NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

Tree/Shrub Establishment

(Acre)

Code 612

DEFINITION

Establishing woody plants by planting seedlings or cuttings, direct seeding, or natural regeneration.

PURPOSES

- To establish woody plants for forest products.
- To establish wildlife habitat.
- To provide long-term erosion control and improve water quality
- To treat waste.
- To reduction air pollution.
- To sequester carbon.
- To conserve energy.
- To enhance aesthetics.

CONDITIONS WHERE PRACTICE APPLIES

On any areas where woody plants can be grown.

CRITERIA

General Criteria Applicable to All Purposes

- Plans and application of tree/shrub establishment shall comply with all applicable federal, state, and local laws and regulations.
- The species, type of plant material, location, layout and density of the planting shall accomplish the intended purposes.
- Species shall be adapted to the soils, climate and site conditions.
- The planting design shall consider the cultural and management practices likely to occur in the future e.g. thinnings etc.
- Native plant species shall be used whenever possible. Known non-native invasive species shall not be used.
- Woody plants shall be established without compromising the integrity of:
  1. Property Lines
  2. Fences
  3. Utilities
  4. Roads
  5. Legal Drains
  6. Other Easement Areas or Right of Ways

  Where a right-of-way easement exists, written permission from the landowner will be needed.
- Where subsurface drains (tile lines) cross through a tree/shrub planting, and where these drains will remain functional. Sealed conduit shall be installed through the planting and extend a minimum of 50 feet on either side of the planting, or trees/shrubs shall not be planted within 50 feet on either side of the tile line.

Site Preparation/Weed Control for Establishment

1. Eliminate competing vegetation prior to planting or seeding (see Table 1). Before direct seeding or installing weed barrier material heavy grass and/or weed cover shall be eliminated to prevent damage to plants from mice and voles.

2. If fabric weed barrier is used the following shall apply:

- The minimum width of weed barrier material shall be 3 feet wide.
- The weed barrier shall contain UV inhibitor, be permeable to water movement, and have a manufacturer's guarantee not to deteriorate for a minimum of 3 years when exposed to sunlight.
- Weed barrier shall be capable of preventing underlying plant growth.
- Weed barrier shall be installed according to the manufacture specifications.

3. Hay or straw mulch shall not be used for weed and grass control around trees and shrubs.

Planting Dates

- Barerooted stock shall be planted in early spring as soon as the ground thaws until June 1.
- Balled and burlapped or container grown stock shall be planted September 15 to June 1 as local soil and weather conditions permit.
- Direct seeding shall be completed as local soil and weather conditions allow as follows:

  September 15 – December 1 or using stratified seed in the spring after the ground thaws before May 15th except White Oak, Swamp Chestnut Oak, and Chinquapin Oak. These species should be seeded within 10 days after seed drop because they are difficult to store.
- Extension of planting dates is appropriate if approved by the NRCS State Forester.

Planting Stock Size

- Bare rooted stock

Conifers:

Tree Height	Caliper[1]	Minimum Root Length
9"	1/8"	8"
12"	3/16"	10"
15"	3/16"	10"

Hardwoods:

Tree Height	Caliper[1]	Minimum Root Length
8"	3/16"	8"
10'	¼"	10"
12"	¼"	10"

- Balled and Burlapped Stock

Conifers:

Tree Height	Minimum Diameter Ball
18-24"	10"
2-3'	12"
3-5'	14"
5-6'	20"

Hardwoods:

Tree Height	Minimum Diameter Ball	Caliper[1]
5-6'	12"	1/2"
6-8'	14"	3/4"
8-10'	16"	1"

- Container stock (all species)

Container Size	Tree Height	Caliper[1]
1 gallon	2 – 4'	3/8 – 5/8"
3 gallon	2 – 6'	3/8 – 5/8"

[1] Caliper (diameter at ground level) shall be measured at the root collar.

Planting and Storage Guidelines for Woody Stock

- Care and Handling Requirements for Woody Planting Stock

1. Plant material will be protected from desiccation during temporary storage and delivery to the planting site. Stock will be kept in a cool environment out of direct sunlight and wind.
2. If seedling planting is delayed more than 5 days, keep seedlings in shipping container and place in cold storage at 35º to 45º F. If cold storage in not feasible, seedlings will be heeled-in. To heel-in, dig a trench in a shady area, deeper than the root system and spread the roots against the back of the trench. Cover roots completely with soil, tamped to eliminate air pockets. Water as needed to keep the roots moist.
3. Roots of bareroot stock shall be kept moist during planting operations by placing in a water-soil (mud) slurry, peat moss,

sphagnum moss, super-absorbent (e.g. polyacrylamide) slurry or other equivalent material. (Note: Do not soak trees in water for more than 2 hours.)

