

Operation & Maintenance Plan for
Building 1 Parking Area Stormwater BMPs
Nye Lubricants, Inc.
12 Howland Road
Fairhaven, MA 02719

Prepared for:
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Table of Contents

1.0 Introduction.....	2
2.0 Purpose	2
3.0 Descriptions and Locations	2
3.1 Description	2
3.1.1 RainGardens.....	2
3.1.2 Vegetated Filter Strip.....	3
3.2 Location.....	3
4.0 Inspection Frequency, Safety, and Schedule	3
4.1 Inspection Frequency.....	3
4.2 Inspection Safety.....	3
4.3 Maintenance	4
5.0 Implementation and Maintenance Procedures	4
5.1 RainGardens.....	4
5.1.1 Checklist.....	5
5.2 Vegetated Filter Strips	5
5.2.1 Checklist.....	6
6.0 Inspections and Record Keeping	7

Appendices

Appendix A	Inspection and Maintenance Forms
Appendix B	As-Built Plans (to be included after Construction)

1.0 Introduction

Nye Lubricants, Inc (Nye) is the repaving of the parking area south and southwest of Building 1 at the site described by the Fairhaven Assessor's Department as Map 19 Lot 100, also known as 12 Howland Road. As part of the balance between development and environmental protection, the project proposes various Stormwater Best Management Practices (BMPs) to capture and treat runoff from the developed area and maintain the ecological integrity of the wetland resource areas.

2.0 Purpose

This Operation and Maintenance Plan (O&M Plan) provides a mechanism for the consistent inspection and maintenance of the of stormwater drainage structures installed during the Project. Included in this O&M Plan is a description of the stormwater structure, the location of each structure, an inspection schedule for each stormwater structure, and a standard form to be utilized to document the inspection and maintenance of each stormwater structure. Nye will be responsible for the Operation and Maintenance of the proposed Stormwater BMPs and the vegetative plantings. We estimated that the annual expense will be \$750 for all the tasks described herein.

3.0 Descriptions and Locations

3.1 Description

The proposed activities will include a reduction of impervious area, a vegetated filter strip and two raingardens. For more specific location information and design specifications, please refer to the project plans accompanying this O&M Plan.

3.1.1 RainGardens

RainGardens function as soil and plant-based filtration devices that remove pollutants through a variety of physical, biological, and chemical treatment processes. The RainGardens used in this Project utilize a bioretention system consisting of a soil bed planted with native vegetation all located above an underdrain layer. Stormwater runoff entering the RainGarden system is filtered through the hardwood bark mulch layer and then the bioretention soil mixture before being collected and then conveyed downstream by the underdrain system. Runoff storage depths above the planting bed surface are less than 6 inches. Bioretention systems are used to remove a wide range of pollutants, such as suspended solids, nutrients, metals, hydrocarbons, and bacteria from stormwater runoff. They can also reduce the peak runoff rates and increase stormwater infiltration when designed as a multi-stage, multi-function facility.¹

¹ New Jersey Stormwater Best Management Practices Manual, February 2004, Chapter 9.1, "Standard for Bioretention Systems."

3.1.2 Vegetated Filter Strip

Vegetated Filter strips, often referred to as grass buffer strips, are uniformly graded vegetated surfaces that receive sheet flow runoff from an adjacent impervious area. These filters are intended slow runoff, filter some of the sediment and promote natural infiltration. They are typically designed as a pre-treatment stormwater BMP and implemented as a first line of defense in a stormwater treatment train.

3.1.3 Street Sweeping

Street sweeping activities are performed to address debris that collects in parking and paved areas. At this site that could include sand, debris, and seashells. This is a non-structural best management practice that is used to removed items that collect on the impervious area that could contain nutrients or contaminants that would be deleterious to the surrounding area if they runoff from the impervious area.

3.2 Location

The site is located at 12 Howland Road in Fairhaven, with the stormwater BMPs located in the southwestern corner of the parking area for Building 1. Locations are also shown in the plans provided in Appendix B of this Manual.

