

APPENDIX B - WORKING WITHIN THE LAWS GOVERNING NONPOINT SOURCE POLLUTION

Forestry BMPs are practical and cost effective methods that are specifically designed to help protect the State's aquatic resources by minimizing the effect of nonpoint source (NPS) pollution caused by human activities on the landscape. The NPS pollution is one of the leading causes of water pollution and aquatic ecosystem degradation in the nation.

The NPS pollution comes from a wide variety of diffuse sources including atmospheric deposition, agriculture, urban storm water runoff, mine drainage, land development, road building and numerous other land use activities. In the forested landscape, rainfall or snowmelt runoff moving over and through the ground can carry natural and man-made pollutants toward water sources eventually depositing them into lakes, rivers, wetlands, coastal waters, or underground aquifers. Examples of these pollutants include excess fertilizers and pesticides from silvicultural activities and sediment runoff from harvest sites, skid trails, road building, bridge or culvert installation and other land altering activities.

There are a number of state and federal statutes that relate to Michigan aquatic resource protection including the protection of ponds, inland lakes, the Great Lakes and intermittent and perennial streams. In Michigan, Part 31 of the Natural Resources and Environmental Act, 1994 PA 451, as amended (NREPA), addresses direct or indirect discharges that impact water quality, wildlife, fish, aquatic life and plants. Appendix C highlights Part 31 and other specific laws regulating forestry activities and related infrastructure installation and maintenance (bridges, culverts, roads).

Permits are required in a number of situations such as crossing streams and wetlands or building haul roads. These state and/or local permits help ensure proper engineering design and environmental protection. If you have questions regarding specific permit requirements, please contact the DEQ Environmental Assistance Center at 800-662-9278, or the local district DEQ Service Center (Note that a storm water permit is not required for mobile logging operations).

Failure to secure the necessary permits while engaged in logging, road building, and/or crossing streams activities is against the law. Violations could lead to enforcement actions and the possibility of fines of up to \$25,000 per day.

APPENDIX C - LIST OF APPLICABLE LAWS IN MICHIGAN

Part 17, Michigan Environmental Protection Act, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

This Act provides for the protection of air, water, and other natural resources, and the public trust associated with those resources. It provides the right to any person to bring an action against another person, agency, corporation, and political subdivision for conduct that may pollute, impair or destroy air, water, or other natural resources.

Part 31, (Section 3108) Water Resource Protection (Floodplain Regulatory Authority), of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

A Part 31 permit (Section 3108) is required for any occupation, construction, filling, or grade change within the 100-year floodplain of a river, stream, drain, or lake. Bridges and culverts are considered an occupation of the floodplain, as are activities that involve storage of materials in the floodplain. A 100-year flood has a 1% chance of occurring or being exceeded in any given year. These activities are regulated by a permit system with the purpose of ensuring that the channels and floodways are kept clear and uninhabited and that structures placed outside the floodway are properly protected from flood damage. The floodway includes the stream channel and that portion of the floodplain that is required to convey the flow of floodwater. Structures that are placed outside of the floodway portion of the floodplain must be properly protected from flood damage. This can be accomplished by elevating structures above the 100-year floodplain elevation or by designing the structures to be water tight without human intervention.

Part 31, (Section 3109) Water Resource Protection (Discharge into state waters), of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

Section 3109 of Part 31 is the statute used in the State of Michigan to address direct or indirect discharges of a substance that is or may become injurious to any of the following: a) public health, safety, or welfare, b) waters used for domestic, commercial, industrial, recreational or other uses, c) value and utility of riparian lands, d) livestock, wild animals, birds, fish aquatic life, or plants or to their growth and propagation, and the value of fish or game. Pursuant to the Part 31 statute, specific rules have been promulgated to address pollutants or substances such as excess sediment that can become injurious to waters of the State and aquatic life and its productivity.

Part 91, Soil Erosion and Sedimentation Control (SESC), of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

The purpose of Part 91 is to prevent soil erosion and to protect the waters of the State from sedimentation. A permit is required for any earth change that disturbs one or more acres of land OR that is within 500 feet of a lake or stream. Plowing and tilling for crop production and integral activities associated with logging and mining do not require permits. Access roads leading to or from a logging area, and ancillary and support activities associated with logging and mining, are subject to permits. A SESC permit is obtained by contacting your local county or municipal enforcing agency, CEA or MEA. For more information on the SESC program, please visit www.mi.gov/deqland and select "Soil Erosion and Sedimentation Control."

Whether a permit is required or not, the landowner is responsible for preventing off-site sedimentation. Activities that result in sedimentation to the waters of the State are a violation of Part 91 and are subject to enforcement actions by either the County Enforcing Agency or the State of Michigan. The counties are primarily responsible for issuing Part 91 permits. Prior to obtaining a permit, the landowner, or his/her designated agent, must submit an application and comprehensive soil erosion and sedimentation control plan to the appropriate county agency.

