# Black Nubble Wind Farm Project

# Erosion and Sedimentation Control Plan
# For Roadway Construction

Prepared by:

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# 1.0 Introduction

DeLuca-Hoffman Associates, Inc. was retained to prepare designs and portions of the permit applications for a series of wind turbines proposed to be sited on Black Nubble. DeLuca-Hoffman Associates, Inc. designed the primary access roads and summit roads, which will be used to access the wind turbines from existing roadway systems; and also prepared the Stormwater Management Report, Erosion and Sedimentation Control Plans, Road Maintenance Plan, Solid Waste Narrative, and Blasting Narrative associated with the primary access roads and summit roads. Note that the term "summit road" is synonymous with "ridgeline road" within this application. The work of DeLuca-Hoffman Associates, Inc. is summarized in a series of reports as follows:

- Basis of Design for Primary Access Roads and Summit Roads;
- Erosion and Sedimentation Control Plan for Roadway Construction;
- Stormwater Management for Primary Access Roads and Summit Roads;
- Road Maintenance;
- Blasting Narrative;
- Erosion and Sedimentation Control Plan for Transmission Line Corridor Construction; and
- Solid Waste Narrative.

The narratives prepared by DeLuca-Hoffman Associates, Inc. are supported by the project Civil Engineering Design Drawings included with this submission. Please refer to Cover Sheet C-1 for a complete list of the project drawings.

The designs and reports prepared by DeLuca-Hoffman Associates, Inc. rely upon baseline information provided for this project by other consultants to Maine Mountain Power.

Civil Engineering Design Specifications for the project are provided in Appendix 2.11.

DeLuca-Hoffman Associates, Inc. has prepared the following plan, which presents the erosion and sedimentation control provisions required to construct the roadways.

The baseline data prepared by other consultants includes the following:

- The identification and location of wetlands and other natural resources by Woodlot Alternatives.
- Surficial Soils Surveys, identification of water courses and seep areas, and narratives prepared by Al Frick.
- Base topographic mapping prepared by Aerial Survey with ground truthing survey integrated by Westwood Professional Services.
- Geotechnical evaluations and recommendations for Roadway Construction prepared by S. W. Cole.

There are other physical elements of the project such as the electrical power transmission lines, staging areas, and small buildings with attendant construction areas, which are being designed by other consultants and discussed in separate portions of the application. The fundamentals of erosion and sediment control presented in this document for the roads will be implemented for the building pad, staging areas and transmission line access route construction. A separate erosion and sediment control plan has been written for transmission line corridor construction.

This plan presents the erosion and sedimentation control provisions required to construct the roadways. There is the potential for conditions to be encountered during construction that have not been anticipated at this time. This plan identifies the tools which can be implemented during construction of the roadways, explains the basis for their use, and provides details for their installation to be able to field adjust the controls to match encountered conditions. The erosion and sedimentation control plan and attendant drawings are not intended to provide the exact location for placement of the erosion control measures, but rather provide the basis for their use. The erosion and sedimentation control plan has been developed to satisfy the requirements of

LURC Chapter 10 Rules and Standards and calls for provisions for the construction of roads to minimize unreasonable soil erosion and not result in reduction in the capacity of the land to absorb and hold water.

## 2.0 Existing Site Conditions

The area where wind turbines are proposed is on top of the Black Nubble Mountain. The centroid of the parcel is approximately latitude 45 degrees 1.25 minutes and longitude 70 degrees 27 minutes. The land for the wind turbines is about 487 acres, bounded by Department of the Navy lands to the south and other portions of Redington Township on the other sides.

The parcel is generally "L" shaped. Elevations of the Black Nubble parcel range from approximately 2,700 to 3,705 feet above sea level. The topography is also steep with some flatter areas on the summits. The topographic ranges on the Black Nubble parcel are characterized in Table 1:

**Table 1 – Topographic Ranges on Entire Black Nubble Parcel**

| Slope Ranges in Percent Slope | Percent of Parcel Area | Area (Acres) |
|---|---|---|
| 0-8 | 6.6 | 31 |
| 8-15 | 14.5 | 68 |
| 15-20 | 14.0 | 66 |
| 20-25 | 14.8 | 70 |
| 25-30 | 12.0 | 56 |
| 30-33 | 6.0 | 28 |
| 33-100 | 32.1 | 151 |
| Area Previously Without Topo | | 17 |
| **TOTALS** | **100.0** | **487** |

The USDA medium intensity soils map shows the following soil types:

- Sisk-Surplus
- Surplus-Sisk
- Saddleback-Mahoosuc-Sisk
- Hermon Monadnock
- Surplus-Saddleback-Ricker

As noted, detailed information on these surficial soils is provided in other reports which accompany this application.

Natural resources on the Black Nubble parcel have been identified by Woodlot Alternatives and are depicted on project maps. Water courses and seeps on the Black Nubble parcel have been identified by Albert Frick, a Certified Soil Scientist, in consultation with David Roque, the State Soils Scientist, and are shown on the project drawings.

The project also affects areas attendant with the required access to the parcels and on proposed transmission lines. The sites will be accessed from Route 16/27 using a series of existing paper company roads to get as close to the mountain range as possible before starting new road construction.

The existing roads from Route 16 are gravel roads. The lengths of the existing roads, which are proposed to be used for access to the Black Nubble parcel, are as follows:

| Table 2 – Access to Wind Turbines | | |
|---|---|---|
| **Existing Road Segment** | **Distance (ft)** | **Distance (miles)** |
| I.P. Road from Route 16 to tee intersection just beyond the Batch Plant Site. | 26,928 | 5.1 |
| Road segment from tee intersection to Lower Black Nubble (includes portion of RE2). | 16,896 | 3.2 |
| | | |
| **TOTALS** | **43,824** | **8.3** |

The IP Road is an excellent quality paper company road with widths that vary from 10 to 18 feet and a generally smooth horizontal alignment and flat to moderate vertical grades. The IP Road has three existing bridges and three sharp corners.

***IP Road***

Road RE2 will be used as a portion of the access to the Black Nubble Mountain parcel. The road travel width varies from 9 to 16 feet and has one bridge.

Black Nubble will be accessed from two new roads. Both roads are in Redington Township. The lower Black Nubble Road will ascend from approximately 2,640 to 2,875 feet above sea level, and the upper Black Nubble Road will ascend from approximately elevation 2,660 to 3,310. The land where the access roads will be constructed is currently commercial forestland.