4.0 Inspection Frequency, Safety, and Schedule

4.1 Inspection Frequency

A complete and thorough inspection of the system using the inspection and maintenance forms provided in Appendix A of this Manual shall be performed on a semi-annual basis (once in the spring and once during the fall) and after major rain events or nor'easter storm events (approximately 2.0 inches of rain). See Section 5.0 Implementation and Maintenance Procedures for a description of the inspection activities.

4.2 Inspection Safety

The inspector performing the inspections on the structures and vegetation must have the proper safety equipment (heavy duty gloves, steel-toed boots, hard hat, and first aid kits, etc.) and training before conducting any inspections. If the drainage structures reveal any safety problems the site activities may need to be modified to reduce or eliminate the safety risk. The following is a list of safety precautions the inspector should be aware of when conducting the drainage structure inspections.

- Wear gloves for any inspections. Wearing gloves not only reduces the risk of getting cuts and abrasions, but also reduces the exposure of pollutants to the skin.
- Lift boulders or cobbles carefully. These items can be very heavy and if wet, can be slippery. Also, learn the correct way to lift heavy items to avoid back injury.
- Check the water depth of the system before you take a step in the water. The water may be deeper than you think or there may be steep slopes below the water line.
- Be aware that nails, broken glass, or other sharp debris may be present and can cause injury. Wearing the proper safety clothing will reduce the safety risk associated with these objects.

- Because the site contains vegetation, ticks, mosquitos and other pests can represents a risk. Products containing permethrin kill ticks. Permethrin can be used to treat boots, clothing and camping gear and remain protective through several washings. Use a repellent with DEET on skin. Repellents containing 20% or more DEET (N, N-diethyl-m-toluamide) can protect up to several hours. Always follow product instructions. Long sleeves and long pants are recommended to be worn to minimize exposed skin areas. After the site visit, check clothing and body for ticks, and remove any found as soon as possible, using tweezers and pulling the tick straight out.

4.3 Maintenance

All maintenance work must be done in accordance with OSHA regulations. Maintenance personnel will have the proper safety equipment (heavy duty gloves, steel-toed boots, first aid kits, etc.) and training before performing any maintenance on the Site. The following is a list of safety precautions maintenance personnel should be aware of when they perform maintenance on the drainage structures.

- Operate equipment safely and in accordance with the manufacturer's specifications. Equipment operators must always remain aware of site personnel to avoid causing injury to others.
- Contact Dig Safe System Inc. at 1-888-DIG-SAFE seventy-two (72) hours before excavating a site. Underground utility wires and pipes may be present. Cover excavated areas that cannot be filled in at the end of the day. Also, be aware of overhead electrical wires that could come in contact with maintenance equipment.
- Identify where you will dispose removed sediment or wastes prior to cleaning the drainage structures. Use shovels, trowels or a high-suction vacuum to remove wastes. Do not clean sediment or waste with bare hands. The sediment or waste may be hazardous. Place the sediment or waste in an area where it cannot be washed into a storm drain or water body.
- Wear gloves when performing maintenance work. Wearing gloves not only reduces the risk of getting cuts and abrasions, but also reduces the exposure of pollutants to the skin.

5.0 Implementation and Maintenance Procedures

Nye is responsible for inspecting and maintaining the parking area and the stormwater BMPs being implemented as part of this project. The following list of inspections and maintenance will be performed on the required schedule. All sediment, debris, and hydrocarbons contaminated material that are removed during the maintenance of the stormwater system components should be properly handled and disposed.

5.1 RainGardens

The primary maintenance requirement for RainGardens (Bioretention Systems) is that of inspection, and repair or replacement of the RainGarden's individual components. Typically, these activities consist of nothing more than that which is required of any landscaped area. The primary maintenance function is the removal of accumulated sediment and debris. Other potential tasks include the replacement of dead

vegetation, soil pH regulation, erosion repair at inflow points, mulch replenishment and repair of inflow structures.

