Plum Creek Concept Plan

Erosion and Sedimentation Control Plan for Roadway Construction

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1.0 Introduction

DeLuca-Hoffman Associates, Inc. has prepared the following preliminary plan, which presents the erosion and sedimentation control provisions required to construct the project roadways. Plum Creek has retained DeLuca-Hoffman Associates, Inc. to prepare preliminary discussions on erosion and sediment control as well as phosphorous related impacts resulting from the construction of the access roads and subdivision lots within the Plan Area. These reports will be further refined and detailed designs prepared as individual subdivision proposals are brought forth for LURC review and approval. The following outline of erosion control measures is provided in support of Plum Creek's ability to comply with all relevant standards and requirements pertinent to their proposed development activities.

This preliminary 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, which will require modification to this plan. However, for the purposes of the Concept Plan submission, this plan identifies the tools that can be implemented during construction of the roadways, explains the basis for their use, and provides details for their installation. The erosion and sedimentation control plan and related 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.

Filled or graded areas, including all areas of disturbed soil, within 250 feet of water bodies and wetlands, shall be stabilized according to the Guidelines for Soil Stabilization contained in Appendix B of LURC Guidelines Chapter 10.

2.0 Existing Site Conditions

The development activities proposed by Plum Creek will generally involve access from existing land management roads within the greater Moosehead Lake region. New road construction and upgrades to existing land management roads are contemplated, thus requiring adequate measures be in place to prevent and minimize erosion and sediment transport from disturbed areas. Most of the existing land management roads have a defined drainage ditch system and are reasonably maintained. Typical road widths are 14' to 18'; however, this may vary, depending upon forest management practices and frequency of existing use. In many areas no new improvements are proposed, although continued maintenance including grading, drainage course stabilization, and driveway construction is proposed as part of the proposed subdivisions. In other areas, new road construction is warranted along with driveway construction to lots.

Lot development activities are primarily planned for areas that have moderate topography (<25% average slope) and are located within land areas away from sensitive natural resources including streams or wetlands.

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 soils identified by S.W. Cole Engineering and the USDA Medium Intensity Soil Survey with the attendant "K" values are listed in Table 1.

Table 1 – Surficial Soil Types and Relative Erodibility

Soil Type	Soil Description	K Value
Telos Silt Loam	HSG C – Very deep, moderately erodible, and somewhat poorly drained. Not hydric.	.24 - .32
Masardis	HSG A – sandy, somewhat excessively deep	0.10
Danforth	HSG B – Loamy Till, deep, well drained	0.15
Elliottsville	HSG B-silty, moderately deep, well drained Till	0.24

Becket	HSG C – loamy over sandy, well drained	0.28
Brayton	HSG C – loamy, deep, poorly drained till	0.32
Colonel	HSG C – Loamy, deep, somewhat poorly drained till	0.24
Dixfield	HSG C – loamy, deep, moderately well drained till	0.24
Marlow	HSG C – Loamy, deep, well drained till	0.32
Skerry	HSG C – Loamy over sandy, deep, moderately well drained	0.28
Tunbridge	HSG C – loamy, moderately deep, well drained	0.20
Chesuncook Silt Loam	HSG C – very deep, moderately well drained, slightly to moderately erodible land. Not hydric.	.24 - .32
Monarda	HSG D	0.28
Lyman	HSG C/D	0.32
Monson	HSG C/D	0.24
Chesuncook Silt Loam	HSG C – very deep, moderately well drained, slightly to moderately erodible land. Not hydric.	.24 - .32

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

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

- A strict limit on the amount of denuded 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; and
- The availability of the materials for construction without delay.

These five requirements 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 five requirements listed above.**

These five limitations are expounded upon further in the following paragraphs:

3.1 Limitation of 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, a major rain event will not cause significant erosion, because the open area that is susceptible to erosion will be small.

Achieving this objective will require that roadway segments be constructed and completed within 7-14 days, as opposed to sequential step progression where one element (such as clearing and grubbing) is completed followed by the next construction element.