***RE2***

***RE2***

Natural resources along the existing and proposed access roads have been identified by Woodlot Alternatives and are described in Section 7 (Wildlife and Fisheries). They are also shown on the project drawings.

## 3.0 Overview of Soil Erosion and Sedimentation Concerns

The susceptibility of soils to erosion is indicated on a relative "K" scale of values over a range of 0.02 to 0.69. The "K" value is frequently used with the universal soil loss equation. The higher values are indicative of the more erodible soils. The Black Nubble soils identified by Al Frick and the USDA Medium Intensity Soil Survey with the attendant "K" values are listed in Table 3.

**Table 3 – Surficial Soil Types and Relative Erodibility**

| Soil Type | Soil Description | K Value |
|---|---|---|
| Sisk-Surplus Association | HSG C – Very stony, highly erodible, and well drained. Not hydric. | .24 - .32 |
| Surplus-Sisk Association | HSG C – Strongly sloping, very stony, potentially highly erodible land, and moderately well drained. Not hydric. | .24 - .32 |
| Saddleback-Mahoosuc-Sisk | HSG C/D – Very steep, highly erodible, and well drained. Not hydric. | .05 - .28 |
| Brayton Colonel | HSG C – Gently sloping, very stony, potentially highly erodible land, and poorly drained. Partially hydric. | .17 - .32 |

| | | |
|---|---|---|
| Hermon-Monadnock | HSG A – Rolling, very stony, potentially highly erodible land, and somewhat excessively drained. Not hydric. | .10-.28 |

Based on a review of the K values, the onsite soils in the area where construction is focused are potentially moderately to highly erodible after the cover material is stripped.

The control of erosion and sediment from the proposed construction of the access roads to serve the wind turbines has several requirements which will be necessary, irrespective of tools selected for construction:

- A strict limitation on the amount of denuded (i.e. striped of stumps and grubbings) area exposed at any time;
- The rapid establishment of drainage patterns to control runoff and divert it away from construction areas;
- The proper selection and installation of the erosion control materials;
- The use of native materials to the extent possible;
- The availability of the materials for construction without delay;
- Use of winter conditions to limit and control the disturbance of soils that would be subject to erosion conditions at other times of the year.[1]

These six principles that must be strictly adhered to and are essential for the erosion/sediment control plan to be successful. **It is recommended that any contract include a specific statement requiring the contractor to certify the work will comply with the six requirements listed above.**

[1] July 14, 2006 Prefiled Direct Testimony of Dwight D. Anderson, at p. 24

These six limitations are described further in the following paragraphs:

### 3.1 Limitation 0f Denuded Areas

There will undoubtedly be periods of adverse weather during the construction period for the roadways. Most construction areas are susceptible to erosion during adverse weather. By limiting the amount of denuded areas, the area exposed to erosion at any given time is reduced. Consequently, it becomes known that a major rain event will not cause significant erosion, because the open area which is susceptible to erosion will be small.

Achieving the objective will require the roadways be constructed and completed in segments as opposed to sequential step progression where one element (such as clearing and grubbing) is completed followed by the next construction element. Each segment will be cleared, built, and erosion protected before clearing the next segment.

Limitation of the denuded area will require adherence to the construction sequence established by this plan and designed to limit the size of any denuded area at a given time.

### 3.2 Rapid Establishment of Drainage Patterns to Control Runoff and Avoidance of Erosion

This establishment includes the diversion of runoff from the construction site and the installation of the measures to collect and convey runoff across the roadway. These methods are described in the same sequence in which construction of these measures is recommended and will typically follow clearing operations.

#### *3.2.1 Wet or Seepage Areas*

The first item will be to identify areas where wet conditions or seepage is observed. Fieldwork conducted by Albert Frick, MMP's Certified Soil Scientist, identified the areas shown on the project drawings. Other areas may be

encountered during construction. The following sequence of measures to address these conditions is required:

- Review the proposed profile and determine if an adjustment of the profile can be made to elevate the section of roadway over the wet seepage area. If so, the design profile should be readjusted, being cautious to remain within the basis of design parameters established for the established roadway.
- Grub the wet area – The grubbing should attempt to remove the organics directly under the roadbed area only and in accordance with the Geotechnical Engineering Report to be submitted with the Final Design Plan.
- Place fabric and drainage stone as shown in the trap rock sandwich detail contained in the project drawings (see drawing C-50) or place cross piping.
- Install cross culvert – In most areas at least a 12-inch culvert will be installed within or below the stone bedding. This may be done concurrently with the stone placement or as a subsequent step. However, if done later, the fabric will need to be cut and repaired.
- Place and secure fabric over the stone (unless stipulated otherwise by the geotechnical representative).
- Cover fabric with common borrow to provide at least 24 inches of cover over the top of the culvert.
- Install the riprap culvert inlet and outlet aprons and channel including the flow dispersion lip for the culvert outlet.

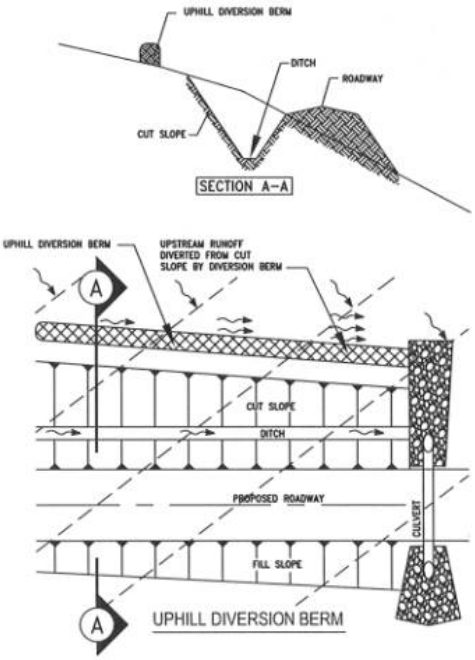
### *3.2.2 Install Cross Culverts Including Aprons and Outlet Flow Dispersion Lip*

It is very important that culverts be carefully sited. Culvert locations will be continually evaluated in the field to accommodate discovered field conditions. The final culvert locations should be at locations which appear to be stable and not eroded and at either natural low areas or areas where the flow dispersion lip can be eliminated. Culverts should be properly bedded and backfilled with cover material prior to crossing them with construction vehicles. Riprap aprons at the inlet and outlet should be installed at the same time that culverts are installed. Anticipated culvert locations are depicted on the project drawings. See Section 1, Appendix 2.3 (Mountain Drainage Analysis Maps).