Part 301, Inland Lakes and Streams, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

The intent of the Inland Lake and Stream Protection Program is to protect the integrity of the land/water interface, the correlative rights of other riparian owners, and public trust in the inland waters of the State. Crossing a permanent or intermittent stream while skidding forest products or transporting them to the mill requires a Part 301 permit.

Road and pedestrian crossings, as well as utility crossings, that disturb land below the ordinary high water mark, are examples of common projects that require a Part 301 permit. A storm water outfall, with or without stream bank or streambed protection (riprap), stream relocations and enclosures are also examples of projects requiring a permit.

Part 303, Wetlands Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

Part 303 defines a wetland as "land characterized by the presence of water at a frequency and duration sufficient to support, and that under normal circumstances does support, wetland vegetation, or aquatic life, and is commonly referred to as a bog, swamp, or marsh."

The following construction activities are prohibited in wetlands, unless a Part 303 permit has been obtained from the DEQ:

- Deposit or permit the placing of fill material in a wetland.
- Dredge, remove, or permit the removal of soil or minerals from a wetland.
- Construct, operate, or maintain any use or development from a wetland.
- Drain surface water from a wetland.

Regulated wetlands are defined in Part 303 and associated administrative rules. However, silvicultural and timber harvesting activities, such as the building of roads for wood transport, are exempt from obtaining a Part 303 permit, as long as adverse effects on the wetland are minimized and the roads are built solely for logging or forestry purposes.

Part 305, Natural Rivers Act, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

This statute regulates all development and land uses, including timber harvesting and stream crossings, on both public and private lands, that are within 400 feet of a designated stream. Part 305 requires DNR approval of plans for the location and construction of any utility or publicly provided facility, including roads, bridges and culverts, within a designated Natural River Area. Each designated river system is managed according to a long-range management plan. This plan outlines the specific manner in which lands and water are to be managed to protect the unique river values of a designated Natural River system. Both mainstream and tributaries are regulated under Part 305.

Part 323, Shorelands Protection and Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

This program provides for the designation and proper management of environmental areas, high-risk erosion areas and flood risk areas along the Great Lakes shoreline. These areas include coastal wetlands and the adjacent uplands that provide habitat and nursery for fish and wildlife. A Part 323 permit is required for certain activities in a designated environmental area.

Part 353, Sand Dunes Protection and Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

The designated critical dune areas along the Great Lakes shoreline are areas where the most unique and fragile sand dunes are found. This program minimizes the impact of development on these critical dune areas. A permit is required for all proposed new uses in designated critical dune areas mapped in the "Atlas of Critical Dune Areas", prepared by the DEQ.

Part 365, Endangered Species Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

This statute protects threatened and endangered species from being taken or harmed during project development activities, unless a permit is issued by the DNR. Where threatened and endangered species are thought to exist, the landowner or responsible party is required to request an environmental review by the DNR to determine whether or not threatened or endangered species may be impacted by planned activities.

Part 515, Forest Protection and Forest Fires Act, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

This establishes the machinery to protect the forest from fires. It applies to all forest land; timbered, potential timber producing, cutover or burned timber land or grasslands, not including farmland. It requires a permit for burning on or adjacent to forestland, except for domestic purposes, and when the ground is snow covered.

National Pollutant Discharge Elimination System (NPDES) – Michigan Environmental Protection Act, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

A NPDES permit is required for fixed forestry activities such as permanent log storage areas maintained by paper mills or saw mills. Discharge to a storm sewer does not go to a municipal treatment facility, and is considered a direct discharge. Discharge to a municipal treatment facility may require a permit from the municipality under the Industrial Pretreatment Program.

Act 676 of 2002, Right to Forest Act.

An Act to provide for circumstances under which certain forestry operations shall not be found to be a public or private nuisance; to provide for certain forestry management practices; to provide for certain powers and duties for certain state agencies and departments; and to provide remedies.

APPENDIX D - FREQUENTLY ASKED QUESTIONS REGARDING STREAM CROSSING REGULATIONS AND PERMITS

APPLICABLE LAWS: Part 301, Inland Lakes and Streams, Part 91, Soil Erosion and Sedimentation Control, and Part 31, Water Resources Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

Definition of a stream: Has a defined bed, bank and some occurrence of water flow at sometime during the year.

Who is in charge of enforcing this law? The Michigan Department of Environmental Quality (DEQ).

When do I need to apply for a permit? Any time you plan to engage in an activity that may involve putting material or structures in or over a stream or stream bank.

