

Chapter 10

Site Preparation and Reforestation

For Forest Owners:

- 1) *Successful site prep can improve the financial advantages of forest management by shortening the period of time to a partial and final harvest.*
- 2) *Sites that are very cleanly harvested may not require much site prep. This should be a goal during a timber harvest.*
- 3) *Intensive site prep may not be needed if converting former cropland or pasture to forest, unless weeds or grasses need to be controlled. This usually can be done with herbicides.*
- 4) *Seek consultation from a registered forester or other natural resources professional when evaluating your site prep needs.*
- 5) *Obtain a detailed plan and map outlining what site prep treatments will be done, including BMPs and a timeline.*



Also Refer To...

Chapter 6 explains in more detail the Dredge and Fill Law and Corps/U.S.EPA Memorandum to Field

The Reason for Site Preparation

Trees vary in their requirements for sunlight and soil exposure to successfully regenerate. This includes the majority of North Carolina's commercially valuable trees, as well as many that are valued for wildlife, recreation and visual beauty. Site preparation (referred to as "site prep") accomplishes one or more of the following objectives:

- Creates soil conditions for successful natural regeneration or tree planting.
- Promotes tree seedling survival by reducing plant competition for nutrients, water and sunlight.
- Improves soil moisture conditions.
- Makes tree planting easier by reducing or eliminating unusable debris.
- Enhances food and habitat conditions for certain wildlife species.
- Reduces wildfire hazards and improves access for firefighting.

Water Quality Link

There are numerous methods to prepare a site for tree regeneration. In many cases, site prep requires the use of heavy equipment and some degree of soil disturbance. Common themes for site prep to protect water quality include:

- Select the method(s) that accomplish your goals while minimizing negative impacts to the soil, organic matter, and hydrology.
 - Operate heavy equipment when soil conditions are favorable for water quality protection and soil conservation.
 - Only expose the minimum amount of bare soil as needed, especially on areas with high potential for erosion or near waterbodies.
 - The site prep operation should not significantly reduce the infiltration capacity of the soil.
 - Adjust site prep methods according to topography, soils, and water features
- Do not assume the same treatment will work across the entire site.

Rules Related to Site Prep for Forest Management

Forest Practices Guidelines Related to Water Quality (FPGs)

North Carolina General Statute 77-13 and General Statute 77-14

DWR riverbasin and watershed 'Riparian Buffer Rules'

These rules restrict certain site prep activities within the buffer zones.

North Carolina Dredge and Fill Law

This state law requires that permits be secured for discharges of dredged or fill material in certain locations within the 20 CAMA counties.

U.S. Army Corps of Engineers / U.S. EPA Memorandum to the Field Related to the Silviculture Exemption (Mechanical Site Prep BMPs for Pine Plantations on Wetlands of the Southeast)

For Forest Owners:

Successful site prep should include planning.

A site prep or 'regen' (regeneration) plan should take into account:

- Site, soil, and soil moisture conditions.
- Inventory of competing vegetation.
- Use of methods that minimizes soil disturbance and protects water quality while meeting the forest owner's goals.
- SMZs, buffers and BMPs.
- Consideration of using non-mechanical methods in areas prone to accelerated erosion or intensive soil disturbance.
- Required use of correctly maintained and operated equipment.

Helpful Hints:

A toothed-rake may be more suitable for piling than an enclosed blade, since soil can escape between the rake's tines.

FPG

Refer to FPG .0202,
N.C. G.S. 77-13 and
N.C. G.S. 77-14

Site Prep Methods and BMPs

The following site prep methods are commonly used for forest management in North Carolina, either by themselves or together with other methods.

The specific site prep prescription should be unique to the forest owner's objectives and the current condition of the site to be reforested.

Prescribed Fire

Prescribed fire improves access for tree planting and can create a suitable soil seedbed for natural seeding. Fire can also control competing vegetation.

Burning is cost-effective, but must be done by trained individuals due to obvious hazards involved with the use of fire. A burning plan likely will be needed as part of the regeneration plan if fire is used.

Refer to Chapter 9, *Fire Management* for BMPs on prescribed fire.

Shearing, Raking or Piling

These methods include the use of heavy equipment, such as bulldozers to knock down and pile unusable trees or leftover debris.

Extreme care by a skilled operator, using proper equipment, is required to insure water quality is protected from potential increased erosion and runoff and to prevent soil from being intensively disturbed.

