USDA United States Department of Agriculture
Forest Service
Monongahela National Forest
200 Sycamore Street
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File Code: 1900; 2700
Date: March 15, 2017

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St., N.E., Room 1A
Washington, DC 20426

Dear Ms. Bose:

Subject: Forest Service's Tree and Shrub Planting Guidelines for Pipeline Rights-of-Way and Associated Disturbances
OEP/DG2E/Gas 4
Atlantic Coast Pipeline, LLC
Docket No. CP15-554-000 and CP15-554-001

The Forest Service submits tree and shrub planting guidelines for pipeline rights-of-way and disturbances associated with the proposed Atlantic Coast Pipeline Project (ACP Project). The recommendations for the planting of trees and shrubs are detailed in the attached document and provide guidance for rehabilitation of the rights-of-way and associated disturbances on the Monongahela National Forest and George Washington National Forest. Please incorporate this information into the Construction, Operations, and Maintenance Plan for the ACP Project.

For questions, please contact Jennifer Adams, Special Project Coordinator, by phone at (540) 265-5114 or by email at jenniferpadams@fs.fed.us.

Sincerely,

Clyde A Thompson

CLYDE THOMPSON
Forest Supervisor

cc: Atlantic Coast Pipeline, LLC

TREE AND SHRUB PLANTING GUIDELINES FOR PIPELINE RIGHTS-OF-WAY AND ASSOCIATED DISTURBANCES IN THE MONONGAHELA AND GEORGE WASHINGTON-JEFFERSON NATIONAL FORESTS

March 2017

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Introduction

This document provides guidelines and recommendations for planting trees and shrubs for the reclamation and restoration of pipeline installations and repairs and maintenance on National Forest lands. It is intended to guide reclamation and restoration efforts to results that are beneficial to a variety of wildlife, including birds, mammals, and pollinators. The pipeline will traverse different habitat types and elevations, so species need to be chosen accordingly for successful establishment. In addition to meeting habitat-specific requirements, vegetation species must also be native to the state in which they are planted and come from local seed sources and ecotypes.

For small mammals and game birds, placement and spacing of shrubs on the landscape are important. Shrubs placed close enough together that the crowns touch or grow together to form a large clump or thicket provides excellent cover, refuge, and brood-rearing habitat that is vital in open spaces.

Other considerations for choosing which small tree and shrub combinations to plant include pollination requirements, blooming times, and fruiting times. No tree or shrub requiring insect or wind pollination should be planted at a great distance from another plant of the same species. The best practice is to plant many of the same species in the same general area to maximize pollination, but nowhere should there be a monoculture. A variety of species should be planted together to provide a diversity of bloom shape, bloom color, and bloom time. There are many different types of pollinators, all of which require pollen and nectar. To get at these vital resources, they have developed different adaptive strategies. For instance, hummingbirds have very long, slender bills to reach into long, tubular-shaped blooms. A variety of color in the blooms attracts a wider variety of pollinators to the plants. And most important is to choose a variety in which there is something blooming in the spring, in the summer, and in the fall to ensure a consistent source of pollen and nectar throughout the active period for pollinators. There should be in any particular area at least a couple of species in bloom all year, except for in the winter.

The same concept exists for fruiting times of these plants but also extends into winter. Wildlife needs the nuts, seeds, and berries produced by these plants throughout the year. Many wildlife species remain active in the winter, when food is scarce, so having plant species that retain their food source into the winter is important for wildlife survival. Many, but not all, of the species below retain their food source into winter if not consumed before then.

Species Selection

The species in the tables below are divided into upland/dry and riparian/wet habitats and have a variety of pH preferences so that plants can be chosen for the appropriate habitat and soil types. They have elevation ranges that occur throughout the National Forests. The maximum heights of the species are also given. Depending on spacing, a feathered edge could be created by planting small trees on the forest/disturbance edge with shorter trees and shrubs on the other side toward the interior of the pipeline.