Typical logging/forestry situations requiring a Part 301, Part 91, and Part 31 permits include:

1. Moving equipment or logs across a stream at any time during a logging or forest management operation.
2. Installation of a culvert or temporary bridge.
3. Modification or improvement of an existing culvert or bridge.
4. Activity that may result in deposition of material in a stream or that may affect natural stream flows.
5. Activity that occurs below the ordinary high water mark of the stream (e.g. the top of the stream bank).
6. Use of "ice bridges" that involve placing fill, snow or slash in the stream bed area.

Where do I go to apply for a permit? Contact your local DEQ office. A map showing the location of local DEQ offices throughout the State is available www.michigan.gov/deq, under "DEQ Locations" at the bottom of the website.

How much does this permit cost? The majority of stream crossings used for logging/forestry will have a permit cost of \$50. If the drainage area of the stream is more than two square miles, the permit cost is \$100. Installation of a newly created **permanent** stream crossing may have a permit cost of \$500.

How much will it cost to install a stream crossing? Costs may vary from several hundred to several thousand dollars, depending on what infrastructure is required and how much labor is involved in meeting DEQ permit requirements.

What is the preferred method of crossing a stream? The use of portable wooden or steel bridges is the preferred method, as proper installation involves the least amount of impact on the stream, as well as unimpeded fish passage.

What about the use of rocks or logs to cross the stream? The DEQ will not issue a permit for the use of such materials to construct a stream crossing. Rare exceptions may be made, but only after careful review and consideration by DEQ permitting staff.

What can I do to shorten the time it takes to get a permit? Contact your local DEQ office and work with the appropriate person closely throughout the permitting process. Providing clear and accurate photos of the stream crossing site and meeting with permitting staff on site may also help speed up the permitting process.

How can I find out more information regarding stream crossing permits: Please contact your local DEQ office or visit the DEQ/USACE Joint Permit Application website: <http://www.michigan.gov/jointpermit>, and select "Joint Permit Application" in the middle of the website. This website provides an extensive amount of information regarding the permit requirements for construction activities where the land and the water meet.

APPENDIX E – VEGETATIVE EROSION CONTROL GUIDANCE FOR NATURAL RESOURCE MANAGEMENT

Introduction

The purpose of this document is to provide information to facilitate the successful and timely re-establishment of vegetation following earth change activities. In most situations, vegetation is the best means of controlling wind or water erosion and preventing sediment transport and off-site sedimentation.

This document focuses on methods for the quick establishment of vegetative ground cover and establishing permanent native vegetative ground cover. It also discusses what environmental regulations apply regarding establishing vegetative cover for erosion control.

With respect to erosion control, the key legislation (and its administrative rules) that applies here is Part 91, Soil Erosion and Sedimentation Control (SESC), of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). As discussed in the manual, *“Sustainable Soil and Water Quality Practices on Forest Land”*, Part 91 applies whenever there is an “earth change” (e.g. removal of the vegetative cover and soil disturbance by a bulldozer) that is one or more acres in size or within 500 feet of a water body. Refer to the manual’s section 2, “Laws and Permits” and “Appendix C – List of Applicable Laws in Michigan”, for more information regarding Part 91 and its requirements.

Natural revegetation of areas in which the vegetative ground cover has been removed rarely occurs with the rapidity or vigor required to prevent erosion. Consequently, methods that quickly re-establish vegetative ground cover are required. Seeding using grass species is the most commonly used and most effective means of re-establishing vegetation.

For erosion control, many governmental agencies and landowners have relied heavily on using certain non-native and invasive plant grass species. However, increasingly, it is being recognized that these species can cause ecological damage. Alternatives are being sought to control erosion using grass species native to the region and state. An additional consideration is to use native plant species seed of a locally adapted genotype (seed from local populations of native species), as locally adapted genotypes often have better long-term growth.

Definitions That Apply To This Document

Native plants are naturally occurring species that existed in Michigan prior to European settlement.

Native plant genotypes are represented by genetic strains that have evolved in Michigan and are assumed to be adapted to Michigan's conditions.

Non-native species are species that were not naturally occurring in Michigan prior to European settlement. Some of these plants have had little impact on native species, others have had direct negative impacts on native species.

Invasive non-native plants are species that have had direct negative impact on the State's natural resources. These plants are very aggressive and out-compete native plants. Examples include autumn olive and purple loosestrife.

Native and Introduced Species

Within the natural resource management field, as well as the general public, there is increasing concern regarding current and potential future damage to native ecosystems due to the establishment and spread of certain non-native plant species (e.g., garlic mustard, purple loosestrife, crownvetch). These non-native species are referred to as “invasive”, as they disrupt native ecosystems that maintain or conserve native plant and animal biodiversity.