To achieve this objective, construction work should adhere to the sequence established by this plan.

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

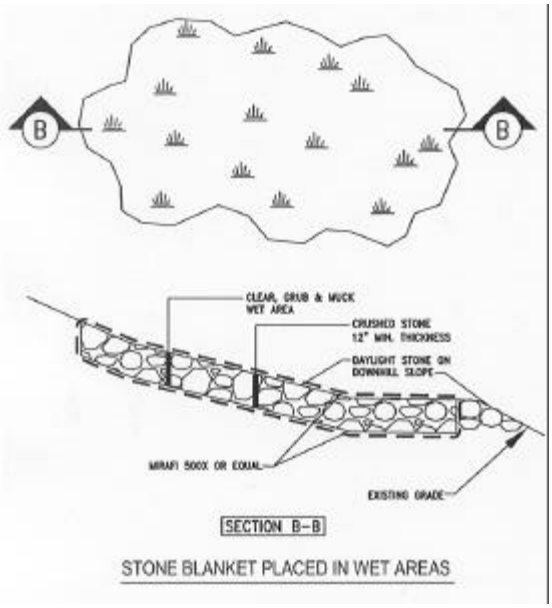
Establishment of drainage patterns includes the diversion of runoff from the construction site and the installation of the measures to collect and convey runoff across the roadway. These methods are described in the same sequence in which construction of these measures is recommended, and will typically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

3.2.1 Wet or Seepage Areas

The first step will be to identify areas where wet conditions or seepage are observed. The following sequence of measures to address these conditions is required:

- Review the proposed road 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 adjusted, being cautious to remain within the basis of design parameters established for the roadway.
- Grub the wet area – The grubbing should attempt to remove the organics directly under the roadbed area only.

Place fabric and drainage stone – The fabric should be overlapped at the edges by approximately 18 inches and be installed to minimize creases of the fabric. If the conditions are very wet, it may be necessary to use staples or ballast to secure the fabric until the stone is placed on top of the fabric. The figure below shows a detail of stone blanket for placement in wet areas.



STONE BLANKET PLACED IN WET AREAS

- 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.

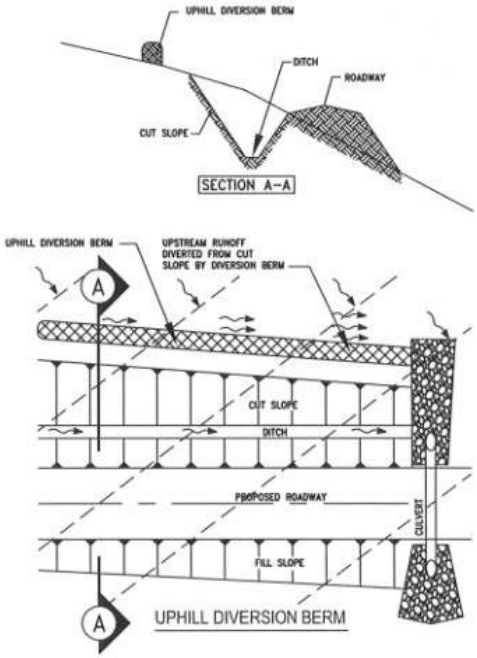
3.2.2 Install Cross Culverts Including Aprons and Outlet Flow Dispersion Lip

It is very important that culverts be carefully sited. Field observation will be required to finalize culvert locations. The final culvert locations should be at locations that 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.