A key point to remember is to minimize the amount of bare soil that is exposed, especially in areas prone to accelerated erosion or near waterbodies.

BMPs for Shearing, Raking or Piling

- Minimize the amount of soil that is disturbed by the equipment blade / rake and avoid uprooting leftover trees and stumps, thereby reducing the likelihood of loose soil eroding and being deposited into waterbodies.
- Prevent the movement of significant amounts of soil into debris piles, because this loose soil can easily erode and wash into nearby waterbodies:
- When conditions and goals warrant, minimize the removal of surface organic matter. However, in certain cases, heavy organic surface root-mats may need to be displaced to create suitable growing conditions for tree seedlings.
- Maintain existing debris and groundcover within ephemeral drains or dry gullies to provide filtering of runoff.
- Keep equipment out of the SMZ or riparian buffers.

Helpful Hints:

Leaving gaps within a windrow also provides better access for wildlife and for wildfire control.

- For windrow placement:
 - Set windrows along the land’s topographic contour when suitable.
 - When leaving openings within the windrow, stagger the openings from one windrow to the next. Doing so will filter the runoff and reduce the chances of concentrating or funneling the surface runoff.
 - Avoid gouging the soil surface in a manner that could funnel runoff and transport sediment into nearby waterbodies.
 - Frequently inspect the job site and stop work or change methods if intensive soil disturbance occurs, or water quality protection cannot be achieved at that time.

For Forest Owners:

Chopping is most effective on small diameter material and brushy vegetation. The intent is to chop the debris and vegetation, not the soil underneath!

Chopping during summer is usually preferred because:
- Soils are usually drier.
- It reduces the density of sprouts from undesirable vegetation.
- Leftover debris dries out better, allowing for a more effective prescribed burn.

Drum Chopping

A rolling drum chopper is used to sever, chop and/or compact vegetation, brush and small debris. If left standing, this residual vegetation and debris will shade out and inhibit growth of the newly regenerated trees.

The size, weight, and use of the chopper should be adjusted so vegetation is chopped and not pushed over.

BMPs for Drum Chopping

- Minimize the uprooting of leftover trees and stumps, which reduces the likelihood of loose soil eroding and being deposited into waterbodies.
- Appropriate equipment and usage should minimize intensive soil disturbance and reduce the risk of erosion and sediment transport.
- Avoid creating large contiguous areas of exposed, bare soil.
- Minimize the potential of concentrating surface runoff.
- Keep the number of passes made with the chopper and equipment to a minimum.
- Consider testing the chopper on a small area first, to see if it will meet water quality and site prep goals.

For Forest Owners:

Bedding is considered an acceptable forestry ('silvicultural') practice, including work in forested wetlands. However, in wetland situations, bedding must be done in a manner that does not convert a wetland to a non-wetland.

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Bedding

Bedding is the mounding of soil into strips or narrow rows ('beds'), usually done to improve spot-drainage and soil conditions in the rooting zone of planted seedlings. Bedding might also be done to incorporate needed nutrients.

BMPs for Bedding

- Conduct bedding work when the soil moisture is appropriate to avoid negative impacts to soil structure and infiltration.
- Keep the number of passes made with the bedding equipment to a minimum, according to site prep goals.

Bedding is usually only one part of a more comprehensive site prep prescription.

This Manual does not suggest that using bedding methods for site prep is, in itself, a BMP.

BMPs are provided here for situations where bedding is performed.

- When conditions allow, align beds along the land contours, and not up or down the slope. Minimize the potential of creating surface runoff.
- Retain undisturbed groundcover between beds.
- Stop beds at the outer edge of the SMZ or riparian buffer.
- Keep beds from connecting into a stream or water drainage system. Do not tie beds into ditches that outlet directly to intermittent or perennial streams.
- When leaving gap openings within the bed row, stagger the openings from one bed row to the next. Doing so will reduce the chances of concentrating or funneling the surface runoff, while preventing blockage of surface flow.
 - Staggered openings are recommended on wetland sites, or on sites with frequent surface water sheetflow or heavy surface runoff.
- Consider pulling a test bed across a small area first to see if it will meet water quality and site prep goals.

Figure 10A: Ground-level view of a freshly pulled bed in eastern N.C.



Caption:

On this site, a single pass with a 'Savannah'-type bedding plow created beds (left) suitable for planting.

Un-bedded strips of soil (right) were left in between the bed rows.