### *3.2.3 Divert Uphill Drainage*

Runoff which must be handled during construction includes that emanating upslope of the work area. There is a series of implementation steps or tools to control runoff from the upgradient areas when necessary. These include:

- A barrier positioned across the upslope area to divert the water. This method will be very effective when the barrier directs the runoff to an area where a culvert has been set to convey the water across the proposed access road. The upstream barrier is illustrated in the sketch at right.




The material of the diversion berm will vary. A suggested schedule of materials for the barrier, as well as suggested maintenance and removal, is provided in the table as follows:

| **Table 4 – Riprap Material Size for Diversion Berm** | | | | |
|---|---|---|---|---|
| **Flow Range (cfs)** | **Gradient (% Slope)** | | | |
| | **0-5** | **5-10** | **10-15** | **>15** |
| 0-2 | d50 = 2” | d50 = 3” | d50 = 3” | d50 = 4” |
| 2-4 | d50 = 2” | d50 = 3” | d50 = 4” | d50 = 5” |
| 4-6 | d50 = 3” | d50 = 4” | d50 = 5” | d50 = 6” |
| 6-10 | d50 = 3” | d50 = 5” | d50 = 7” | d50 = 8” |

- An upgradient trench to divert the water: This alternative involves trenching in the upstream area to divert the runoff away from the slope. Instead of a berm, a ditch is constructed. The following table illustrates the treatment of the diversion ditch.

| **Table 5 – Diversion Ditch Size and Channel Treatment** | | | | |
|---|---|---|---|---|
| **Flow Range (cfs)** | **Gradient (% Slope)** | | | |
| | **0-5** | **5-10** | **10-15** | **>15** |
| 0-2 | d50 = 2” | d50 = 3” | d50 = 3” | d50 = 4” |
| 2-4 | d50 = 2” | d50 = 3” | d50 = 4” | d50 = 5” |
| 4-6 | d50 = 3” | d50 = 4” | d50 = 5” | d50 = 6” |
| 6-10 | d50 = 3” | d50 = 5” | d50 = 7” | d50 = 8” |

Generally, diversion berms will only be used in lower sections of the roadway where upstream drainage runoff is substantial due to the size of the catchment.

### *3.2.4 Construct Backslope and Drainage Collector*

The final step in the control of the drainage is to construct the ditch on the "cut" side of the roadway. This ditch is typically two feet deep with a 3:1 slope to the edge of shoulder and a backslope which matches the cut slope. The ditch should be protected with the final cover material within 24 hours of completing final grading for any section of ditch.[2] The ditch will lead to the riprap aprons of the cross culvert. In some cases, there may be a drainage collector up the backslope to intercept the runoff from the diversion berm. In areas where seepage is observed in the cut slope, a blanket drain or riprap slope will be installed as shown on the project details. See drawing C-47.

## 3.3 The Proper Selection and Installation of Erosion Control Materials

The erosion control material selection is contingent upon the slope, the tributary watershed and the season of construction. Winter provisions for erosion control are different than those used in the other periods of the year. The installation of erosion control materials should be in strict accordance with the details, Maine DEP Best Management Practices, and information provided by suppliers. **The applicant will provide a training session for the contractor prior to the start of construction. Samples of all erosion control materials will be at the site of the training session in order that the selection and installation techniques can be reviewed. The bids and specifications for the contractor will have the plan attached.**

## 3.4 The Availability of the Material for Construction

The contractor will not be allowed to substitute material or delay installation of erosion control measures. The contractor shall be given the responsibility to maintain an adequate supply of all erosion/sedimentation control materials. In the event that a

[2] June 2, 2006 MMP Response to Agency Comments, Response No. 16 to Art McGlauglin's April 10, 2006 Memo to LURC.

material supply is depleted, additional areas for the roadway construction cannot be denuded until the materials have been received and are available for use on the project.

## 4.0 Description and Location of Limits of All Proposed Earth Movements for the Roadway Construction

The construction of the roadways to access the wind turbines proposed for the Black Nubble mountain range improvements will disturb a variable width section to construct the roadways. This width of disturbance will vary based upon the following:

- The existing transverse grade;
- The needed width of the traveled road surface;
- The relative grade of the proposed section relative to the existing grade;
- The selected side slope treatment;
- The geotechnical stability of the cut slope;
- Uphill diversion methods (if any); and
- Whether the road is in tangent or a curve.

The factors which affect these parameters are discussed in the Basis of Design for Roadways to Access Wind Turbines Report. The lengths of the new roadway proposed for this project are summarized in the updated Key Facts Table for the project, located in Section 1 (Development Description) of the Revised Application, and include 5.6 miles of new road for Black Nubble.

In addition, there will be disturbance for stump disposal areas and for the borrow areas where the roadway surface gravels will be obtained.

There are approximately 104 acres of disturbed area for proposed new access roads, summit roads, turbine sites, stump dumps, substation, reference towers, the O&M site, the Batch Plant,

access routes to transmission lines and existing road improvements as summarized in the solid waste section of this application (Section 18.0, subsection 3).

As noted, this is for the work attendant with the existing and proposed roadways, turbine pads, substation and reference tower sites only. Additional clearing associated with construction of the transmission lines is described in the Erosion and Sediment Control Plan for Transmission line Corridor Construction. See Section 14.2 of the Revised Application.

## 5.0 Existing and Proposed Drainage Features for Roadways

The new roadways will traverse timberland which currently has no formal drainage systems. The basis of design for the drainage system for the new roadways is detailed further in the Stormwater Management for Access Roadways and Basis of Design for the Roadways to Access Wind Turbines. The basic principles include:

Existing seeps and subsurface drainage channels will be retained to the extent possible. The tools to accommodate these are the fabric and crushed stone sandwich to be placed in locations where wet conditions are observed, the use of trap rock protected by fabric under the prepared subgrade, or cross piping. More detailed Cross Hydrology Preservation details are shown on Sheet C-50 of the project drawings. The proposed access road, summit road and turbine site areas have been walked and field surveyed by personnel from Woodlot Alternatives, Albert Frick and Associates and DeLuca-Hoffman Associates, Inc.