4. Rooting medium of container and balled and burlapped stock shall be kept moist at all times by periodic watering.

- Planting Requirements for Woody Planting Stock

1. Stock shall not be planted when the soil is frozen or dry. All stock will be planted in a vertical position. Bare root and container stock shall be planted with the root collars approximately at or slightly below the existing ground line. Balled and burlapped stock will be planted with the root collars at or slightly above the existing ground line.
2. Seedlings: The planting trench or hole shall be deep and wide enough to permit roots to spread out and down without J-rooting or L-rooting. If the roots are too long for the planting equipment modestly prune them to the correct length before planting. Never prune back beyond the main root system or more than 25% of the root length. After planting pack soil around each plant firmly to eliminate air pockets.
3. Container trees: Dig a hole slightly larger than the container diameter. Remove plants from containers before placing in the ground and firmly pack soil around roots to eliminate air pockets. Before planting loosen any spiraling roots and prune if needed.
4. Balled and burlapped trees: When handling stock never pick up a tree at the stem or trunk, handle stock at the root ball. Dig a hole 11/2 times as wide as the root ball and about the same depth as the root ball. Remove any rope, wire, or plastic twine from the tree. Pull back burlap around trunk and fold once in the hole. Carefully place the tree in the hole and firmly pack soil around roots to eliminate air pockets. After planting water as needed.

Criteria for Forest Products, Erosion Control, Improve Water Quality, Reduce Air Pollution, And to Sequestrate Carbon

A minimum of 300 trees/acre shall be established using one or a combination of the following methods:

- planting bare root seedlings
- direct seeding
- natural regeneration
- planting container stock

1. Criteria for bare root seedlings

- Planting bare root seedlings is applicable on a wide range of soil types, hydrologic conditions, aspects and slopes. Bare root seedlings can be used in reforestation projects, supplemental plantings and wildlife projects.
- A minimum of 436 trees/acre shall be planted (10 foot by 10-foot spacing or equivalent).

Number of plants required per acre for various spacing

Spacing (feet)	Plants per acre
5 x 5	1742
6 x 6	1210
6 x 8	907
6 x 10	726
7 x 10	622
7 x 7	889
8 x 8	681
9 x 9	538
8 X 10	544
9 x 10	484
10 x 10	436
10 x 12	363
10 x 13	335
12 x 12	302
14 x 14	222
16 x 16	170
18 x 18	134
20 x 20	109

2. Criteria for direct seeding

Seed Inspection

Inspect seed by species selecting at least 10 randomly selected seeds/bushel. Crack or cut seeds open to be sure all seed is filled, moist, normal colored and not damaged by insects. If seed appears to be non-viable increase the seeding rate by the percentage of non-viable seed from the tested seed.

Floating in water can separate walnut seed that has not filled, as the unfilled nuts will float, while the filled nuts will sink. Discard floating walnut seed.

Seed Care, and Storage

Field collected seed shall be placed in porous bags e.g. onion bags, burlap bags, or standard feed sacks and placed in storage no more than 50º F and preferably 35-40º F to prevent heat buildup.

All species except oaks should be kept dry. Oak acorns should be re-hydrated, by soaking in cold water for 4- 24 hours as soon as possible after collection or delivery, maintain moisture content at greater than 25%.

If planting is delayed for more than 2 weeks or planted after February, store seed at 35-40º F in sealed containers as described by species in the "Illinois Direct Seeding Handbook".

Species that need stratification to germinate, shall be stratified as described in the "Illinois Direct Seeding Handbook". Stratification is a pregermination treatment to break seed dormancy. Stratification methods vary by species.

Seeding Rates and Methods

- Shall consist of at least 75%, of a combination of Black Walnut, Oak and/or Hickory species.
- To improve seed germination and to prevent rodent depredation the site (planting rows or entire area) shall be kept bare and free of grass and weed cover before and 2 years after direct seeding is completed.
- Seed shall be sown at 2 times the seed diameter.
- To overcome seed predation double the seeding rate for the first 300 feet on sites adjacent to woodlands.

