STORMWATER SYSTEMS MANAGEMENT PLAN

GREAT BAY KENNEL – DOG DAY CARE
27 NEWMARKET ROAD
DURHAM, NH 03824
TAX MAP 6, LOT 11-7

PREPARED FOR:

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1.0 TABLE OF CONTENTS

LIST OF APPENDICES — APPENDIX

2.0 EXECUTIVE SUMMARY

The Storm Water Systems Management Plan (SWSMP) provides a complete reference guide for use by the property owner and their chosen maintenance subcontractor for the inspection and maintenance of the storm water best management practices (BMPs) at the Great Bay Kennel Dog Day Care in Durham, NH. While the primary purpose of the SWSMP is to establish inspection and maintenance requirements, the plan also summarizes the purpose and function of each practice. The SWSMP, in conjunction with the construction plans and details found in the Site Plan Package, describe the construction requirements of each BMP and standards for their protection and initial stabilization during the construction phase of the development and therefore should be incorporated into the construction bid documents. Compliance with the recommendations in the SWSMP will assure expected operation, performance, and life cycle of the BMPs which have a common purpose of collecting and treating storm water runoff in an effort to protect the quality of public waters.

3.0 TEMPORARY BEST MANAGEMENT PRACTICES

This section describes the temporary best management practices to be employed during construction whose purposes are to protect downstream water quality from sediment/ contaminants carried in storm water surface run off during the site construction phase of the development. The temporary BMPs are summarized below.

3.1 SILT SOXX™ (PERIMETER CONTROL)

Silt Soxx is a 12 to 18 inch diameter tube of geotextile fabric filled on site with bark mulch/compost. This is used along the down gradient side of disturbed site areas where surface runoff is non-concentrated sheet flow or minimal shallow concentrated flow. The material in the tubes filters the runoff and allows sediment to settle out by temporarily ponding runoff on the up gradient side.

These tubes are placed as shown in the construction plans prior to any soil disturbance on the site and maintained in accordance with the manufacturers requirements throughout construction. The tubes are removed once the development site has achieved greater than 75% stabilization. Bare soil areas resulting from the removal of the tubes are revegetated. Alternatively, the tubes can be slit along the top and the mulch/compost distributed to either side. The tube material then gets removed and disposed of in a normal trash container used by the contractor.

3.2 SWEEPING OF PUBLIC WAY

Sweeping is accomplished by power broom or hand broom as needed whenever soil or debris from site construction activities are deposited on the public way. At a minimum, sweeping shall take place at the end of each work day during the site work and landscaping phase of construction.

3.3 SILTATION POND

Storm water runoff from disturbed areas associated with site construction tends to concentrate more easily than on naturally vegetated soils. The velocity of the runoff becomes erosive as it concentrates in the resulting conveyance of sediment. Properly placed siltation ponds allow temporary ponding of this runoff which allows much of the sediment to settle out. The siltation pond is provided with a stable overflow channel such as a rip rap spillway underlain with a

geotextile fabric or sand filter to allow runoff to exit the pond during more intense rain events.

In many instances, the pond areas used as a permanent BMP can temporarily be used as a siltation pond. In this case, it is recommended that the area of the bioretention system not be used as the siltation pond to avoid degradation of the infiltration capacity of the surrounding soils. The siltation pond should be constructed to the north of the bioretention system adjacent to the proposed access drive.

3.4 STONE CHECK DAMS

As the name implies, stone check dams are physical dams made from 1-1/2 inch and smaller crushed stone, often referred to as erosion stone. They are used in areas of concentrated flow such as swales, but also in areas prone to rilling. Check dams decrease the velocity of the runoff, filter runoff, and allow soil particles to settle out by creating a temporary "pond" on the up gradient side of the dam. The shape of the dam shall always cross from one side of bank to the other, or in the case of placement on a slope, shall be shaped as a horse shoe so that runoff can not run around the outside edges of the dams. Stone check dams shall be replaced when sediment accumulates to 2/3 the original height of the dam.