3.2.3 Divert Uphill Drainage

Runoff that 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 following table:

Table 2 – 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”

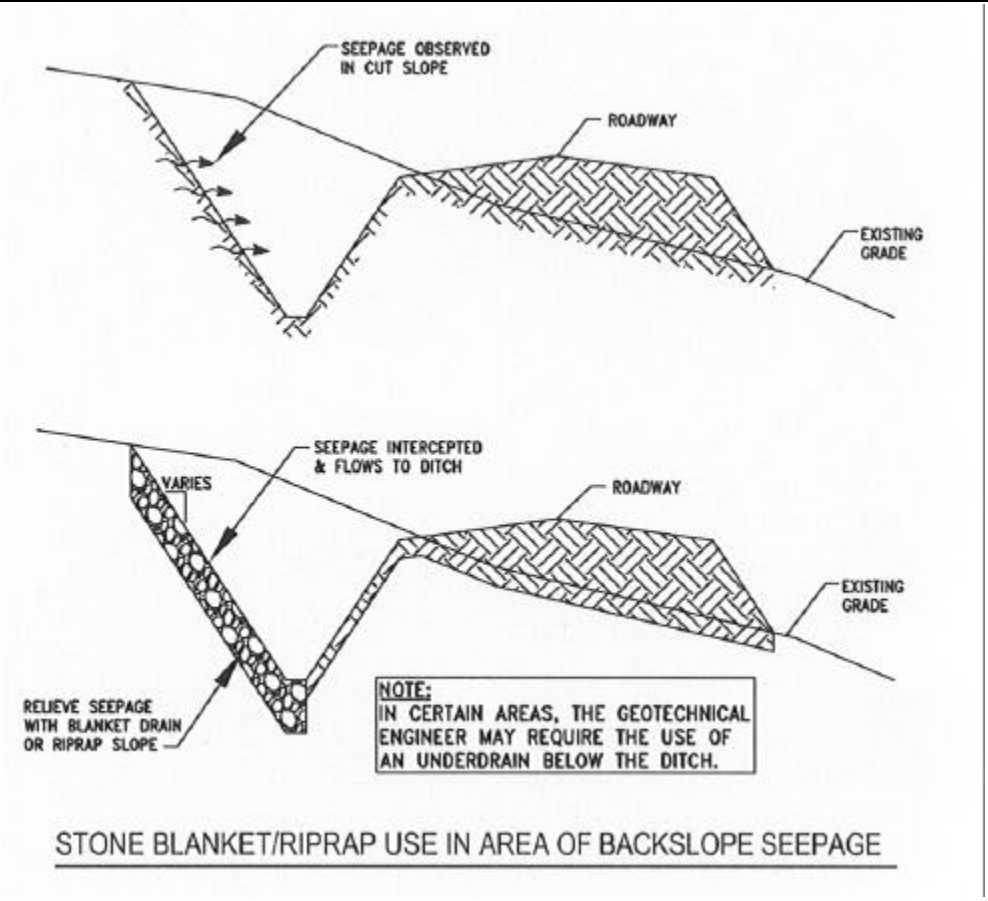
- An upgradient trench to divert the water: This alternative involves trenching in the upstream area to divert the runoff away from the slope. Instead of a berm, a ditch is constructed. The following table illustrates the treatment of the diversion ditch.

Table 3 – 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 that matches the cut slope. The ditch should be protected with the final cover material as soon as possible. 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 in the following figure.



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. Provisions for erosion control in winter are different than those used at other times of the year.

The installation of erosion control materials should be in strict accordance with the details that will accompany each Subdivision Plan set, Maine DEP Best Management Practices, and information provided by suppliers.

3.4 The Availability of the Materials 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 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 will disturb a variable width cross section. The goal of this section is to minimize disturbance. The width of the disturbed area will vary based upon the following:

- The existing transverse grade;
- The relative grade of the proposed section relative to the existing grade;
- The selected side slope treatment;
- Uphill diversion methods (if any);
- Whether the road is in tangent or a curve; and
- Whether the cut side is being widened to generate fill or the fill side is being widened to accommodate waste material.