Seeding rates[1] (minimum):

Seeding Method	**Seeds Per Acre** (heavy seeded species)
Row Planting	3000
Broadcast Planting	4500

[1]See direct seeding rate table on page 5 for seeding rates by species.

Species suitable for direct seeding:

Heavy Seeded Species	**Light Seeded Species**
Black Walnut (*Juglans nigra*)	Ash (*Fraxinus spp.*)
Oak (*Quercus spp.*)	Yellow Poplar or Tulip Tree (*Liriodendron tulipifera*)
Hickory (*Carya spp.*)	Black Cherry (*Prunus serotina*)
Persimmon (*Diospyros virginiana*)	Maple (*Acer spp.*)
Kentucky Coffeetree (*Gymnocladus dioica*)	Basswood (*Tilia americana*)
	Sycamore (*Platanus occidentalis*)
	Hackberry (*Celtis occidentalis*)
	Blackgum (*Nyssa sylvatica*)
	Sweetgum (*Liquidambar styraciflua)*
	Bald Cypress (*Taxodium distichum*)

Row/Seed Spacing for 3000 seeds/acre

Row Spacing (feet)	Seed Spacing (feet)
3	4.8
4	3.6
5	2.9
6	2.4
7	2.0
8	1.8
9	1.6
10	1.5
11	1.3
12	1.2
14	1.0
16	0.9
18	0.8

Direct Seeding Rates Table (Note: walnut and all hickory species are husked)

Common Name	Scientific Name	Range of Seeds/Lb.	Ave. Seeds/Lb.	Lbs/Ac. For 3000 Seeds/Ac	Lbs/Ac. For 4500 Seeds/Ac
Common Persimmon	*Diospyros virginiana*	665-1764	1200	2.5	4
Black Walnut	*Juglans nigra*	11-100	40	75	112
Hickories (Carya Species)					
Bitternut Hickory	*Carya cordiformis*	125-185	156	20	30
Mockernut Hickory	*Carya tomentosa*	34-113	90	34	51
Pecan	*Carya illinoensis*	151-174	162	19	28.5
Pignut Hickory	*Carya glabra*	175-225	200	15	22.5
Shagbark Hickory	*Carya ovata*	80-150	100	30	45
Shellbark Hickory	*Carya laciniosa*	25-35	30	100	150
Oaks (Quercus species)					
White Oak	*Quercus alba*	70-210	120	25	37.5
Chinquapin Oak	*Quercus muhlenbergii*	263-520	395	8	12
Swamp White Oak	*Quercus bicolor*	90-175	85	35	52.5
Shingle Oak	*Quercus imbricaria*	315-795	415	8	12
Overcup Oak	*Quercus lyrata*	139-154	140	22	33
Bur Oak	*Quercus macrocarpa*	40-145	75	40	60
Swamp Chestnut Oak	*Quercus michauxii*	35-195	85	35	52.5
Cherrybark Oak	*Quercus pagoda*	420-745	580	5	7.5
Pin Oak	*Quercus palustris*	320-540	410	8	12
Northern Red Oak	*Quercus rubra*	75-256	125	24	36
Shumard Oak	*Quercus shumardii*	78-128	100	30	45
Black Oak	*Quercus velutina*	125-400	245	13	20

3. Criteria for Natural Regeneration

Natural regeneration is generally used to supplement direct seeding, container stock, and bare root seedling plantings.

Natural regeneration is not always successful even next to a forested seed wall. A forested seed wall is a site dominated by woody vegetation adjacent to the site. Failure may result from poor site preparation practices, adverse soil conditions or seed predators.

Successful natural regeneration shall establish (>300 stems/acre, including seeded or planted stock if applicable) woody vegetation within 3 years. If natural regeneration has not established woody vegetation after 3 years additional planting will be completed if it is determined that additional natural regeneration will not be sufficient to colonize the site within an acceptable time frame (usually 5 years).

Section 1. (floodplain sites)

Natural regeneration may be considered likely to establish woody vegetation on sites that are frequently flooded (see flooding parameter table) with an upstream floodplain that is dominated by woody vegetation. Flooding frequency can be obtained from the NRCS FOTG, Section II and local observation. If the site is not frequently flooded or if the upstream watershed is not dominated by woody vegetation proceed to Section 2.

Section 2. (non floodplain sites)

This section applies to sites that are not frequently flooded or on flood plain sites that are not downstream from a floodplain dominated by woody vegetation.