Many non-native grasses and other plant species introduced in the past and promoted for erosion control have proved to be less beneficial for their intended purpose than native species. Some of these introduced species have become invasive or noxious. However, many non-native plant species, such as those used for erosion control, are economical and readily available relative to native plant species.

Native species can be expensive and only available from a limited number of suppliers. Despite these factors, forest land managers and others are realizing long-term ecological and economic benefits by re-establishing locally adapted genotypes of native vegetation for erosion control and other restoration efforts.

In Michigan, the DNR and federal land management agencies emphasize or, in some cases, require the use of native species vegetation, and, if available, locally adapted genotypes on the lands they manage. The DNR encourages the use of native seed or native vegetation on private lands as well.

To meet legal requirements and prevent soil from eroding into a water body, certain introduced species may be used, especially if quick establishment of vegetative cover is needed. However, this document only recommends those non-native species that are not considered to be invasive, which are most likely to promote the natural succession of the site to native ground cover or are not likely to interfere with the native seed applied at a later date.

Planning and Site Assessment

Proper planning and site assessment is essential to ensure erosion control and establishment of native ground cover. The selection of plant species to use and establishment procedures should match the plant’s adaptations to local site conditions, including:

- available sunlight
- slope
- topography
- local climate
- soil drainage class
- soil texture
- proximity to environmentally-sensitive areas or natural plant communities
- soil fertility
- soil pH

To ensure proper establishment, a soil test may need to be taken at the site and soil amendments (e.g., fertilizer and lime) may need to be applied. In many cases, soil amendments will not be necessary when using suitable native plants. Managers should plan to stockpile the topsoil that was removed from the site during road and landing construction, to later use when topsoil is needed for the re-establishment of vegetative ground cover.

Site Preparation

The purpose of site preparation is to have good contact between soil and seed to achieve acceptable levels of germination. For temporary roads, landings and primary skid trails, site preparation generally occurs after harvest operations have been completed. Where disturbed/bare soil sites are small and soil compaction is minimal, it may be suitable to use a hand rake to prepare the seedbed (e.g., secondary skid trails in a RMZ on dry, upland or non-saturated soils).

Topsoil Use

It is essential for successful and quick revegetation to have a suitable depth of firm, but friable topsoil. Part 91 erosion control guidelines state that disturbed sites have a minimum of 3 to 4 inches of firm, but friable topsoil. However, these same guidelines allow for professional judgment and knowledge as to what depth of native topsoil will work as a suitable seedbed. Stockpiled topsoil that was removed from the site during road or landing construction should be re-applied when the constructed roads and landings are no longer required for operational or other forest management purposes (e.g. access to replant tree seedlings after a clearcut has occurred).

On sloped areas, prior to re-application of topsoil, roughen the subsoil to prevent a shear or smooth surface and slippage of the topsoil. Typically, surface roughening is accomplished by running tracked equipment (e.g. bulldozer) up and down the sloped area. If more topsoil is required to provide suitable seedbed germination, acquire topsoil from a source native to the area. Use topsoil that is not contaminated with non-native, weedy and invasive species.

Part 91 administrative rules state that a person shall complete permanent soil erosion control measures for all disturbed land areas within 5 calendar days after final grading or the final earth change has been completed. However, when seedbed preparation and/or seeding must be delayed due to weather, climate, seasonal conditions or certain resource management issues (pertinent to the site), then *appropriate* temporary erosion control (e.g. mulch) and sedimentation control measures (e.g. silt fence) shall be installed and maintained until seedbed preparation and seeding can commence.

Seeding and Erosion Control– Native and “Safe” Non-Native Species Use

Seed may be applied by hand, mechanical spreader, seed drill, or by hydro-seeding. Some native species must be applied with a drill.

Two objectives should be considered when seeding:

- 1) What is required to meet Part 91 requirements (quick establishment of vegetative cover and minimal erosion and sedimentation).
- 2) Long-term establishment of native vegetation.

To meet both of these objectives usually requires, at a minimum, the application of grass seed that is fast growing and provides fairly quick erosion control. As with other BMPs, there are a number of options based on the conditions of the site and when the seed is applied.

Seeding Recommendations

Seed Rates

All seeding rates, such as those stated in Table 8, are in pounds of "pure live seed" (PLS). In the case of certain native species, this can be significantly more than the weight of bulk seed.