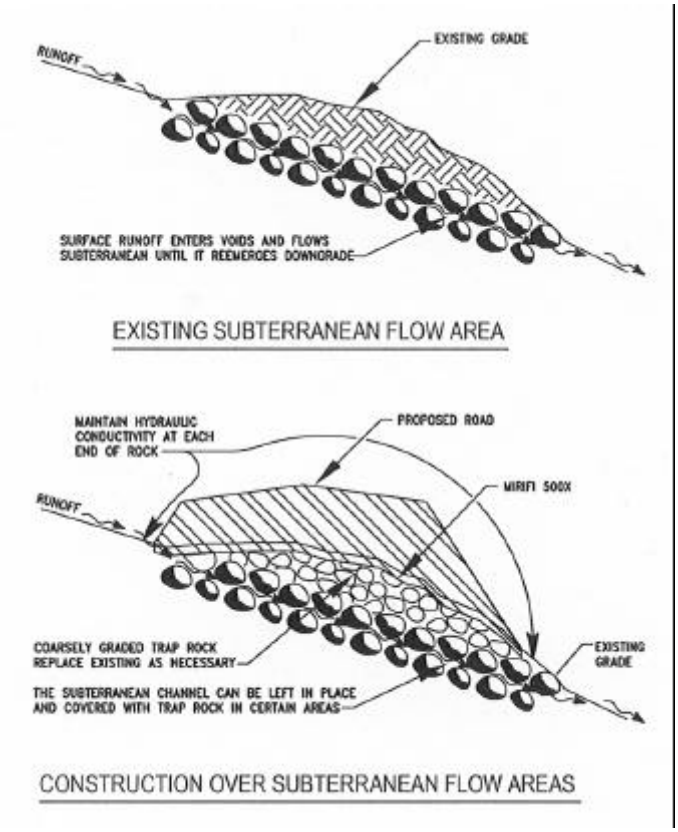
In addition, there will be disturbance for stump disposal areas and for the borrow areas where the roadway surface gravels will be obtained.

5.0 Existing and Proposed Drainage Features for Roadways

The new roadways will traverse timberland currently containing no formal drainage systems. The basis of design for the drainage system for the new roadways will ultimately be outlined in the individual subdivision applications. However, the basic measures may include:

- Retaining existing seeps and subsurface drainage channels to the extent possible. (In certain areas, surface seeps and runoff enter the subterranean features although there is no evidence of surface flow.) The tool to accommodate these is the fabric and

crushed stone sandwich, placed in locations where wet conditions are observed, or trap rock protected by fabric under the prepared subgrade. These are illustrated in the following figures:



- In some areas, the runoff may principally be a mix of sheet flow, shallow concentrated flow, and subterranean flow. In these situations, culverts are to 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.

Culvert sizing will be completed as individual subdivision proposals are submitted. However, placement will rely on field judgment and reconnaissance.

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 is observed, and it appears 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%. Thereafter, follow-up monitoring of the outlets will occur to verify discharge stability.

The existing roadways have culverts and bridges, which will be retained. If longer culverts are required along existing roadways, the diameter of the new culvert will be the same as the old one. When culverts require replacement, small culverts will be replaced by ones one size larger (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 standard procedures.

6.0 Critical Areas

The following three areas are considered "critical" areas:

6.1 Areas Within the 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.

6.2 Areas Near Particular Natural Resources

Wetlands, streams, and other natural resources are considered critical areas. These critical areas should include a minimum 100-foot buffer. 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 should be located within these critical areas.

6.3 Areas with Slopes Over 25%

These areas are inherently unstable due to slope. Stump dumps and stockpiles should not be located within these areas.

7.0 Erosion/Sedimentation Control Measures

The developer will provide their contractors with the Final Erosion Control Plan, since it defines the basis of the erosion/sedimentation control plan for the project. **It should be the responsibility of the contractor to properly install these devices to control fugitive dust emissions, avoid turbid discharges, and avoid significant sedimentation throughout the construction process.** 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; *Best Management Practices for Forestry: Protecting Maine's Water Quality, 2004*; 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 requirements as defined by this plan.

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. The fence will be 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 are 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.

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

Table 4 – 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 that 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 required if the cut slope height exceeds five feet. However, slopes that 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 anchoring be used to secure the material in place. Bark mulch slope protection will be used as the primary soil stabilization measure to encourage natural woody vegetation to grow back.