Woodlot Alternatives and Albert Frick and Associates have identified water courses (perennial streams, intermittent streams, surface drainage channels, braided channels, seep areas and wetlands). These areas are shown on the plans for the project and have been identified on Drawings C-BN5 to C-BN7. Sample drawing C-BN18 included in Section 2.1 with this submission shows additional detail regarding non-regulated hydrologic features and demonstrates how various project site elements will be appropriately coordinated with the design of the access road and summit areas.

- Soil Hydrology Preservation details are shown on Sheet C-50 of the project drawings and will be designated by select areas on the appropriate 50 scale Grading and Erosion Control plans to be included with the project's final development plan.
- Especially in the higher elevations, the runoff is principally a mix of sheet flow, shallow concentrated flow, and subterranean flow. Culverts will be placed at frequent intervals to avoid flow concentration. When no downstream swale or runoff conveyance channel is observed, the flow will be re-dispersed at the outlet.
- Intercepting groundwater where seeps or erosion of the cut slope are likely to occur.

The stormwater management report provided with this application provides the basis for the size and placement of most culverts. However, placement will rely on field judgment and reconnaissance. Most drainage channels have been located and considered in the roadway design. An example of the detailed grading and erosion control plan is shown in drawing C-BN18. Additional detailed grading and erosion control plan drawings will be provided with the Final Design Plan.

Monitoring of the culvert outlets after construction will be necessary to confirm the culvert discharges are not causing erosion in downstream areas. If erosion is observed, the following corrective alternatives are available:

- Placement of non-erodible material or geotextiles to re-disperse the flow.
- Adding Culverts – For example, if a problem area was observed, and it appeared to be fed by 200 feet of runoff intercepted in the uphill ditch, a second culvert placed midway back of the ditch line would reduce the flow by 50%. Therefore, follow-up monitoring of the outlets will occur to verify discharge stability.

The existing roadways have existing culverts and bridges, which will be retained or replaced. If lengthening of culverts is required along existing roadways, the size will be matched. If culvert replacement were required, the replacement for small culverts would be increased by one size.

(For example, a 15-inch culvert would be replaced with an 18-inch culvert.) Larger culverts would be checked for size before replacement using the procedures described in the stormwater management report for roadways.

## 6.0 Critical Areas

The following four areas are considered "critical" areas:

### 6.1 Areas Within the Designated Viewsheds

Stump disposal areas, borrow sources, and other features which result in additional clearing should not be located within the areas considered to be viewsheds. For identification of these areas, refer to the visual assessment portion of this application prepared by Terrance DeWan and Associates.

### 6.2 Areas Near Natural Resources

Wetlands, streams, and other natural resources are considered critical areas. The critical areas include buffers as shown on the drawings. Only the specific work shown on the plans shall be permitted in these areas. No optional areas such as stockpiles, stump disposal areas, or borrow sources are located within these critical areas.

### 6.3 Areas Above Elevation 2700

In areas above elevation 2,700, the period of exposure for denuded areas is reduced and the period where winter construction measures are required is longer than in the areas below this elevation. **The contractor should take careful note of this differential.**

### 6.4 Areas With Slopes Over 25%

These areas are unsuitable for use due to slope. Stump dumps and stockpiles are not located within these areas.

## 7.0 Erosion/Sedimentation Control Measures

The Applicant should provide the contractor with this plan, since it defines the basis of the erosion/sedimentation control plan for the project.

**It is the responsibility of the contractor to properly install these devices to achieve the requirement for control of fugitive dust emissions, avoidance of turbid discharges, and avoiding significant sedimentation throughout construction.**

The proper installation of these devices, combined with the essential steps of implementation outlined in Sections 3.1 to 3.4, will be necessary for the contractor to meet these responsibilities. The devices described in this section are among the tools available to the contractor for construction of this project. These devices shall be installed as indicated on the plans or as described within this plan. For further reference, see the Maine Erosion and Sediment Control Best Management Practices, March 2003. Also see: State of Maine Department of Transportation (MDOT), Standard Specifications, Highways and Bridges, Revision of 1992; Erosion and Sediment Control Handbook for Maine Timber Harvesting Operations – Best Management Practices, June 1991; and Land Use Handbook – Section 6 – Erosion Control on Logging Jobs and Revision (Supplement), effective January 5, 1981. In addition, the contractor may add measures to meet the responsibility as defined by this narrative.

### 7.1 Siltation Fence

Siltation fence shall be installed down slope of any disturbed areas to trap runoff-borne sediments until the site is revegetated. The silt fence shall be installed per the detail provided in the plan set and inspected immediately after each rainfall and at least daily during prolonged rainfall. The contractor shall make repairs immediately if there are any signs of erosion or sedimentation below the fence line. Proper placement of stakes and keying the bottom of the fabric into the ground is critical to the fence's effectiveness. If there are signs of undercutting at the center or the edges, or impounding of large volumes of water behind the fence, the barrier shall be replaced with a stone check dam.

Siltation fence on the downgradient side of the roadway should be installed after the profile and slope treatment for the applicable segment of roadway has been determined. (For additional information on the implementation steps refer to Section 7 of the Basis of Design for Primary Access Roads and Summit Roads narrative.)

Silt fence is classified by three types depending upon the timing and intent as follows:

**Table 6 – Schedule of Silt Fence Requirements**

| Silt Fence | Type and Purpose | Time of Installation |
|---|---|---|
| Type 1 | To trap sediment along the downgradient edge of the roadway with the silt fence placed in segments to nearly parallel existing contours. | At initial site preparation and clearing, prior to other work. Also install around the perimeter of any stockpile which has erosion potential. |
| Type 2 | To trap sediment from the work area; install in short sections parallel to existing contour; typically occurs where proposed and existing contours form a "V" shape. | During construction as the contour is shaped. |
| Type 3 | To trap sediment along the base of proposed cut slopes; typically used in deeper cut areas. | During construction after new grade and backslope are shaped. Time between work in area and shaping new grade to allow silt fence to be installed shall be minimized. Typically not required if the cut slope height exceeds five feet. However, slopes which are found to be wet or have seepage may warrant the use of this silt fence for shallower heights. |

## 7.2 Mulch

Straw, bark or hay mulch, including hydroseeding, is intended to provide cover for denuded or seeded areas until revegetation is established. Mulch placed on slopes of less than 10 percent shall be anchored by applying water; mulch placed on slopes steeper than 10 percent shall be covered with fabric netting and anchored with staples in accordance

with the manufacturer's recommendations. Proposed drainage channels and the ditch at the toe of the "cut" slopes, (which are to be revegetated), shall receive Curlex blankets by American Excelsior or equal. Mulch application rates are provided in Attachment A of this section. Hay mulch shall be available on site at all times in order to provide immediate temporary stabilization when necessary. Where necessary, a temporary stone channel pipe sluice may be used to convey runoff down the slope as might be required from upstream diversion berms. For the cover material to be effective, it is necessary that it is applied uniformly at the rates indicated in this plan and that proper anchorage be used to secure the material in place. Erosion Control Mix[3] slope protection will be used as the primary soil stabilization measure to encourage natural woody vegetation to grow back.