When accounting for the amount of PLS, one will need to purchase and use more bulk seed than the weight per acre recommendations given for a particular seed species. Use the following formula to derive the required weight of bulk seed from the PLS rate. Germination, hard seed (a characteristic of legume seeds), and purity percentages are found on the information label attached to all commercially purchased seed.

$$\text{Pounds (lbs) of Bulk Seed} = \frac{\text{lbs PLS}}{(\text{purity} * + \text{hard seed}*) (\text{germination}*)}$$

*express % purity, hard seed, and germination in hundredths; i.e. 97% = 0.97

For example, a seed label indicates Canada Wild Rye that has a germination rate of 90%, no hard seed content, and a purity of 97%. The “Cool Season” seed mix from Table 2 requires 4 pounds of Canada Wild Rye PLS/acre. Compute the bulk seed rate as follows:

$$\text{lbs of bulk Canada Wild Rye seed} = \frac{4}{(0.97 + 0) (0.90)} = \frac{4}{0.873}$$

lbs of bulk Canada Wild Rye seed = 4.6 (which is the equivalent of 4 lbs of PLS)

Table 1 provides a list of native and non-native ground cover species (grasses and forbs) to consider for erosion control. Table 7 provides, by plant species, the soil texture, soil moisture, and sunlight requirements for successful germination and establishment. The comments portion contains information as to whether a species is native or non-native, perennial or annual, and (for grasses only), if it is considered a warm season or cool season grass.

Key for Information in Tables 7 and 8			
SOIL	MOISTURE	LIGHT	REGION
S - Sand	D - Dry	S - Full Sun	UP-Upper Peninsula
L - Loam	M - Moist	P – Partial Shade	NLP-Northern Lower Peninsula
C - Clay	W - Wet	Sh – Shade	SLP -Southern Lower Peninsula
M - Muck			SW - Statewide

Table 7. Native & Non-Native Plant Species To Use For Erosion Control In Forest Land

SPECIES NAMES Common (<i>Latin</i>)	SOIL	MOISTURE	LIGHT	REGION	Comments
Grasses:					
American beach grass (<i>Ampophila breviligulata</i>)	S	D	S	SW	Native perennial, dune stabilization – use plugs, not seed
Annual rye (<i>Lolium multiflorum</i>)	S-L-C	D-M-W	S, P, Sh	SW	Non-native annual, temporary cover
Big bluestem (<i>Andropogan gerardii</i>)	S-L-C	D-M-W	S	SW	Native perennial, warm season grass*
Creeping red fescue (<i>Festuca rubra</i>)	S-L-C	D-M-W	S, P	SW	Non-native perennial
Indian grass (<i>Sorghastrum nutans</i>)	S-L-C	D-M-W	S-P	NLP, SLP	Native perennial, warm season grass*
June grass (<i>Koeleria micrantha</i>)	S-L-C	D-M	S, P	SW	Native perennial, cool season grass**
Little bluestem (<i>Schizachyrium scoparius</i>)	S-L	D-M	S, P	SW	Native perennial, warm season grass*, dune stabilization
Oats (<i>Avena sativa</i>)	S-L-C	D-M	S, P	SW	Non-native annual, temporary cover
Redtop (<i>Agrostis gigantea</i>)	L, C, M	M-W	S	SW	Non-native perennial, cool season grass**
Switchgrass (<i>Panicum virgatum</i>)	S-L-C	D-W	S	SW	Native perennial, warm season grass*
Wild-rye, Canada (<i>Elymus canadensis</i>)	S-L	D-M-W	S, P, Sh	SW	Native perennial, cool season grass**
Wild-rye, Virginia (<i>Elymus virginicus</i>)	L-C	M-W	S, P, Sh	SW	Native perennial, cool season grass**
Forbs (Wildflowers)					
Legumes:					
Alsike Clover (<i>Trifolium hybridum</i>)	L-M	D-M-W	S, P	SW	Non-native, perennial, good for forest roads in northern hardwoods
Lupine (<i>Lupinus perennis</i>)	S-L	D-M	S - P	SLP + Newaygo Co.	Native perennial, butterfly host, nectar source
Medium Red Clover (<i>Trifolium pratense</i>)	S-L-C	D-M-W	S, P	SW	Non-native, perennial legume, good for forest roads in northern hardwoods
Round-headed bush clover (<i>Lespedeza capitata</i>)	S-L	D-M	S	SLP + Newaygo Co.	Native perennial legume, wildlife food
White Dutch Clover (<i>Trifolium repens</i>)	L-C-M	D-M-W	S, P	SW	Non-native, perennial legume, good for forest roads in northern hardwoods
Other Wildflowers:					
Black-eyed Susan (<i>Rudbeckia hirta</i>)	L-C	D-M	S-P	SW	Showy native perennial, yellow