7.3 Wood Waste

Wood waste generated by chipping trees and cleared material is intended to provide a cover material over bare slopes as an erosion control material. It may also be applied as a berm up to 12" high on the uphill side of Type 1 silt fences. It must be securely anchored with a geotextile since it is buoyant and therefore prone to dislodging by water. The wood waste will eventually break down and become thin. Therefore, it is recommended that a wildlife seed mix such as New England Logging Road Seed Mix as distributed by New England Wetland Plants, Inc. or equal, be applied to the soil below the wood waste material. The wood waste material will be continually available at the site, so it should not be discounted, but effectively integrated into the erosion/sedimentation controls.

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 to be provided in the construction details that will accompany future subdivision applications.

7.5 Diversion Berms

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

identification of appropriate discharge locations and treatment of culvert discharges in the field is usually the most effective way to achieve the successful 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 stabilized construction entrance consisting of a stone pad will be constructed between the terminus of the last completed segment of roadway and the next section scheduled for construction. Construction details will be provided in the individual subdivision plans.

7.7 Sediment Traps

Stone sediment traps will be installed ahead of culvert inlets. Installation details are to be provided in future plan sets.

7.8 Reinforced Turf

Reinforced turf is to be used on steep slopes where a vegetated fill slope steeper than 3:1 but shallower than 2:1 is constructed.

7.9 Dirtbags™

Dirtbags™ will be required to be on site and available for construction dewatering. These will have particular benefit for dewatering 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 revegetative measure for denuded areas not provided with other erosion control measures, such as riprap. However, to allow natural woody vegetation to grow back, bark mulch 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.

7.11 Special Steep Slopes

Where a near vertical slope has to be created, special slope protection devices to allow back and fill slopes to be constructed are to be designed to retain the slope without erosion. These include gabions, nail walls, Miraweb™, and reinforced slopes. The need for such special slopes will be better identified during individual subdivision planning, although all effort will be made to avoid such areas if practicable.

7.12 Separation Fabric

Separation fabrics are to be placed in wet crossing areas in conjunction with stone or trap rock; they reduce turbidity and avoid rutting of the subgrade on the construction site.

8.0 Temporary Erosion/Sedimentation Control Measures

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

- 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 to a grass coverage level of 75% or otherwise permanently stabilized.

- A crushed-stone-stabilized construction entrance shall be placed at any construction access points onto public roadways at the terminus of established roadways.

- 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 that 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. If necessary, mesh shall be installed to prevent wind from removing the mulch.

- All back and fill slopes that 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 that can be completed within a one-week period.

- 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. Controlling fugitive dust should improve visibility for equipment and vehicle operators, and so enhance safety.
  .

- Stone check dams, hay bale barriers, downstream stone, or fabric should be installed where any concentrated flow discharge points are evident during construction and earthwork operations. The treatment should extend downgradient to a location where stable flow conditions exist.

- Silt fencing with a maximum of 6 feet between stakes should be used, unless the fence is reinforced by wire mesh of at least 14 gauge and 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 to a minimum depth of 6” and backfilled, per the plan detail. Any silt fence identified as not being properly

installed during construction shall be immediately repaired in accordance with the installation details.

- Culvert inlets shall be protected by stone sediment barriers or check dams. Stone sediment barrier installation details shall follow those contained in the MeDEP Best Management Practices Handbook. The barriers shall be inspected after each rainfall and repairs made as necessary, including the removal of sediment. Sediment shall be removed and the barrier restored to its original dimensions when the sediment has accumulated to ½ the design depth of the barrier. 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 2:1 shall receive reinforced turf.

- 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 based on 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 Standard 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. The contractor shall construct and stabilize all grass-lined ditches and channels along the roadway, using the standard methods, by September 15. 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 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. The contractor shall seed and mulch all slopes to be vegetated, using standard methods, by September 15. LURC will consider any area having a grade greater than 15% (7 horizontal feet: 1vertical foot) 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 October 1, 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 wood waste compost as described in this plan, or with stone riprap as described in this plan.