3.5 INLET PROTECTION

The purpose of inlet protection is to collect and contain the majority of soil particles conveyed in storm water runoff prior to the runoff entering a drainage structure inlet (catchbasin, manhole opening, culvert, etc.). The use of silt sock is acceptable for inlet protection during this project.

3.6 MULCHING, TACKIFIER, GEOTEXTILE MATTING, CRUSHED GRAVEL

These temporary practices are employed to improve the resistance of bare soil to erosion. Mulching with weed free straw/hay, sprayed on liquid tackifier, and placement of decomposable fabrics reduce and disperse the impact of falling rain drops, minimize the velocity of runoff, and help hold soil particles in place. Use of a temporary 4" thick layer of crushed gravel provides a necessary means of equipment travel through otherwise unstable material and helps minimize the release and conveyance of soil particles. Any single or combined form of these practices is highly encouraged during construction. Examples include disturbed areas excavated to subgrade and then left un-worked for more than 3 consecutive days and on temporary soil stockpiles. This shall continue until the final permanent site stabilization is in place and at least 75% of the vegetation is established.

3.7 SITE DEWATERING

Efforts shall be made to eliminate excavating in extremely damp conditions. The use of equipment in soils where free water is present tends to cause erosion and increased sedimentation. Dewatering requires removal of free groundwater to below the depth of excavation and can be accomplished by digging a temporary sump adjacent to the excavation site and filling this sump with clean crushed stone embedded with a perforated stand pipe. A pump is then placed in the standpipe to extract the water. With time, the free groundwater in the vicinity of the excavation is lowered and then site excavation can occur with minimal release of fines into storm water.

3.8 WASHOUT AREA/BOOM

A washout area/boom can take the form of either a naturally vegetated area or manufactured system where water from dewatering can be directed for treatment prior to release into public waters. A simple practice is to encircle an area with haybales overlaid with geotextile and direct the discharge onto a splash plate in the middle of this circle. The size of the area will depend on the amount of water to be discharged and therefore experimentation at the site is warranted.

This area is often used to treat the discharge waters from the washout of concrete trucks. Maintenance is required as the area or system becomes 2/3 or more clogged with fines and fails to contain the majority of fines. Removal of the accumulated fines may be adequate, however, in many instances, full replacement of the practice may be necessary due to the difficulty of restoring the filtration of the practice.

3.9 SITE WATERING

Site watering is intended to dampen the surface of bare soils in order to reduce airborne dust associated with earth moving operations. It is important to establish an application rate suitable for each site that provides adequate dampening of the soils but does not generate runoff. The weather conditions will dictate the frequency of site watering needs.

4.0 PERMANENT BEST MANAGEMENT PRACTICES

The section identifies the BMPs employed on this development and provides a brief summary to establish their purpose in the collection and treatment train within the storm water system. See the included Storm Water Systems Overview Plan for the location(s) of each of the BMPs.

4.1 ROOF DRAINAGE COLLECTION

Portions of the building shall have a roof gutter system with down spouts and collector pipes that discharge to either drip strips or splash pads.

4.2 CLOSED DRAINAGE SYSTEM

The closed drainage system is composed of collection and conduit systems. The bioretention system has an underdrain system that outlets into an 8-inch pipe located in the downslope vegetated buffer. A 10 inch Nyloplast Inline drain will collect runoff from the up hill side of the building and covered canine play area. A drip strip with 4 inch drain will collect runoff for the rear of the proposed building and tie into this catchbasin. The 8-inch catchbasin outlet pipe connects with a wye connection to the bioretention system underdrain pipe.

4.3 TRENCH DRAINS

A trench drains (hillside ditch) is proposed to be relocated further to the south of the proposed building. Trench drains are 12 inch wide by 18 inch high trenches containing a 4" perforated pipe. The trench is lined with geotextile and filled with stone aggregate. These trench drains intercept runoff flowing down the hill toward the dog day care building and play area and minimize erosion of the slope.