SPECIES NAMES Common (<i>Latin</i>)	SOIL	MOISTURE	LIGHT	REGION	Comments
Butterflyweed (<i>Asclepias tuberosa</i>)	S-L	D-M	S	SW	Showy native perennial, orange
Common milkweed (<i>Asclepias syriaca</i>)	S-L	D-M	S-P	SW	Native perennial, pink, butterfly food
Horsemint (<i>Monarda punctata</i>)	S-L	D-M	S	SW	Native perennial, white/pink
Lance-leaved coreopsis (<i>Coreopsis lanceolata</i>)	S-L-C	D-M	S.P	SW	Showy native perennial, yellow
Starry false solomon-seal (<i>Smilacina stellata</i>)	S	D-M	S-P	SW	Native perennial, dune stabilization, white
Wild Bergamot (<i>Monarda fistulosa</i>)	S-L-C	D-M	S	SW	Showy native perennial, pink

* Warm season grasses = most of their growing occurs during the warm summer months, July, Aug, Sept.
** Cool season grasses= most of their growing occurs in cool, spring months, May, June

Table 8. Two Examples of Seed Mixtures Using Native Plants

Mix type	Common Name	Rate. lbs/acre
Cool Season	Canada Wild-rye	4
	Wild Virginia-rye	5
	Annual rye	5
Warm Season	Big Bluestem	4
	Indian grass	3
	Switchgrass	1

Note: For the Upper Peninsula, substitute Little Bluestem for Indian Grass

Other Items to Consider When Planting Native Species in a Forested Setting:

While Part 91 erosion control guidelines can contain helpful information, they were developed with the primary purpose of establishing grass cover on construction sites after final grading has been completed. The next paragraph provides a few additional considerations specifically designed for natural resource management purposes. For more specific technical information as to the proper timing, soils and general methods to ensure long-term establishment of a native plant seeding, contact the firm from which you purchased the seed.

As with introduced grasses, native grass/wildflower seed germination success requires good seed contact with soil. Depending on the site conditions, prepare the soil as needed and either handsow or use a prairie drill such as the Tye drill, Truax drill, or the John Deere Rangeland drill. If handsowing, it is advisable to mix the seed with a contact mulch such as wetted sand or vermiculite. If handsowed, rake or drag the seed in so that it is lightly covered with soil. Roll the site with a roller or drive over it to firm seed into the soil. Do not roll the site, if the soil is wet so as to avoid soil compaction. Hydro-seeding is generally not recommended for wildflower and prairie grass seeding, as it does not ensure firm seed-to-soil contact.

Mulch Use after Seed Application

In some cases, applying the detritus from the forest floor may be considered, if erosion is not an immediate threat, the site is not near a water body, and conditions are right for seed within the detritus to establish.

In most situations, it will be appropriate to apply a light covering of clean, weed-free straw with some moisture content, as this will increase germination rates. This is particularly helpful on dry sandy soils and heavy clay soils. Straw should just cover the soil surface, but not bury it. Some soil should be visible through the straw. Chopping and blowing the straw onto the area is the best method, as chopped straw is less susceptible to being blown away by the wind. On steep slopes, hold the straw in place by using biodegradable stakes and mesh over the straw. Never use field hay, as it invariably contains innumerable weed seeds.

Conclusion

These guidelines are just that, guidelines as of early 2007. Introduced plant species used for erosion control and site stabilization have been researched and used for a long time. Conversely, the amount of information available regarding the use of native plant species for erosion control and site stabilization is far less, especially with respect to what will work for the various ecological regions of a given state, such as Michigan. Hence, it is essential that users of these guidelines keep abreast of vegetation erosion guideline updates. Use professional judgment and past experience as to what will prevent erosion, meet Part 91 requirements, and result in the establishment of native vegetation genotypes adapted to the local site conditions.

The DNR and DEQ recognize that the use of native species is more expensive than using introduced species and are more difficult to obtain. However, native species with local region genotypes are the species best adapted to the site conditions and survival for the long-term, without harm to the environment or Michigan's biodiversity conservation efforts.

A number of Michigan firms which produce seed native to Michigan have formed an association called the Michigan Native Plant Producers Association. Their website is: <http://www.mnppa.org/>. Another source for information is the Michigan Wildflower Association. Their website is: <http://www.wildflowersmich.org/>. Another related site is the Michigan Association Conservation District's website on native plants. This website is: <http://www.macd.org/nativeplants/nphome.html>. Many county conservation districts sell native plants, as well as provide general and technical information regarding the uses and benefits of various native plant species.