In this section natural regeneration may only be considered likely if the site is adjacent to a forested seed wall. A distance of 150 feet for natural regeneration may be used in these instances. If a forested seed wall is not present or is greater than 150 feet from the site natural regeneration is not considered likely.

- **If natural regeneration is not considered likely from Section 1 or 2. Trees and/or shrubs shall planted or seeded.**

Flooding Parameter Table[1]

Flooding Frequency	**Chance of Flooding Each Year**
Frequently	>50%
Occasional	5-50%
Rare	0-5%
Flooding Duration	**Days of Flooding**
Very long	>30
Long	7-30
Brief	2-7
Very Brief	<2

[1]Data can be obtained from the NRCS, FOTG, Section II, Water Features Table. An on-site investigation is recommended to verify flooding or ponding parameters.

4. Criteria for Container Stock

Container stock (potted stock) may be a satisfactory method to establish trees on sites where spring planting of bare root stock is not feasible due to spring and summer flooding or excessive wetness. Container stock may also be appropriate in other situations, e.g. supplemental plantings, windbreaks, environmental plantings etc.

In areas not prone to flooding or ponding, potted stock is generally, not the most efficient or cost effective way to establish woody plants. In most situations bare root seedlings are proven to be more reliable and economical method to establish woody plants.

- **Container stock when natural regeneration is likely**

  If natural regeneration is determined likely from **Criteria for Natural Regeneration** then container stock shall be planted at a minimum rate of 27 plants/acre (40' x 40' spacing or equivalent). However, clump planting of trees shall be used when potted stock is likely to fail over large portions of the area due to flooding, wetness, water flow, sand deposition, or debris deposit. The minimum number of trees to plant in a clump shall be 109 trees per acre (20' x 20' spacing or equivalent). The minimum clump size shall be ¼ acre unless site conditions suggest otherwise.

- **Container stock when natural regeneration is not likely**

  When natural regeneration is considered not likely from **Criteria for Natural Regeneration** then container stock shall be planted at a minimum rate of 300 plants/acre (12' x 12' foot spacing or equivalent).

Additional Criteria to Reduce Soil Erosion

To control sheet and rill erosion on critical slopes:

- plant trees and shrubs on the contour
- apply mulches as needed, see FOTG (484) Mulching
- seed a cover crop between the planted rows

Cover Crop Seeding Table (using pure live seed)

Species	Seeding Rate Lbs/Ac
Annual Ryegrass	8
Spring Oats	16
Winter Wheat	30

Additional Criteria for Forest Products

Christmas trees
Use a 6' spacing in the rows and a row width to accommodate maintenance equipment. Allow for adequate service roads in the plantation.

Supplemental planting (species enrichment)
Planting additional trees in an area that is already stocked with trees. Supplemental planting is done to improve the stocking and composition of an existing stand. The existing stand is managed for the protection and early development of planted trees.

- Trees shall not be planted in locations where they will be overtopped by other trees left in the stand. Overstory trees shall be killed or removed within 2-5 years after plant establishment. The following table provides a list of species suitable for supplemental planting.

Species Suitable for Supplemental Planting

Scientific Name	Common Name
Fraxinus americana	White Ash
Fraxinus pennsylvanica	Green Ash
Juglans nigra	Black Walnut
Liquidambar styraciflua	Sweetgum
Liriodendron tulipifera	Yellow Poplar or Tulip Tree
Prunus serotina	Black Cherry
Quercus alba	White Oak
Quercus rubra	Red Oak

Fine Hardwood Products

Fine hardwoods are tree species that can be used for furniture, veneer products, etc. In Indiana fine hardwood species include:

Fine Hardwood Species

Scientific Name	Common Name
Acer saccharum	Sugar Maple
Carya illinoensis	Pecan
Juglans nigra	Black Walnut
Liriodendron tulipifera	Yellow Poplar or Tulip Tree
Prunus serotina	Black Cherry
Quercus spp.	Some Oak Species

To promote rapid canopy closure and to produce a forest containing well-formed trees a minimum of 544 trees/acre shall be planted (8' X 10' spacing or equivalent) or established using direct seeding methods.

Criteria to Enhance Aesthetics

Trees or shrubs shall not be planted within 10 feet of fire hydrants, water meters, or utility structures.

Trees and shrubs shall be planted so that the crowns will not infringe on adjoining property unless permission is obtained from the landowner.