The bedding was performed when soil moisture conditions were appropriate and not too wet.

Did You Know?

Tillage can be accomplished by one of several different methods:

- Disking
- Furrowing
- Scalping
- V-blading

Tillage

Tillage is a term used to describe the loosening of soil. Tillage in forestry applications often is used to create suitable root zone conditions for new plant growth, reduce unwanted vegetation, or incorporate soil amendments. Tillage can also improve water infiltration and soil structure conditions on areas of intensive soil disturbance (such as compaction, rutting, churning, etc.)

For Forest Owners:

For old fields or pastures, tillage may be all that is needed to prepare a site.

These old fields typically have a thick root mat of old grasses and a compacted layer of subsoil known as a 'hardpan' that must be tilled so tree roots can grow.

Ideally, soil should be moist when tilling, not too wet or too dry.

Helpful Hints:

Lopping can be cost-effective on sites that have large, scattered trees as the only material needed to remove for tree regeneration.

FPG

Refer to FPG .0202,
FPG .0208,
N.C. G.S. 77-13 and
N.C. G.S. 77-14

Watch Out!

Herbicides must be applied according the product label's requirements.

BMPs for Tillage

- Conduct tillage activities when soil moisture is appropriate to avoid negative impacts to soil structure and infiltration.
- When conditions allow, till along the land contours, and not up or down the slope. Minimize the potential of creating surface runoff.
- Retain undisturbed vegetation and groundcover between tillage strips to provide filtering of runoff across the ground surface.
- Stop tillage work at the outer edge of the SMZ or riparian buffer. Tillage should not funnel runoff into streams or other water drainage systems.
- Minimize tillage work within ephemeral drainages. Where possible, maintain existing debris and groundcover within ephemeral drains or dry gullies to provide filtering of runoff.
- Keep the number of repeated passes of the tillage equipment to a minimum, according to site prep goals.
- Consider pulling a test strip across a small area first to see if the tillage method you select will meet water quality and site prep goals.

Lopping

Lopping is the use of hand tools and/or chainsaws to fell, cut up and otherwise reduce leftover tree stems and debris. Lopping is a good choice on sites with soil that is susceptible to erosion or intensive soil disturbance because heavy equipment is not used and soil disturbance is minimized.

BMPs for Lopping

- Lopping is a preferred method of vegetation management and site prep within the SMZ or riparian buffer.
- Retain sufficient shade within the SMZ as appropriate for site prep goals.
- Keep felled or lopped vegetation out of streams and waterbodies.

Herbicides

There are several herbicides that are suitable as a site prep method for forestry. Soil disturbance is usually minimized when using herbicides alone. However, herbicides often are only one part of a more comprehensive regeneration plan.

Herbicides can be applied in a variety of methods, including:

- Air application using a helicopter.
- Ground application using tractors or bulldozers.
- Directly injecting into stems or stumps ('hack & squirt method').
- Basal spraying ('thin line method').

BMPs for Herbicides in Site Prep

- Refer and implement the BMPs for forest chemicals as recommended in Chapter 7.
- If tractors are used to apply the herbicide, operate the equipment when site conditions are appropriate to avoid negative impacts to soil structure, infiltration or runoff.
- Keep the number of passes made with the tractor and equipment to a minimum.

For Forest Owners:

Planting work done with the assistance of a tractor is called machine planting.

This method is usually used on flat or rolling terrain that is relatively free of debris.

Tree Planting

Forest tree seedlings are either planted by hand or with the assistance of a tractor-mounted planting mechanism.

Generally speaking, hand planting does not create conditions that may be a water quality concern, but you may want to review the BMPs listed below to see if any apply to your job site.

Machine planting requires tractors to operate on the site. When heavy equipment works on a site, you should consider appropriate BMPs that will protect water quality as a result of equipment activity.

BMPs for Tree Planting

- Conduct machine planting when the site conditions are appropriate to avoid intensive soil disturbance or accelerated runoff.
- Keep the number of passes made with the tractor to a minimum.
- Operate equipment along the contours if possible to avoid channeling surface runoff within the trench or slit created by the tree-planting machine.
- Properly dispose of all seedling bags, boxes and culled seedlings. Do not place them in or near streams or other waterbodies.
- Refer to Chapter 8 for BMPs on equipment fluids and solid waste.

Watch Out!

**Safety 1st - - -
Evaluate the chances
of the tractor and
equipment rolling
over when working
on steep slopes.**