APPENDIX F – NATURAL RIVER BUFFERS

River	Public Lands		Private Lands (1)		Counties
	Mainstream	Tributary	Mainstream	Tributary	
Upper Peninsula					
Fox	200	200	100	100	Alger, Luce, Schoolcraft
Two Hearted	100	100	100	100	Luce
Northern Lower					
Au Sable	150	150	75	50	Crawford, Oscoda, Otsego, Roscommon, Montmorency, Iosco, Alcona
Betsie	100	100	50	50	Benzie, Manistee
Boardman	100	100	75/50	50	Grand Traverse, Kalkaska
Jordan	100	100	100	25	Antrim, Charlevoix
Pere Marquette	150	150	75	50	Lake, Mason, Oceana, Muskegon
Pigeon	200	150	100	75	Otsego, Cheboygan
Pine	175*	100 - 155**	100	50	Wexford, Osceola, Lake, Manistee
Upper Manistee	175*	100 - 155**	75	75	Antrim, Otsego, Crawford, Kalkaska, Missaukee
Southern Lower					
Flat	50	50	25	25	Montcalm, Ionia, Kent
Huron	100	100	50	50	Livingston, Washtenaw
Kalamazoo	150	150	50	50	Allegan
Rifle	150	100	75	50	Ogemaw, Arenac
Rogue	100	100	50	25	Kent
White	100	100	50	50	Newaygo, Oceana, Muskegon

Note: All distances listed above are measured in feet from the ordinary high watermark.

(1) When working on private lands along Natural Rivers, a Natural River permit is required when cutting within the buffer.

* Buffer includes the entire face of a bluff where the toe of the bluff is within 175 feet of the river's edge and lands within 50 feet of the crest of a bluff.

** Buffer width increases depending on steepness of slope.

Contact the Department of Natural Resources, Natural Rivers Program for additional buffer information at 517-373-1280.

APPENDIX G - DESIGNATED NATURAL RIVERS AND TRIBUTARIES

UPPER PENINSULA

FOX RIVER

Mainstream: Alger and Schoolcraft Counties

Tributaries:

Alger County: Casey Creek, West Branch Fox River

Schoolcraft County: Camp Seven Creek, Clear Creek, Cold Creek, East Branch Fox River, Hudson Creek, Little Fox River, Spring Creek, Spring Ponds, West Branch, Fox River

Luce County: Bev Creek, Deer Creek, East Branch Fox River, Spring Creek

TWO HEARTED RIVER

Mainstream: Luce County

Tributaries:

Luce County: Dawson Creek, East Branch Two Hearted River, North Branch Two Hearted River, South Branch Two Hearted River, West Branch Two Hearted River

NORTHERN LOWER PENINSULA

AU SABLE RIVER

Mainstream: Upstream of Loud Dam - Alcona, Crawford, Iosco, and Oscoda Counties

Tributaries:

Alcona County: Blockhouse Creek

Crawford County: Big Creek (including East Branch, Middle Branch and West Branch), Bradford Creek, East Branch Au Sable River, Kolka Creek, North Branch Au Sable River, South Branch Au Sable River

Montmorency County: Middle Branch Big Creek

Oscoda County: Beaver Creek, Big Creek, Big Creek Township (including East Branch and West Branch), Blockhouse Creek, Comins Creek, East Branch Big Creek, Greenwood Township, Glennie Creek, Loud Creek, Middle Branch Big Creek, Greenwood Township, Nine Mile Creek, Perry Creek, Sohn Creek, Wolf Creek

Otsego County: Chub Creek, Kolka Creek, North Branch Au Sable River, Turtle Creek, West Branch Big Creek

Roscommon County: Beaver Creek, Douglas Creek, East Creek, Hudson Creek, Robinson Creek, South Branch Au Sable River, South Creek, Thayer Creek

BETSIE RIVER

Mainstream: Benzie and Manistee Counties

Tributaries:

Benzie County: Little Betsie River, Dair Creek

BOARDMAN RIVER

Mainstream: Grand Traverse County

Tributaries:

Grand Traverse County: Bancroft Creek, Beitner Creek, Carpenter Creek, East Creek, Jackson Creek, Jaxson Creek, North Branch Boardman River, Parker Creek, South Branch Boardman River, Swainston Creek, Twenty Two Creek

Kalkaska County: Crofton Creek, Failing Creek, North Branch Boardman River, South Branch Boardman River, Taylor Creek

JORDAN RIVER

Mainstream: Antrim and Charlevoix Counties

Tributaries: All tributaries entering the mainstream upstream (south) of Rogers Bridge, Charlevoix County, T32N, R7W, Section 26/35

PERE MARQUETTE RIVER

Mainstream: Lake and Mason counties

Tributaries:

Lake County: Baldwin River, Blood Creek, Bray Creek, Cole Creek (including North Branch and South Branch), Danaher Creek, Kinney Creek, Leverentz Creek, Little South Branch Pere Marquette River, Middle Branch Pere Marquette River, Sandborn Creek, Sweetwater Creek

Mason County: Big South Branch Pere Marquette River, Carr Creek, Swan Creek, Weldon Creek,

Newaygo County: Big South Branch Pere Marquette River, Cedar Creek, Little South Branch Pere Marquette River, McDuffee Creek, Pease Creek