Plant Spacing:

- Large trees (mature height greater than 60 feet) shall be planted no closer than 40 feet apart.
- Medium trees (mature height 30-60 feet) shall be planted no closer than 35 feet apart.

- Small trees (mature height less than 30 feet) shall be planted no closer than 25 feet apart.
- Shrubs shall be planted no closer than 3 feet apart.

Use evergreen and/or deciduous species, species with showy flowers, brilliant fall foliage, persistent colorful fruits, and noteworthy growth forms and shapes. Use a mixture of small and/or large trees, and shrubs.

Use curvilinear designs and/or small group plantings to increase visual sight diversity.

CONSIDERATIONS

General

Consider landowners objectives for tree/shrub establishment so that the planned objective for the planting is achievable.

Bare root seedlings should be considered as the standard method to establish trees and shrubs. Planting bare root seedlings has proven to be the most economical and successful method to establish trees and shrubs. However, other methods to establish trees and shrubs may be applicable in some circumstances.

Seed sources for direct seeding and woody planting stock should be locally adapted and come from no more than 200 miles north or south of the planting site.

Consider selecting species from Conservation Tree/Shrub Suitability Groups (CTSG), species to plant, Section II (FOTG). Trees to plant from CTSG's can be viewed at the NRCS Indiana web site.

Monocultures and off site species are discouraged in hardwood reforestation projects.

Consider planting 2-3 rows of conifers along all open plantation edges and planting periodic rows of conifers within large plantings to serve as a woodland border and/or wind barrier.

Consider using a support stake when planting container trees and balled and burlapped stock.

Consider planting a mixture of species (5-10 species) adapted to the site (including conifers, hardwoods, and shrubs) to improve plant diversity.

Seek technical assistance from a professional forester for reforestation or other conservation tree planting projects.

Weed Control

To improve plant growth, consider 2 additional years of chemical weed control after plants are established. Weed control should be performed using narrow bands (2'-3' wide) on each side of a plant row unless the entire site is treated.

Erosion

To control sheet and rill erosion consider the establishing permanent cover between tree rows To treat gully erosion consider closer tree spacing and establishing permanent cover. See FOTG Conservation Cover (327) for additional information.

Forest Products

Fine hardwood species should be mixed with other trees (hardwood and softwood) and shrubs to promote diversity, facilitate thinning operations and encourage straight boles.

Direct Seeding

For direct seedings, if there is not a source of light seeded species within 500 feet of any portion of the site, consider seeding an additional 1000 seeds/acre of heavy or light seeded species.

When using direct seeding consider that spring seeding can reduce rodent and insect damage. Fall seeding can eliminate the need for seed storage.

Natural Regeneration

Sites that are frequently flooded or ponded for long or very long duration may be difficult and unpractical for tree/shrub establishment. Consider using natural regeneration on these sites to establish woody plants and allow the site to revegetate to herbaceous and/or woody plant cover.

Consider that natural regeneration is often likely to occur, but not guaranteed on sites that have a seed source from a forested floodplain system where seeds are deposited in sufficient quantity to establish woody vegetation. On these sites, natural regeneration of light seeded species (e.g.

green ash, silver maple, cottonwood , etc.) may establish large numbers of tree seedlings.

Wildlife

Consider selecting species from FOTG Wildlife Upland Habitat Management (645) and/or FOTG Wetland Wildlife Habitat Management (644) to enhance wildlife benefits.

Shrub species may be direct seeded to provide wildlife habitat. Refer to Direct Seeding of Shrubs, IN-NRCS, Forestry Technical Note No. 16.

Soil Fertility

Consider soil testing to determine pH, Phosphorus (P), and Potassium (K) levels before establishment of woody vegetation. Soil pH should be checked by soil horizons, P and K should be checked in the Ap horizon or upper 8 inches. Species planted should be adapted to soil pH levels at the site. Apply lime only on sites that have been acidified through actions of man e.g. past cropping systems. Consider applying P and K to a medium level for forage production.

PLANS AND SPECIFICATIONS

Plans and specifications for tree/shrub establishment will be prepared for each site in accordance with the criteria for this practice. The plan will include planting dates, site preparation, weed control, plant spacing, species, type of stock used, and planting and storage guidelines.