5.1.1 Checklist

Table 5-1 RainGarden Maintenance Schedule	
Soil	
<ul style="list-style-type: none"> • Visually inspect and repair in the Spring and Fall. In the event of erosion, stabilize erosion path with ¾ inch crushed stone • Remove accumulated sediment, debris, and litter • Check the soil pH every other Spring. Apply appropriate product to adjust pH, as required. The recommended soil pH levels should range from between 5.0 and 6.0 for the raingardens. 	
Mulch	
<ul style="list-style-type: none"> • Re-mulch any void areas by hand, as needed. • Every Spring add a fresh mulch layer. • Every 3rd year, remove and replace mulch. 	
Plants	
<ul style="list-style-type: none"> • Once a month during the growing season, visually inspect vegetation for disease and pest problems. • Every Spring and Fall, remove and replace all dead and diseased vegetation. • Weed, as needed. • Prune excess growth and dead branches every Spring. • During periods of drought, inspect for signs of stress (wilting, yellow, spotted or brown leaves, loss of leaves, etc.). Water in the early morning as needed. 	
General	
<ul style="list-style-type: none"> • Annually, after a heavy rainstorm, inspect RainGardens for signs of ponding and to make sure water dissipates after a period of 4 to 6 hours. • Monthly, inspect and remove accumulated trash and debris from Raingardens. 	

5.2 Vegetated Filter Strips

Inspections will be performed once during the late spring and once during the fall, however there shall be additional inspections per year for the first growing season following construction. During the initial post-construction period, special attention will be paid to the grass plantings to ensure they are establishing as intended. Filter strips should be inspected for health of vegetation, soil stability, erosion and sedimentation. Regular maintenance tasks include mowing, watering, weeding, pest control and sediment removal.

5.2.1 Checklist

Table 5-2 Vegetated Filter Strip Maintenance Schedule
Soil
<ul style="list-style-type: none"> • Visually inspect and repair in the Spring and Fall. In the event of erosion, stabilize erosion path by reestablishing soil, grass, and mulch. • Every Spring and Fall remove accumulated sediments and debris. • Check the soil pH every other Spring. Apply appropriate product to adjust pH, as required. The recommended soil pH levels should range between 5.0 and 6.0 for the water quality swales.
Grass
<ul style="list-style-type: none"> • Once a month during the growing season, visually inspect vegetation for disease and pest problems. • Every Spring and Fall, remove and replace all dead and diseased vegetation. • Weed, as needed. • Reseed if needed, to maintain effectiveness of vegetation for pollutant and sediment removal. • Mow as necessary. Never cut shorter than 4 inches. • During periods of drought, inspect for signs of stress (wilting, yellow, spotted or brown leaves, loss of leaves, etc.). Water in the early morning as needed.
General
<ul style="list-style-type: none"> • In the event of heavy sediment accumulation, the vegetated water quality swale may need to be reconstructed.

5.3 Street Sweeping

Nye has an on-site street sweeper which is used for the seashells continually dropped on the parking areas by birds in the area. The street sweeping will also be used to remove sediment and debris that accumulates in the parking structure. The street sweeping proceeds are collected and properly disposed.

5.3.1 Checklist

Table 5-2 Street Sweeping Maintenance Schedule
Soil
<ul style="list-style-type: none"> • Visually inspect in the Spring and Fall, particularly in advance of snow storms, and following a heavy snow event and the associated melting. • Every Spring and Fall remove accumulated sediments and debris. • Seashells shall be removed on an as-needed basis.
General
<ul style="list-style-type: none"> • In the event of heavy sediment accumulation, street sweeping may need to occur more frequently.

6.0 Inspections and Record Keeping

An "Inspection and Maintenance Form" shall be filled out each time inspectional or maintenance work is performed.

A binder will be kept at the property owner's offices that contains all the completed forms and/or photos and related material. The inspection reports in the binder will be maintained for a minimum of three years and will include photo documentation of the inspections.