4.4 BIORETENTION SYSTEM

The bioretention system is a landscaped depression that allows runoff to pond before it filters through a 15 inch deep soil mix, and infiltrates in to the ground or is collected by an underdrain system. The bioretention system incorporates a dense planting scheme specifically planned for the uptake of runoff.

The bioretention system is designed to temporarily hold runoff like a detention pond and allow time for the vegetation to uptake the runoff, effectively reducing the pollutant load. The bioretention system incorporates an underdrain and spillway.

4.5 DEVELOPMENT VEGETATION

The development plan includes additional landscaping around the parking area. Plants uptake water and thereby reduce contaminants through this water consumption process.

4.6 SEDIMENT FOREBAY

A sediment forebay is proposed to collect runoff from the gravel driveway. The forebay will provide pretreatment of runoff by allowing for the settling of coarse sediments prior to reaching the bioretention system. Runoff will outlet through a 3/4 inch crushed gravel check dam.

4.7 OUTLET PROTECTION

A riprap apron is provided at the outlet of the bioretention system underdrain. Outlet protection reduces the velocity of runoff exiting a pipe thereby preventing scour and downstream erosion.

4.8 VEGETATED SWALE

A vegetated swale is proposed along the hillside to the east of the proposed building. This conveyance swale will intercept runoff and divert it away from the building and into the bioretention system. This swale shall be lined with turf reinforcement matting to prevent erosion.

5.0 INITIAL STABILIZATION AND MAINTENANCE OF PERMANENT BMPS

The maintenance requirements of Best Management Practices will vary through their life span. It is critically important to establish the required maintenance needs during the initial stabilization period as well as those long term maintenance needs during the course of their useful life. This section addresses the maintenance requirements for the initial stabilization period. Long term maintenance, repair, and potential replacement needs are discussed in Section 6.0. Note that any accumulated sediments to be removed shall be removed off site or, if approved by the owner, can be incorporated in the soils used during final site stabilization. However, none shall be incorporated into the soils within the bioretention system.

5.1 ROOF DRAINAGE COLLECTION

Initial maintenance will include keeping the gutters and downspouts flushed clear of debris to ensure proper flow of roof runoff. The splash pads at the down spouts shall also be swept clear of leaves and debris. Any leaks from the gutters shall be addressed.

5.2 CLOSED DRAINAGE SYSTEM

Implementation of the Temporary BMPs, particularly the Silt Sock will protect the closed drainage system from siltation.

5.3 TRENCH DRAINS

To preserve the infiltration capacity of the underlying soils the trench drains (hillside ditches) should not be placed into service until all contributing disturbed areas are stabilized. Do not discharge sediment laden waters from construction activities to the trench drain. Do not traffic exposed soil surface with construction equipment.

5.4 BIORETENTION SYSTEM

The site work contractor is encouraged to refrain from final landscape installation in the bioretention system until the contributing disturbed areas are stabilized and all plant materials are immediately on hand prior to preparing the bedding material. However, it is not possible, especially when the unknown of weather patterns are considered, to time all site construction activities to eliminate accumulation of fines in the final stabilized bioretention system. The fines that do accumulate within the basin portion of the bioretention system during the final phase of construction shall be removed prior to placement of the reservoir course and soil mix.

The establishment of the vegetation shall be a priority including adequate watering and pruning as prescribed by the supplier. It is recommended that the owner hold a contingency/guarantee of growth on the landscape contractor for period of 6 months to one year depending on the timing of the installation.

5.5 DEVELOPMENT VEGETATION

The development incorporates landscaping as shown on the construction plans. Plant beds shall be prepared and plant material shall conform to the supplier's requirements.