OPERATION AND MAINTENANCE

Check survivability of planted species after 3 years to insure that at least 300 desirable stems/acre of woody plants are established. If less than 300 stems/acre are established additional planting will be completed if it is determined that additional natural regeneration will not be sufficient to colonize the site within an acceptable time frame (usually 5 years).

Control weed competition during establishment (3 years). Competing weeds, brush, and vines can adversely affect survival, form and rate of tree growth. Additional years of weed control may be needed in some instances e.g. to control johnsongrass, quackgrass, or other hard to control weed species.

Use the following or combination of methods as needed to control weed competition (see Table 1 for specific treatments):

- shallow cultivation
- mowing
- spraying approved herbicides
- cutting woody plants and applying approved pesticides

Shear and shape Christmas trees and correlatively prune hardwood species, as needed depending on species and growth form desired. Refer to FOTG Tree Shrub Pruning (660).

Protect the planting from fire. Plan access roads and firelanes prior to planting. See Indiana Field Office Technical Guide, Section IV for Access Road (560) and Firebreak (394).

Fence if necessary to protect the planting from excessive livestock browsing and trampling damage, refer to FOTG Standards, Use Exclusion (472) and Fence (382).

Protect from disease, rodents, deer, and insects using approved pesticides, hunting, fencing, or other appropriate methods. Additional information can be viewed from the “Illinois Direct Seeding Handbook”, Wildlife Damage Management.

SITE PREPARATION TREATMENT ALTERNATIVES, Table 1.

TILLABILITY /SOIL TEXTURE	SOD OR ALFALFA SITES	SMALL GRAIN OR ROW CROP SITES	HEAVY BRUSH & TREE GROWTH	HEAVY WEED GROWTH	BADLY COMPACTED
TILLABLE SITES WITH LOAMY/ CLAYEY SOILS	#1a or #3a	#1b, #2, or #7 depending on need for erosion protection	#5a, #5b, or #5c depending on equipment available	#1a, #3a, or #4 on slopes 0-2% #2, #3b, or #4 on steeper slopes	#6
TILLABLE SITES WITH SANDY SOILS	#1a or #3a	#1b, #2, or #7 depending on need for erosion protection	#5a, #5b, or #5c depending on equipment available	#1a, #3a, or #4 on slopes 0-2% #2, #3b, or #4 on steeper slopes	Normally not applicable
NON-TILLABLE SITES DUE TO STEEPNESS (>18%)	#3b, run strips on contour if practical	Normally not applicable	#5a, #5b, or #5c depending on equipment available	#3b, run strips on contour if practical	Normally not applicable
NON-TILLABLE SITES DUE TO ROCKINESS	#3a or #3b depending on slope	Normally not applicable	#5a, #5b, or #5c depending on equipment available	#3a, #3b, or #4 on slopes 0-2% #3b or #4 on steeper slopes	Normally not applicable

All options for site preparation should also include an approved herbicide application in conjunction with tree planting unless other effective weed control measures are planned and implemented.

1a - Plow entire area and disc down firm in late summer or early fall. If erosion control is a concern establish a temporary cover crop[1] prior to a spring planting.

1b – If needed for erosion control establish a temporary cover crop[1].

2 - Scalp or till in strips 3 to 4 feet wide in spring just before planting. On sloping ground consider running strips on the contour.

3a - Fall burn-down with approved herbicide over entire site. Best window of opportunity is September 1 to October 15 as long as it is applied at least one week before the first killing frost. Also use a pre-emergent herbicide before or during planting to control emerging seedlings.

3b - Fall burn-down in strips 3 to 4 feet wide with approved herbicide. Also use a pre-emergent herbicide before or during planting to control emerging seedlings.

4 - Mow in fall. Use appropriate herbicides in the spring prior to or during planting.

5a - Deaden the undesirable trees and shrubs and let them stand.

5b - Hand clear by cutting and removing undesirable trees and shrubs. Treat stumps with an approved herbicide.

5c - Use heavy equipment to clear and remove undesirable trees and shrubs. Where needed, follow-up with establishment of a temporary cover crop[1] prior to planting.

6 - Subsoil or rip compacted areas. If soil surface is rough use appropriate tillage tool to smooth. Where needed, follow-up with establishment of a temporary cover crop[1] prior to planting. On slopes over 6% subsoil or rip on contour.

7 - No site preparation needed.

[1]Temporary cover can be seeded August 15–September 30 or using a dormant seeding December 10-February 28, using 1/2 bushel/acre of wheat, rye, or spring oats.

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