A review of all Operation & Maintenance actions will take place annually to ensure that the Site is being taken care of in the manner illustrated in this Operation & Maintenance Plan.

The Nye personnel responsible for implementing this Operations and Maintenance Plan are:

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O&M Activity Log – Building 1 Paving Stormwater BMPs, 12 Howland Rd, Fairhaven, MA

Activity No.	Description of the Activity	Dates of the Activity	Signature of Person Performing Activity	Activity Performed by [Name(s) and Title]
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

BIORETENTION MAINTENANCE INSPECTION FORM

Bioretention Cell: _____ Date: _____ Time: _____
 Weather: _____ Inspector(s): _____
 Date of last rainfall: _____ Amount: _____ Inches
 Street Location: _____

Maintenance Issues:
Comments:

Scoring Breakdown:	1 = Monitor (potential for future problem exists)	*Use open space in each section to further explain scoring as needed
N/A = Not Applicable	2 = Routine maintenance required	
N/I = Not Investigated	3 = Immediate repair necessary	
0 = Not a problem		

1. Outlet, Underdrain, & Cleanout Condition (Inspect underdrain outlet inside catch basin)						
Broken (replacement required?)	N/A	N/I	0	1	2	3
Clogging (flushing required)	N/A	N/I	0	1	2	3
Submerged Outlet Pipe (CB cleaning required)	N/A	N/I	0	1	2	3
2. Bioretention Soil Mix Condition						
Sediment/debris accumulation > 1"	No	Yes				
Ponding more than 24 hours after rain	No	Yes				
Soil pH						
Sediment Accumulation in soil bed	N/A	N/I	0	1	2	3
Oil/chemical accumulation in soil bed	N/A	N/I	0	1	2	3
Other:	N/A	N/I	0	1	2	3
3. Plant Condition						
Disease/Pest Problems	N/A	N/I	0	1	2	3
Weeds	N/A	N/I	0	1	2	3
Excess growth and/or dead branches	N/A	N/I	0	1	2	3
Signs of drought	N/A	N/I	0	1	2	3
4. Mulch Condition						
Overall Condition	N/A	N/I	0	1	2	3
5. Erosion						
Soil and/or debris erosion	N/A	N/I	0	1	2	3

Overall Condition of Bioretention Cell
Inspector's Summary:

VEGETATED FILTER STRIP MAINTENANCE INSPECTION FORM

Facility Number: _____ Date: _____ Time: _____
 Weather: _____ Inspector(s): _____
 Date of last rainfall: _____ Amount: _____ Inches
 Street Location: _____ GPS Coordinates: _____

Scoring Breakdown:		
N/A = Not Applicable	1 = Monitor (potential for future problem exists)	*Use open space in each section to further explain scoring as needed
N/I = Not Investigated	2 = Routine maintenance required	
0 = Not a problem	3 = Immediate repair necessary	

1. Transition from Pavement to Filter Strip						
Undermined/eroded	N/A	N/I	0	1	2	3
Debris/trash accumulations	N/A	N/I	0	1	2	3
Sediment accumulation	N/A	N/I	0	1	2	3
2. Grassed Filter						
Disease/Pest problems	N/A	N/I	0	1	2	3
Sediment/debris accumulation	N/A	N/I	0	1	2	3
Weeds	N/A	N/I	0	1	2	3
Signs of drought	N/A	N/I	0	1	2	3
Consistent mowing (grass kept at minimum height of 4" or greater)	N/A	N/I	0	1	2	3
Other:	N/A	N/I	0	1	2	3
3. Erosion						
Soil erosion	N/A	N/I	0	1	2	3
Foreign Objects causing erosion	N/A	N/I	0	1	2	3
4. Soil						
pH level						
5. Miscellaneous						
Other:	N/A	N/I	0	1	2	3

Overall Condition of Facility	
Total number of concerns receiving a:	(1) _____ - Needs Monitoring
	(2) _____ - Routine Repair
	(3) _____ - Immediate Repair Needed
Inspector's Summary:	