### 7.3 Erosion Control Mix

Erosion and sedimentation control material processed onsite is intended to provide a cover material over bare slopes as an Erosion Control Mix. It may also be applied as a berm for erosion and sedimentation control in lieu of silt fence where appropriate.

### 7.4 Riprap

Riprap slopes, ditch linings, stone check dams, hay bale barriers, and culvert outlet aprons are intended to reduce runoff velocities and protect denuded soil surfaces from concentrated flows. Installation details and stone sizes are provided in the construction details which accompany this application.

### 7.5 Diversion Berm

Flow dispersion berms at culvert outlets are intended to help re-disperse the flow. In areas where a defined area for concentrated flow is visible, the need for this will be less pronounced. In other areas, the redispersion of the water will be necessary. The field

[3] Agency Response to Art McGlauflin Comment #14

identification of appropriate discharge locations and treatment of culvert discharges is likely the most substantial element for the success of the implementation of the erosion control methods. During the course of construction, the flow pattern of the runoff discharge should be carefully observed. There will be instances where the outlet area is less stable than anticipated. In these areas it is recommended that a geotextile or stone be placed downgradient to a location where stable flow conditions are apparent.

### 7.6 Construction Entrances

A construction entrance will be constructed between the terminus of the last completed segment of roadway and the next section scheduled for construction. This is a stone section intended to limit construction traffic from dragging construction soils out of the active construction area.

### 7.7 Sediment Traps

Stone sediment traps or a premanufactured SiltSack™ will be installed ahead of culvert inlets. Installation details are provided in the plan set on the erosion control detail sheets.

### 7.8 Reinforced Turf or Reinforced Erosion Control Mix

This treatment will be used on steep slopes where a vegetated fill slope steeper than 3:1 but equal to or shallower than 2:1 is constructed in areas designated on the drawings. Reinforced turf with loam is not to be used above elevation 2,700.

### 7.9 Dirtbags™

Dirtbags™ will be required to be on site and available for construction dewatering. The contractor will be required to provide as many Dirtbags™ as necessary with one available for use in any new roadway segment. These will have particular benefit for dewatering of areas where wet subgrade has been encountered and filtering of turbid water is required.

### 7.10 Loam and Seed

Loam and seed is intended to serve as a permanent revegetation measure for denuded areas not provided with other erosion control measures, such as riprap. However, to allow natural woody vegetation to grow back, Erosion Control Mix slope protection is preferred over loam and seed and will be used as the primary soil stabilization measure. Application rates are provided in Attachment A of this section for temporary and permanent seeding in non-wetland areas. Loam and seed is not to be used above elevation 2,700.

### 7.11 Special Steep Slopes

Special slope protection devices to allow back and fill slopes to be constructed with near vertical slopes are designed to retain the slope without erosion. These include gabions, nail walls, Miraweb, and reinforced slopes illustrated on the detail drawings.

### 7.12 Separation Fabric

Separation fabrics to place in wet crossing areas in conjunction with stone or trap rock are designed to reduce turbidity and avoid rutting of the subgrade, thereby reducing turbidity on the construction site.

## 8.0 Temporary Erosion/Sedimentation Control Measures

The following are planned as temporary erosion/sedimentation control measures during construction:

- A crushed-stone-stabilized construction entrance shall be placed at any construction access points from the terminus of established roadways. This location will shift as segments of the roadway are constructed.
- Type 1 and 2 siltation fence shall be installed along the downgradient side of the proposed improvement areas. The siltation fence will remain in place and properly maintained until the site is acceptably revegetated.

- Dirtbags™ shall be available for use and, where necessary, installed in accordance with the details in the plan set. The Dirtbags'™ function on the project is to receive any water pumped from excavations during construction. When Dirtbags™ are observed to be at 50% capacity, they shall be cleaned or replaced. Stone under the Dirtbag™ shall be removed and replaced concurrently.
- Temporary stockpiles of erodible materials should be protected as follows:

  1) Temporary stockpiles shall not be located within critical areas and shall be surrounded by silt fence. In general, these stockpiles are expected to consist of the material which has been stripped from the surface.

  2) Inactive stockpiles shall be stabilized within 5 days by either temporarily seeding the stockpile with a hydroseed method containing an emulsified mulch tackifier or by covering the stockpile with mulch or erosion and sediment control mix. If necessary, mesh shall be installed to prevent wind from removing the mulch. Mulch containing any seed other than balsam fir is not to be used above Elevation 2,700.

- All back and fill slopes below elevation 2,700 which will be seeded should be rough graded then fine graded with loam or an organic soil mixture. The mulch and mesh should be applied as soon as possible. As noted, the goal during the drier construction periods of the year should be to construct the roadway in sections which can be constructed in a one-week period.
- All soils disturbed between November 1 and April 1 in areas below elevation 2,700 (and between September 1 and May 31 in areas above elevation 2,700) should be covered with mulch or erosion control mix within 5 days of disturbance, prior to any predicted storm event of the equivalent of ½" of equivalent rainfall in a 24-hour period, or prior to any work shutdown lasting more than 35 hours (including weekends and holidays). The mulch rate shall be double the normal rate.

  For denuded work areas not being covered with stone or gravel that occur between November 1 and April 15 in areas below elevation 2,700 (and between September 1 and May 31 in areas above elevation 2,700), they should have a cover of mulch, applied at twice the

normal application rate, or Erosion Control Mix. All mulched areas shall be covered with at least an anchored fabric netting. The time period for applying mulch in areas below elevation 2,700 shall be limited to 5 days for all areas or immediately in advance of a predicted rainfall event. In areas above elevation 2,700, the period will be 3 days.

