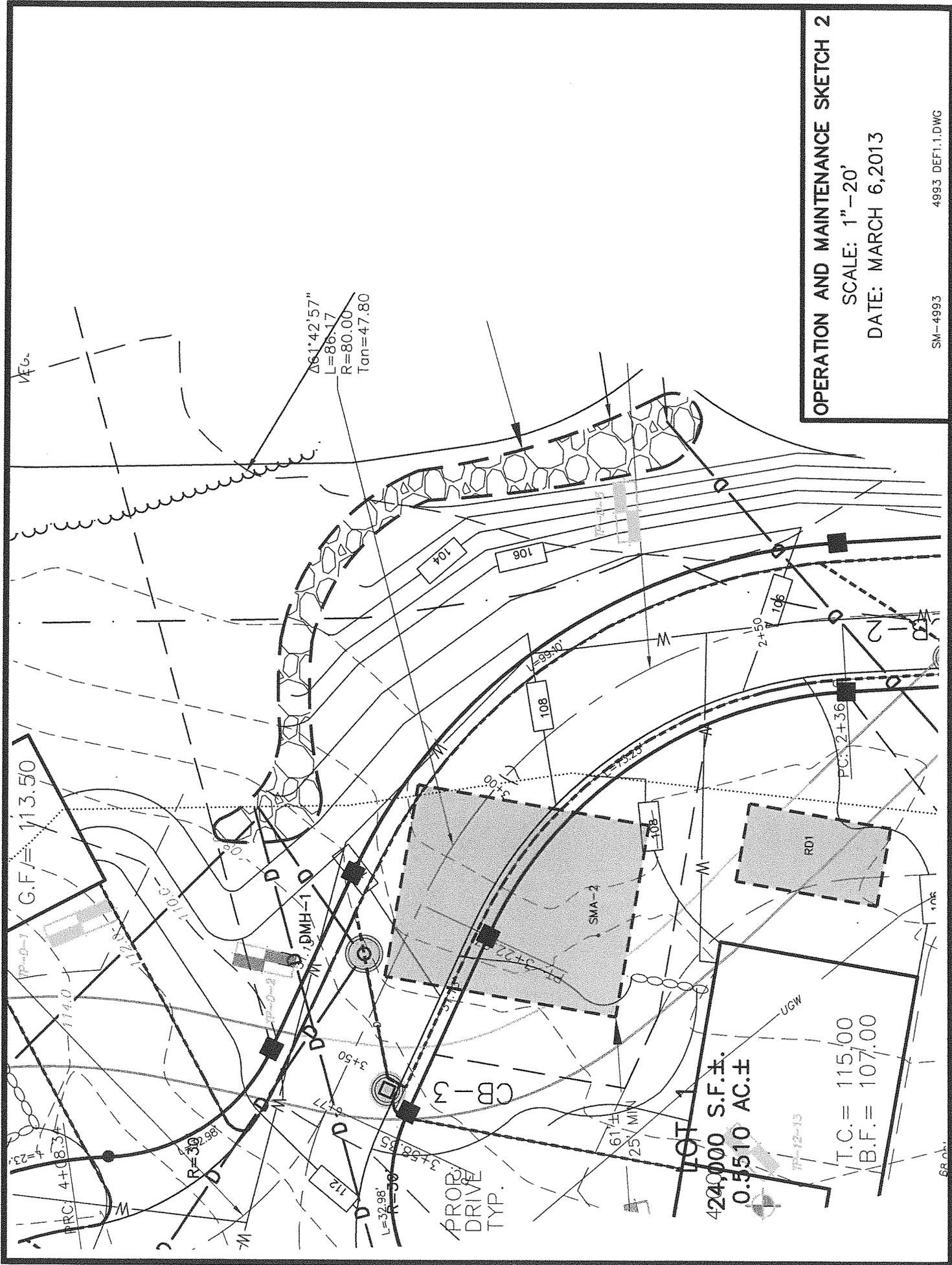
Comments: \_\_\_\_\_

Action Required:

## **Operation and Maintenance Sketches**







**OPERATION AND MAINTENANCE SKETCH 2**

SCALE: 1"=20'

DATE: MARCH 6, 2013



OPERATION AND MAINTENANCE SKETCH 4

SCALE: 1"=20'

DATE: MARCH 6, 2013

SM-4993

4993 DEF1.1.DWG