The species in the tables below are also divided into deer-resistant and non- or less deer-resistant plants. To reduce the cost and effort of planting, monitoring, and replacement, deer-resistant plants may be given preference. **However, the non-resistant apple, plum, hazelnut, and persimmon species are of high value to wildlife and also preferred for inclusion, and these particular species should be protected by fencing cages to prevent deer browse.** Other non-resistant plants may also be used but may receive damage without fencing, possibly leading to the need for replacement.

Recommended Species for Dry Uplands

Species	Height	pH	Wetland Indicator Status	Planting Instructions	Dioecious?
Deer Resistant					
Amelanchier arborea (Common Serviceberry)	36’	4.8-7.5	FAC	20’ apart	
Amelanchier canadensis (Canadian Serviceberry)	23’	5.5-7.5	FAC	15’ apart	
Amelanchier laevis (Allegheny Serviceberry)	25’	<6.8		15’ apart	
Aralia spinose (Devil’s Walking Stick)	20’	Varies	FAC	8’ apart in clumps or offset rows	
Asimina triloba (Pawpaw)	30’	4.7-7.2	FAC	15’ apart	
Crataegus phaenopyrum (Washington Hawthorne)	30’	6.8-7.2	FAC	15’ apart	
Crataegus macrosperma (Bigfruit Hawthorne)	20’	Varies		15’ apart	

Gaylussacia baccata (Black Huckleberry)	6’	Acidic	FACU	6’ apart in clumps or offset rows	
Ilex glabra (Gray Inkberry)	8’	4.5-7.0	FAC	6’ apart in clumps or offset rows	Y
Ilex montana (Mountain Holly)	30’	Acidic	FACU	20’ apart	Y
Kalmia latifolia (Mountain Laurel)	15’	Acidic	FACU	8’ apart in clumps or offset rows	
Lindera benzoin (Common Spicebush)	9’	5.0-8.9	FAC	8’ apart in clumps or offset rows	Y
Morus rubra (Red Mulberry)	70’	5.0-7.0	FACU	20’ apart	Y
Picea rubens (Red Spruce)	110’	4.0-5.8	FACU	20’ apart	
Ribes rotundifolium (Appalachian Gooseberry)	5’	6.1-8.5		4’ apart in clumps or offset rows	
Sambucus canadensis (American Black Elderberry)	12’	5.0-8.9	FAC	6’ apart in clumps or offset rows	
Viburnum dentatum (Southern Arrowwood)	9’	<6.8	FAC	7’ apart in clumps or offset rows	
Viburnum prunifolium (Blackhaw)	15’	6.8-7.2	FACU	8’ apart in clumps or offset rows	
Not/Less Deer Resistant					
Castanea pumila (Chinquapin)	20’	4.5-6.6		10’ apart	
Ceanothus americanus (New Jersey Tea)	3’	4.3-6.5		4’ apart in clumps or offset rows	
Celtis occidentalis (Common Hackberry)	60’	6.0-7.8	FACU	50’ apart	
Cornus florida (Flowering Dogwood)	30’	4.8-7.7	FACU	30’ apart	
Cornus racemose (Gray Dogwood)	6’	4.8-7.4	FAC	3’ apart in clumps or offset rows	
Corylus Americana (Amrican Hazelnut)	10’	5.0-7.0	FACU	10’ apart in clumps or offset rows	
Corylus cornuta (Beaked Hazelnut	8’	4.8-7.5	FACU	8’ apart in clumps or offset rows	
Crataegus crus-galli (Cockspur Hawthorn)	30’	4.5-7.2	FACU	25’ apart	
Diospyros virginiana (American Persimmon)	55’	4.7-7.5	FAC	35’ apart	Y
Hamamelis virginiana (American Witchhazel)	20’	4.5-6.2	FACU	15’ apart	

Malus coronaria (American/Sweet Crabapple)	30’	7.0-basic		30’ apart	
Oxydendrum arboretum (Sourwood)	35’	4.0-6.5	UPL	20’ apart	
Prunus alleghaniensis (Allegheny Plum)	20’	5.0-7.5		20’ apart	
Prunus Americana (American Plum)	25’	5.0-7.0	FACU	20’ apart	
Prunus angustifolia (Chickasaw Plum)	25’	5.0-7.5		20’ apart	
Rhus typhina (Staghorn Sumac)	30’	6.8-7.2		15’ apart in clumps or offset rows	Y
Sorbus Americana (American Mountain Ash)	20’	Acidic	FACU	15’ apart	
Vaccinium angustifolium (Lowbush Blueberry)	2’	<6.8	FACU	2’ apart in clumps or offset rows	