5.6 SEDIMENT FOREBAY

The sediment forebay should be stabilized prior to receiving runoff. Initial stabilization requires a minimum of 85% vegetative growth. During construction frequent inspection will be necessary to ensure the sediment forebay is in good working order. Remove sediment, repair eroded areas, and replace vegetation as needed.

5.7 OUTLET PROTECTION

Refer to Long Term Maintenance for requirements.

5.8 VEGETATED SWALE

The vegetated swale should be stabilized prior to receiving runoff. Initial stabilization requires a minimum of 85% vegetative growth. During construction frequent inspection will be necessary. Remove sediment, repair eroded areas, and replace vegetation as necessary.

6.0 LONG TERM MAINTENANCE OF PERMANENT BMPS

This section will be useful to the property owner and their maintenance subcontractor to establish a systematic approach for the inspection and maintenance of the on-site storm water system components. Included in Appendix B is an Inspection Matrix which summarizes the inspection needs described below. An Inspection Report is provided in Appendix C. It is recommended that completed Inspection Reports be filed with this manual for future reference.

6.1 ROOF DRAINAGE COLLECTION

As needed, but at a minimum of once per year after leaf fall, the gutters and downspouts shall be flushed clear of debris to ensure proper flow of roof runoff. The splash pads at the down spouts shall be swept clear of leaves and debris and replaced if necessary. The roof drainage system shall be observed during a rain event to ensure proper performance. Any leaks from the gutters shall be addressed.

6.2 CLOSED DRAINAGE SYSTEM

The catch basin and the bioretention system outlet pipe shall be inspected for debris and clogging. Provide maintenance as necessary.

6.3 TRENCH DRAINS

Inspect trench (hillside ditch) and outfalls for blockage and debris and remove as necessary. Check for settlement of stone aggregate and replenish as necessary. Trench drains should be inspected at least twice annually and following any rainfall event exceeding 2.5 inches in a 24 hour period, with maintenance or rehabilitation conducted as warranted by such inspection. Inspect down slope side of trench drain for erosion which may indicate overtopping during storm events. Restoration of trench may be required which may include removal of sediment or reconstruction of the trench.

6.4 BIORETENTION SYSTEM

Bioretention system should be inspected at least twice annually and following any rainfall event

exceeding 2.5 inches in a 24 hour period, with maintenance or rehabilitation conducted as warranted by such inspection. At least once annually the bioretention system should be inspected for drawdown time. If bioretention system does not drain within 72 hours following a rainfall event, then a qualified professional should assess the system, to determine required measures to restore infiltration and filtration capacity which may include removal of sediment or reconstruction of filter media.

The landscaping and stone mulch will be the major visible features of this BMP. Pruning of the landscaping to the extent necessary and practical to prevent overgrowth of the vegetation. Watering may be necessary during extended periods of extremely hot and/or dry weather.

6.5 DEVELOPMENT VEGETATION

Regularly heading, pruning, and removal of accumulated leaves will encourage proper growth and healthiness of vegetation. Augment mulching at a rate necessary to keep up with decomposition of mulch. Watering may be necessary during extended periods of extremely hot and/or dry weather.

6.6 SEDIMENT FOREBAY

Inspect annually for debris and sediment deposition. Remove sediment when it reaches one half the height of the stone check dam at the outlet of the sediment forebay. Mow embankments twice a year to control growth of woody vegetation. Repair eroded areas as necessary and replace vegetation as needed.

6.7 OUTLET PROTECTION

Inspect for damage and deterioration and repair as necessary.

6.8 VEGETATED SWALE

Inspect annually for sediment accumulation, erosion, and condition of vegetation and repair as necessary. Mow swale to a height of 4 inches or higher as necessary but at a minimum of once per year.

7.0 REFERENCES

The Storm Water Systems Management Plan incorporates many standard and accepted practices. Specifically the following references were utilized:

Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire. Rockingham County Conservation District, August 1992, or latest edition.

The New Hampshire Stormwater Manual, December 2008, Revision 1.0.