- The existing roadways shall be treated to control fugitive dust as necessary. In fall and spring, a water truck may be adequate, but it is likely that calcium chloride will be necessary during the months of higher evaporation. In addition to control of fugitive dust, the margin of safety for equipment and vehicle operations should be enhanced as a result of the better visibility.
- Stone check dams or hay bale barriers or downstream stone or fabric should be installed at any evident concentrated flow discharge points during construction and earthwork operations. The treatment should extend downgradient to a location where stable flow conditions exist.
- Silt fencing with a maximum stake spacing of 6 feet should be used, unless the fence is supported by wire fence reinforcement of minimum 14 gauge and with a maximum mesh spacing of 6 inches, in which case stakes may be spaced a maximum of 10 feet apart. The bottom of the fence should be properly anchored a minimum of 6" per the plan detail and backfilled. Any silt fence identified by the applicant or reviewing agencies as not being properly installed during construction shall be immediately repaired in accordance with the installation details.
- Culvert inlet protection shall be provided through the use of stone sediment barriers, check dams, or a premanufactured SiltSack™ as distributed by A. H. Harris Company, Portland, Maine. Stone sediment barrier installation details are provided in the plan set. The barriers or SiltSacks™ shall be inspected after each rainfall and repairs made as necessary, including the removal of sediment. Sediment shall be removed and the barrier or SiltSack™ restored to its original dimensions when the sediment has accumulated to ½ the design depth of the barrier. Sediment shall be removed from SiltSacks™ as necessary. Inlet protection shall be removed when the tributary drainage area has been stabilized.
- All slopes over 4:1 shall receive erosion control mesh.

- Slopes steeper than 3:1 shall receive reinforced turf or reinforced Erosion Control Mix.
- Type 3 silt fences shall be installed as construction progresses.
- Areas of visible erosion shall be stabilized with crushed stone. The size of the stone shall be determined based upon flow, slopes, and observed field conditions.

All temporary sedimentation and erosion control measures shall be removed after construction activity has ceased and healthy vegetation has established itself or other appropriate permanent control measures have been implemented.

## 9.0 Standards for Stabilizing Sites for the Winter

### 9.1 Standards for the Timely Stabilization of Ditches and Channels

The following additional measures apply to the colder seasons. The contractor shall construct and stabilize stone-lined ditches and channels along the roadway using the standard methods by November 15 (except in elevations above 2,700 where standard methods apply only until September 30). The contractor shall construct and stabilize all grass-lined ditches and channels along the roadway using the standard methods by September 15 (except in areas above elevation 2,700 where the standard methods apply only until August 21). If the contractor fails to stabilize a ditch or channel to be grass-lined by the specified dates, then the contractor shall take one of the following actions to stabilize the ditch for late fall and winter.

- Install A Sod Lining In The Ditch – The contractor shall line the ditch with properly installed sod. Proper installation includes the applicant pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, watering the sod to promote root growth into the disturbed soil, and anchoring the sod with jute or plastic mesh to prevent the sod strips from sloughing during flow conditions.
- Install A Stone Lining In The Ditch – The contractor shall line the ditch with stone riprap. The contractor shall hire a registered professional engineer to determine the

stone size and lining thickness needed to withstand the anticipated flow velocities and flow depths within the ditch. If necessary, the contractor shall regrade the ditch prior to placing the stone lining so as to prevent the stone lining from reducing the ditch's cross-sectional area.

### 9.2 Standard for the Timely Stabilization of Disturbed Slopes

The contractor shall construct and stabilize stone-covered slopes using standard methods by November 15 (except in elevations above 2,700 where the standard methods apply until September 30). Permanent slope stabilization measures must be installed within 48 hours of completing the final grading for any section of slope.[4] The contractor shall seed and mulch all slopes to be vegetated using standard methods by September 15, except in elevations above 2,700, where the standard methods will end on August 21. The department will consider any area having a grade greater than 15% (7H: 1V) to be a slope. If the contractor fails to stabilize any slope to be vegetated by the specified date, the contractor shall take one of the following actions to stabilize the slope for late fall and winter.

- Stabilize The Soil With Temporary Vegetation And Erosion Control Mesh – By September 15[5] (except August 15 in areas above elevation 2,700), (mulch containing any seed other than balsam fir is not to be used above Elevation 2,700), the contractor shall seed the disturbed slope with winter rye at a seeding rate of 3 pounds per 1,000 square feet and apply erosion control mats over the mulched slope. The contractor shall monitor growth of the rye over the next 45 days. If the rye fails to grow at least three inches or fails to cover at least 75% of the disturbed slope by November 15, then the contractor shall cover the slope with a layer of Erosion Control Mix compost

[4] June 2, 2006 MMP Response to Agency Comments, Response No. 17 to April 10, 2006 Comments of Art McGlauflin.

[5] June 2, 2006 MMP Response to Agency Comments, Response No. 12 to March 10, 2006 Comments of David Rocque.

as described in this standard, or with stone riprap as described in this standard. Rye grass and any other specified grass seed is only to be used below elevation 2,700.

- Stabilize The Slope With Sod – The contractor shall stabilize the disturbed slope with properly installed sod by October 1 (except August 15 in areas above elevation 2,700). Proper installation includes the contractor pinning the sod onto the slope with wire pins, rolling the sod to guarantee contract between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil. The contractor shall not use late-season sod installation to stabilize slopes having a grade greater than 33% (3H: 1V) or having groundwater seeps on the slope face.
- Stabilize The Slope With Erosion Control Mix – The contractor shall place a four-inch layer of Erosion Control Mix on the slope by November 15 (October 1 in areas above elevation 2,700). Prior to placing the Erosion Control Mix, the contractor shall remove any snow accumulation on the disturbed slope. The contractor shall not use Erosion Control Mix to stabilize slopes having grades greater than 50% (2H: 1V) or having groundwater seeps on the slope face.
- Stabilize The Slope With Stone Rip Rap – The contractor shall place a layer of stone riprap on the slope by November 15 (October 1 in areas above elevation 2,700). The contractor shall hire a registered professional engineer to determine the stone size needed for stability and to design a filter layer for underneath the riprap.

### 9.3 Standard for the Timely Stabilization of Disturbed Soil

By September 15 (August 1 in areas above elevation 2,700) the contractor shall seed and mulch all disturbed soils on areas having a slope less than 15%. If the contractor fails to stabilize these soils by this date, then the contractor shall take one of the following actions to stabilize the soil for late fall and winter. Mulch containing any seed other than balsam fir is not to be used above Elevation 2,700.