- Stabilize the Slope with Sod – The contractor shall stabilize the disturbed slope with properly installed sod by October 1. 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% (3 horizontal feet: 1 vertical foot) or having groundwater seeps on the slope face.

- Stabilize the Slope with Wood Waste Compost – The contractor shall place a six-inch layer of wood waste compost on the slope by November 15. Prior to placing the wood waste compost, the contractor shall remove any snow accumulation on the disturbed slope. The contractor shall not use wood waste compost 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. 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, 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.

- Stabilize the Soil with Temporary Vegetation – By October 1, 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 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:

- Culverts with proper inlet and outlet aprons and flow dispersion berms where necessary;

- Ditching on the cut side of the roadway with fully established vegetation or specified erosion resistant material (stone, etc.);

- 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.

12.0 Timing and Sequence of Erosion/Sedimentation Control Measures

The following sequence is recommended for each roadway segment. A roadway segment is defined to be the length of road that can be constructed in 7-14 days. Where possible, roadway segments should end just beyond a cross culvert.

1. Mark the centerline.
2. Clear a corridor centered on the proposed roadway centerline using temporary skidder roads with appropriate 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;
    - 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. Conduct final clearing, including select clearing of trees over 6-inch diameter 30 feet behind the grading limits.

6. Install type 1 and 2 silt fence or organic mulch berm.

7. Stabilize wet or seepage areas using the procedure specified in Section 3.2.1 of this plan.

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 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) and surface.

20. Conduct final grading of roadway surface.

21. Periodically remove sediment from barriers and dress up any areas of minor erosion rills.

22. 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 regulatory officials.

13.0 Contracting Procedure

The roadways for the project will be constructed by subcontractors of the subdivision applicant. The contract documents will require a schedule for the completion of the work that 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 exposed areas as stipulated in this plan, to as great an extent as possible. 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 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 during the following 7-14 days.
- 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 immediately lined or revegetated as soon as their installation is complete.
- Comply with the provisions of this section.
- Stockpiling material 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, or the area has been loamed, seeded, and mulched.

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 that may be necessary to control erosion/sedimentation from the site, dependent upon the actual site and weather conditions occurring at the time of construction.

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 re-established shall be treated as outlined in Section 9.0 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 during the construction period.

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 for by the subdivision applicant. The work may be subject to the requirements of a MeDEP Stormwater Discharge Permit depending on the size and timing of individual development activity proposals. The subdivision applicant will also be subject to the Terms and Conditions of the Maine Construction General Permit (MCGP) under the Maine Pollutant Discharge Elimination System (MPDES). 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. Alternatively, the applicant may engage a Maine registered Professional Engineer to conduct follow-up inspections. The "Rapid Establishment of Drainage Patterns to Control Runoff and Avoidance of Erosion" and the "Erosion/Sedimentation Measures" sections of this application provide details on maintenance procedures. Specific responsibilities of the contract documents for the inspector(s) should include:

1. Execution of the Contractor/Subcontractor Certification 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. All project work sites shall be inspected 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 a 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 operating properly. If not, identify damage to the control device and determine remedial measures.
   - Identify areas that appear vulnerable to erosion and determine additional erosion control measures that 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 subdivision applicant, and/or the Homeowner's Association.

All certifications, inspection forms, and written reports prepared by the inspector(s) should be filed with the subdivision applicant and the Maine Construction General Permit (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.

16.0 Preconstruction Conference

Prior to any construction at the site, representatives of the MeDEP, LURC, the roadway contractor, and the site design engineer should meet with the owner 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, including dates of disturbance and completion of the work. Three copies of the schedule and marked-up site plan shall be provided to the subdivision applicant.

17.0 Closure

This Erosion and Sedimentation Control Plan applies to the new roadways that will be constructed for access to the proposed development activities proposed by Plum Creek under their Concept Plan for Plum Creek's Lands in the Moosehead Region. 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 seeks to outline the measures that will be applied to minimize any unreasonable soil erosion or reduction in the capacity of the land to absorb and hold water during the course of future development activities.