Oceana County: Big South Branch Pere Marquette River, Ruby Creek

PIGEON RIVER

Mainstream: Otsego and Cheboygan Counties

Tributaries: All tributaries in both counties upstream (south) of M-68, Cheboygan County

PINE RIVER

Mainstream: Osceola, Lake, Wexford and Manistee Counties

Tributaries:

Wexford County: North Branch of the Pine River, Spalding Creek, Fairchild Creek, Poplar Creek, Dowling Creek, Hoxey Creek, Unnamed stream with sources in sections 27 and 34, South Branch Twp., Yates Creek

Osceola County: North Branch of the Pine River, Sixteen Creek, Fairchild Creek, Unnamed stream with source at dam in section 8 of Burdell Twp., East Branch of the Pine River, Rose Lake outlet, Emery Lake outlet, Edgetts Creek, Diamond Lake outlets, Unnamed stream with source in section 20, Sherman Twp., Sprague Creek, Beaver Creek, Little Beaver Creek, Coe Creek, Dyer Creek

Lake County: Unnamed stream with source in section 14, Ellsworth Twp., Coe Creek, Sellars Creek, Unnamed stream with source in section 20, Dover Twp., Unnamed stream with source in section 19, Dover Twp., Unnamed stream with source in section 24, Newkirk Twp., Silver Creek including all perennial tributaries, Unnamed stream with source in section 13, Newkirk Twp., Unnamed stream with source in section 11, Newkirk Twp., Unnamed stream with source in section 7, Dover Twp., Unnamed stream with source in section 1, Newkirk Twp., Poplar Creek

RIFLE RIVER

Mainstream: Arenac and Ogemaw Counties

Tributaries:

Arenac County: Fritz Creek, Mansfield Creek

Ogemaw County: Dedrich Creek, Eddy Creek, Gamble Creek, Houghton Creek, Klacking Creek, Little Klacking Creek, Mansfield Creek, Mayhue Creek, Oyster Creek, Prior Creek, Silver Creek, Vaughn Creek, West Branch Rifle River, Wilkins Creek

UPPER MANISTEE RIVER

Mainstream: Antrim, Otsego, Crawford, Kalkaska and Missaukee Counties

Tributaries:

Antrim County: All headwater streams

Otsego County: Frenchman's Creek

Crawford County: Lost Lake Outlet, Unnamed stream, section 30, Frederic Twp. (T28N, R4W), Goose Creek, Portage Creek, including all perennial tributaries

Kalkaska County: Unnamed stream with source in section 13, Blue Lake Twp., Goose Creek, Portage Creek (including all perennial tributaries), Clear Creek, Black Creek (including all perennial tributaries), Dempsey Creek, Big Devil Creek, Big Cannon Creek, North Branch of the Manistee River (including all perennial tributaries), Willow Creek, Pierson Creek, Maple Creek, Little Cannon Creek, Silver Creek, Waterhole Creek (including all tributaries), Babcock Creek, Filer Creek, Nelson Creek, Spring Creek, Bourne Creek, Ham Creek, Haynes Creek, Fisher Creek

Missaukee County: Silver Creek, Filer Creek, Ham Creek, Gravy Creek, Hopkins Creek, Fisher Creek

SOUTHERN LOWER PENINSULA

FLAT RIVER

Mainstream: Ionia, Kent and Montcalm Counties

Tributaries:

Ionia County: Dickerson Creek

Kent County: Clear Creek, Coopers Creek, Wabasis Creek

Montcalm County: Coopers Creek, Dickerson Creek, Wabasis Creek, West Branch Flat River

HURON RIVER

Mainstream: Livingston and Washtenaw Counties

Tributaries:

Livingston County: Davis Creek

Washtenaw County: Arms Creek, Mill Creek

LOWER KALAMAZOO RIVER

Mainstream: Allegan County

Tributaries:

Allegan County: Bear Creek, Mann Creek, Rabbit River, Sand Creek, Swan Creek

ROGUE RIVER

Mainstream: Kent County

Tributaries:

Kent County: Barkley Creek, Cedar Creek, Duke Creek, Rum Creek, Shaw Creek, Spring Creek, Stegman Creek

WHITE RIVER

Mainstream: Muskegon, Newaygo and Oceana Counties

Tributaries:

Muskegon County: Carlton Creek, Carleton (Lanford) Creek, Cleveland Creek, Sand Creek, Silver Creek, Skeels Creek

Newaygo County: East Branch Heald Creek, Five Mile Creek, Flinton Creek, Martin Creek, Mena Creek, Mullen Creek, Wrights Creek

Oceana County: Braton Creek, Carlton Creek, Cobmoosa (Osborn) Creek, Cushman Creek, Knutson Creek, Mud Creek, Newman Creek, North Branch White River, Robinson Creek, Sand Creek

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