- Stabilize The Soil With Temporary Vegetation – By September 15, the contractor shall seed the disturbed soil with winter rye at a seeding rate of 3 pounds per 1,000

square feet, lightly mulch the seeded soil with hay or straw at 75 pounds per 1,000 square feet, and anchor the mulch with plastic netting. The contractor shall monitor the growth of the rye over the next 45 days. If the rye fails to grow at least three inches or fails to cover at least 75% of the disturbed soil before November 15, then the contractor shall mulch the area for over-winter protection.

- Stabilize The Soil With Sod – The contractor shall stabilize the disturbed soil with properly installed sod by October 1. Proper installation includes the contractor pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil.
- Stabilize The Soil With Mulch – By November 15, the contractor shall mulch the disturbed soil by spreading hay or straw at a rate of at least 150 pounds per 1,000 square feet on the area so that no soil is visible through the mulch. Prior to applying the mulch, the contractor shall remove any snow accumulation on the disturbed area. Immediately after applying the mulch, the contractor shall anchor the mulch with plastic netting to prevent wind from moving the mulch off the disturbed soil.

## 10.0 Sedimentation Sumps

The use of shallow sediment sumps where sediment laden water can be captured on the downgradient side of erodible stockpiles and in areas where excess borrow is removed from the "cut side" of the roadway is encouraged.

## 11.0 Permanent Erosion Control Measures

The permanent erosion control measures for the roadways include:

- The culverts with proper inlet and outlet aprons and flow dispersion berms where necessary;
- The ditch on the cut side of the roadway with riprap protection;

- The properly designed and constructed measures for cut or fill slopes which exceed 2:1 including riprap, soil nail walls, gabions, geowebs, and similar steep slope construction measures;
- Ditch turnouts;
- Restored borrow pit areas;
- Graded and revegetated stump disposal areas; and
- Properly designed bridges where specified.

LURC standards require permanent soil stabilization to be completed within one week of inactivity or completion of construction and the following more stringent stabilization time requirements apply to this project:

- Permanent slope stabilization measures must be installed within 48 hours of completing the final grading for any section of slope.
- Permanent ditch stabilization measures must be installed within 24 hours of completing the final grading for any section of ditch.

## 12.0 Timing and Sequence of Erosion/Sedimentation Control Measures

Construction of the roadway and corresponding implementation of erosion and sedimentation control measures will be conducted in segments. MMP will use the following approach to define the length of the segment of roadway to be constructed at a given time:

1) A working road segment, defined as a denuded area of the roadway corridor (i.e. stumped and grubbed), should not exceed the length which can be constructed in a one-week period. A number of working road segments in various areas of the project are expected to be constructed simultaneously by multiple construction crews. During wet periods of saturated soils when runoff is higher, it is recommended that segment lengths be limited to the amount of roadway which can be constructed in two to three days. Above elevation 2,700, segment

lengths should be reduced below the periods noted above as deemed necessary by the onsite field engineer. Where necessary, narrower temporary construction roads will be allowed to exceed these segment lengths to allow transport of material to balance site earthwork cuts and fills; however, temporary erosion controls shall be required along all temporary construction roads.

Along some road segments where more significant cutting or filling is required, these segments may be held short of final surface grade until balance materials from other areas of the project are available. Along these segments permanent stabilization measures will be employed where practical and temporary stabilization measures will be employed to protect the remaining area until which time they can be brought to final grade and completed.

2) Where possible, the terminus of a segment of roadway should end either where special pretreatment of the subgrade is necessary due to soft ground or seepage and high groundwater conditions, or at the cut/fill transition points. Terminating segments at these locations will afford access to these areas by the larger construction equipment needed for stabilization of the subgrade without the passage of skidders or non-construction vehicles. When this is impracticable, a temporary crossing of the wet area should be made with a corduroy crossing or other temporary roadway measures.

**3)** A full time **field engineer** shall be onsite and is required to log daily construction activities by stationing. This engineer is required to have expertise in storm water management and erosion control best management practices and must be present during construction to identify seepages and drainage swales not found during the field investigations, to make adjustments to the road design during construction to maintain the slopes hydrology and to review that proper soil sediment and erosion control features are implemented. **The technical background of, and plan for the implementation of the field engineer must be submitted to the LURC Commission for review and approval prior to construction.**

The following sequence is recommended for each roadway segment. Where possible, roadway segments should end just beyond a cross culvert.

1. Mark the centerline.
2. Clear a 40-foot corridor centered on the proposed roadway centerline using temporary skidder roads with appropriate stabilized crossings over wet areas.
3. Stakeout the roadway at 50-foot sections and walkover by the project team to select final:
   - Cross section and slope treatment to be used along the segment;
   - Locations of cross culverts;
   - Determination of the need for uphill diversion;
   - Identification of seeps or wet areas not previously identified;
   - Erosion control measures to be employed; and
   - Confirmation or recommended adjustment of horizontal and vertical alignment.
4. Mark the final clearing limits along the roadway segment.
5. Final clearing including select clearing of trees over 6-inch diameter 20 feet behind the grading limits.
6. Install type 1 and 2 silt fence and/or Erosion Control Mix berm.
7. Stabilize wet or seepage areas.
8. Install cross culverts including inlet and outlet aprons with dispersion berm if necessary.
9. Install temporary erosion control measures ahead of culvert inlet.
10. Grub the roadway segment.
11. Prepare backslope (if blasting is required, it should be completed for the roadway segment concurrent with this step).
12. Install underdrain and cross hydrology piping if necessary.
13. Install ditch and prepare roadway subgrade.
14. Install type 3 silt fence.

15. Install erosion control and final restoration measures in the ditch including meshes and staples.
16. Dress backslope including placement of final surface cover with mesh and staples.
17. Install roadway gravels.
18. Remove construction entrance.
19. Dress and restore fill slope (certain fill slopes with structural reinforcement will need to be integrated with subgrade preparation) including surface restoration.
20. Final grading of roadway surface.
21. Guide rail can be installed subsequently in groups of several segments.
22. Periodically remove sediment from barriers and dress up any areas of minor erosion rills.
23. Remove temporary erosion control measures after site stabilization has been achieved (for vegetation, a 75% catch of healthy vegetation is required).

Any deviation from this sequence is subject to approval of the applicant and may require separate approval of the regulatory officials.