ATTACHMENT A

PERMANENT SEEDING PLAN

Project Plum Creek Concept Plan Area
Site Location various

X Permanent Seeding _____ Temporary Seeding

1. Area to be seeded: _____ acres, OR _____ M Sq. Ft.
2. Instructions on preparation of soil: Prepare a good seed bed for planting method used.
3. Apply lime as follows: _____ #/acres, OR _____/M Sq. Ft.
4. Fertilize with _____ pounds of - - N-P-K/ac. OR
   15 pounds of 20 - 4 - 12 N-P-K/M Sq. Ft.
5. Method of applying lime and fertilizer: Spread and work into the soil before seeding. Apply one-third of fertilizer in November, one-third in June, and one-third in mid August. Apply fertilizer when grass is dry and water immediately to prevent burn.
6. Seed with the following mixture:

   New England Logging Road Seed Mix by New England Wetland Plants, Inc. or equal (Tel. 413-548-8000)

When using small grain as nurse crop seed it at one-half the normal seeding rate.

7. Mulching instructions: Apply at the rate of _____ tons per acre. OR
   115 pounds per M. Sq. Ft.

	Amount	Unit #, Tons, Etc.
8. TOTAL LIME	0	#/1000 sq. ft.
9. TOTAL FERTILIZER	15	#/1000 sq. ft.
10. TOTAL SEED	20	#/ acre.
11. TOTAL MULCH	115	#/1000 sq. ft.
12. TOTAL other materials, seeds, etc.		

13. REMARKS

Spring seeding is recommended, however, late summer (prior to September 1) seeding can be made. Permanent seeding should be made prior to August 5 or as a dormant seeding after the first killing frost and before the first snowfall. If seeding cannot be done within these seeding dates, temporary seeding and mulching shall be used to protect the site. Permanent seeding shall be delayed until the next recommended seeding period. Seed mixture shall be fresh, clean, new crop seed. If the seed is mixed on the site, each variety shall be delivered in the original containers bearing the dealer's guaranteed analysis. If seed is mixed by the dealer, the Seeding Contractor shall furnish to the Owner the dealer's guaranteed statement of the composition of the mixture and the percentage of purity and germination of each variety. Seed shall be purchased from a recognized distributor and shall test to a minimum percentage of 95% for purity and 85% for germination.

TEMPORARY SEEDING PLAN

Project Plum Creek Concept Plan Area
Site Location various

___ Permanent Seeding X Temporary Seeding

1. Area to be seeded: ___ acres, OR ___ M Sq. Ft.
2. Instructions on preparation of soil: Prepare a good seed bed for planting method used.
3. Apply lime as follows: ___ #/acres, OR ___/M Sq. Ft.
4. Fertilize with ___ pounds of - - N-P-K/ac. OR

   15 pounds of 20 - 4 - 12 N-P-K/M Sq. Ft.
5. Method of applying lime and fertilizer: Spread and work into the soil before seeding.
6. Seed with the following mixture:

   50% Perennial Ryegrass
   50% Winter Rye

When using small grain as nurse crop seed it at one-half the normal seeding rate.

7. Mulching instructions: Apply at the rate of ___ tons per acre. OR
   230 pounds per M. Sq. Ft.

	Amount	Unit #, Tons, Etc.
8. TOTAL LIME	0	#/1000 sq. ft.
9. TOTAL FERTILIZER	15	#/1000 sq. ft.
10. TOTAL SEED	3.5	#/1000 sq. ft.
11. TOTAL MULCH	230	#/1000 sq. ft.
12. TOTAL other materials, seeds, etc.		

13. REMARKS

- Recommended seeding dates after August 15.
- For areas with slopes >10%, waterways, areas within 100 feet of the stream, and fall and winter erosion control areas, mulch netting shall be used per manufacturer's specifications.