## 13.0 Contracting Procedure

The roadways for the project will be constructed by subcontractors of the applicant. The contract documents will require a schedule for the completion of the work which will satisfy the following criteria:

### 13.1 The Work Shall Be Constructed in Accordance with this Erosion Control Plan

Work must also be scheduled or phased to prevent the extent of the exposed areas as stipulated in this plan. The contractor shall also agree and have the responsibility to control turbidity, to prevent significant erosion, to control fugitive dust, and to employ the tools outlined in this plan, and including other measures as may be necessary to meet this responsibility. The work shall be conducted in sections which will:

- Limit the amount of exposed area to those areas in which work is expected to be undertaken as noted in section 12 above.
- Revegetate disturbed areas as rapidly as possible.
- Incorporate specified inlets, groundwater control, and drainage system as early as possible into the construction phase. The ditches shall be riprap lined within 24 hours of final grading.
- Comply with the provisions of this section.
- Stockpiled material shall be located at least 100' from any stream/water body or wetland.

### 13.2 The Area of Denuded Non-Stabilized Construction Shall Be Limited To The Minimum Area Practicable

An area shall be considered to be denuded until the surface gravel is installed on the roadway surface, the final surface treatment constructed, the areas have been loamed, seeded, and mulched, or covered with Erosion Control Mix.

Any deviations from the schedule or provisions contained in this plan shall require the approval of the Permittee. The Permittee may elect to consult with LURC to secure their approval prior to approving any schedule changes.

The contractor must install any added measures which may be necessary to control erosion/sedimentation from the site, dependent upon the actual site and weather conditions occurring at the time of construction.

The applicant will retain an inspector. The contractor shall cooperate with the inspector and permit access to the site by the inspector at all times.

## 14.0 Provisions for Winter or Seasonal Shutdown

Because the roadway construction is required to be completed in small segments, the ability to shut down the work for seasonal or other reasons should be relatively easy. This narrative

describes this shutdown procedure: Any segments of the roadway where vegetation has not been reestablished shall be treated as outlined in Section 9 of this narrative.

An inspection shall be made to identify any areas where additional erosion control work is needed. Such areas shall be repaired.

The new access roads shall be secured and barricaded to prevent illicit entry.

Subsequently, the new and reconstructed access roads shall be re-inspected after a significant rainfall. Any eroded areas shall be repaired. These subsequent inspections shall follow for four significant rainfall events.

## 15.0 Provisions for Maintenance of the Erosion/Sedimentation Control Features

The roadway construction will be contracted by the applicant. The work will be subject to the requirements of a LURC Permit. The final provisions of this permit are anticipated to require the applicant and his contractors to prepare a list and designate by name, address and telephone number all individuals who will be responsible for implementation, inspection and maintenance of all erosion control measures identified within this section and as contained in the Erosion and Sedimentation Control Plan of the contract drawings. The applicant shall engage a contractor certified in erosion control practices by the Maine DEP to install all control measures and conduct follow-up inspections. The applicant may alternatively engage a Maine registered Professional Engineer to conduct follow-up inspections. Both the stormwater management and road maintenance sections of this application provide details on maintenance procedures specific to this project. Specific responsibilities of the contract documents for the inspector(s) should include:

1. Execution of the Contractor/Subcontractor Certification contained in Attachment B by any and all parties responsible for erosion control measures on the site.

2. Assuring and certifying the contractor's construction sequence is in conformance with the specified schedule of this plan. A weekly certification stating compliance, any deviations, and corrective measures necessary to comply with the erosion control requirements of this section shall be prepared and signed by the inspector(s).

3. In addition to the weekly certifications, the inspector(s) shall maintain written reports recording construction activities on site which include:

   - Dates when major grading activities occur in a particular area.
   - Dates when major construction activities cease in a particular area, either temporarily or permanently.
   - Dates when an area is stabilized.

4. Inspection of this project work site on a weekly basis and after each significant rainfall event (0.5 inches or more within any consecutive 24-hour period) during construction until permanent erosion control measures have been properly installed and the site has been stabilized. Inspection of the project work site shall include:

   - Identification of proper erosion control measure installation in accordance with the erosion control detail sheet or as specified in this section.
   - Determine whether each erosion control measure is properly operating. If not, identify damage to the control device and determine remedial measures.
   - Identify areas which appear vulnerable to erosion and determine additional erosion control measures which should be used to improve conditions.
   - Inspect areas of recent seeding to determine percent catch of grass. A minimum catch of 75 percent is required prior to removal of erosion control measures.

   Accumulated silt/sediment should be removed when the depth of sediment reaches 50 percent of the barrier height. Accumulated silt/sediment should be removed from behind silt fencing when the depth of the sediment reaches 6 inches.

5. If inspection of the site indicates a change should be made to the erosion control plan, either to improve effectiveness or correct a site-specific deficiency, the inspector shall immediately implement the corrective measure and notify the applicant of the change.

Once construction has been completed, long-term maintenance of the permanent erosion control measures and storm water systems will be the responsibility of the applicant.

All certifications, inspection forms, and written reports prepared by the inspector(s) should be filed with the applicant, and the MCGP Permit File contained on the project site. All written certifications, inspection forms, and written reports should be filed within one (1) week of the inspection date.

The procedures for maintenance and inspections after construction are provided in the Basis of Stormwater Management for Access Roadways report.

## 16.0 Preconstruction Conference

Prior to any construction at the site, representatives of LURC, the roadway contractor, the geotechnical engineer, and the site design engineer should meet with the applicant to discuss the scheduling of the site construction and compliance with this plan. By or before that meeting, the contractor will prepare a detailed schedule and a marked-up site plan indicating areas and components of the work and key dates showing date of disturbance and completion of the work. Three copies of the schedule and marked-up site plan shall be provided to the applicant.

## 17.0 Closure

This Erosion and Sedimentation Control Plan applies to the turbine sites and new roadways which will be constructed for access to the proposed wind turbines and improvements of existing roadways. LURC Chapter 10 Rules and Standards require permanent and temporary erosion and sedimentation control measures to meet the standards and specifications of the "Maine (MeDEP) Erosion and Sediment Control BMP Manual of March 2003" or other equally effective practices. This Erosion and Sedimentation Control Plan, accompanying Maintenance Narrative, and project drawings seek to minimize any unreasonable soil erosion or reduction in the capacity of the land

to absorb and hold water. **Any deviation from the requirements of this plan shall be reviewed with the Permittee and may require separate approval from LURC.**

Slope Protection specifications are provided in Appendix 2.11 Civil Engineering Design Specifications.

# ATTACHMENT A

## Seeding Plan

# ATTACHMENT B

## Sample Certification and Inspection Forms