FAC = facultative (occurs in wetlands and non-wetlands)
FACU = facultative upland (usually occurs in non-wetlands, but may occur in wetlands)
UPL = upland (almost never occur in wetlands)
Dioecious = male and female flowers occur on separate plants

Recommended Species for Riparian/Seep Areas

Species	**Height**	**pH**	**Wetland Indicator Status**	**Planting Instructions**	**Dioecious?**
Deer Resistant					
Amorpha fruticose (False Indigo Bush)	10’	5.0-8.5	FACW	7’ apart in clumps or offset rows	
Aronia arbutifolia (Red Chokeberry)	12’	<6.8	FACW	4’ apart in clumps or offset rows	
Betula nigra (River Birch)	70’	3.0-6.5	FACW	50’ apart	
Cephalanthus occidentalis (Common Buttonbush)	12’	4.7-8.6	OBL	4’ apart in clumps or offset rows	
Cornus amomum (Silky Dogwood)	10’	5.0-7.0	FACW	6’ apart in clumps or offset rows	
Cornus sericea (Redosier Dogwood)	20’	<7.0	FACW	6’ apart in clumps or offset rows	
Crataegus viridis (Green Hawthorne)	30’	4.3-7.3	FACW	25’ apart	
Hypericum densiflorum (Bushy St. John’s Wort)	5’	5.5-7.0	FACW	3’ apart in clumps or offset rows	

Ilex verticillata (Winterberry Holly)	10’	4.5-7.5	FACW	6’ apart in clumps or offset rows	Y
Physocarpus opulifolius (Common Ninebark)	10’	4.5-6.5	FACW	5’ apart in clumps or offset rows	
Rosa palustris (Swamp Rose)	8’	4.0-7.0	OBL	5’ apart in clumps or offset rows	
Salix discolor (Pussy Willow)	20’	6.8-7.2	FACW	8’ apart in clumps or offset rows	Y
Spiraea tomentosa (Steelebush)	4’	Acidic	FACW	4’ apart in clumps or offset rows	
Not/Less Deer Resistant					
Alnus serrulata (Hazel Alder)	15’	5.0-7.0	OBL	7’ apart in clumps or offset rows	
Vaccinium corymbosum (Highbush Blueberry)	12’	4.7-7.5	FACW	5’ apart in clumps or offset rows	
Viburnum nudum (possumhaw)	16’	<6.8	OBL	7’ apart in clumps or offset rows	

FACW = facultative wetland (usually occurs in wetlands, but may occur in non-wetlands)
OBL – obligate wetland (almost always occurs in wetlands)
Dioecious = male and female flowers occur on different plants

Native Plant Sources

All species planted shall be native to the area. The seed source or ecotype for the saplings need to be as local as possible, with preference of within-state, then mountainous regions of an adjacent state, followed by within the Appalachian Mountain range. The seed source or ecotype should be verified with the vendor, as it is not always given in a catalog or online.

The species listed above are native to Virginia and West Virginia, common to the area, and adapted to the appropriate conditions. Other species exist that are beneficial to wildlife but are allelopathic, preventing the growth of other plants around them, which would reduce success of the plantings. Also, other species may not be adapted to the appropriate conditions. Therefore, it is highly recommended to use only the species listed in this document, as they have been researched with specific purposes in mind. Not every species must be used. If one is unavailable, it may be skipped, and another similar species for the appropriate conditions can be chosen from the list.

Care of Saplings and Planting Procedures

Trees and shrubs should be planted as at least two-year old saplings, and preferably older, with fruit and nut trees being as old as possible. They should be planted while still dormant, in early spring, if possible. Some species may be planted in late fall/early winter when dormant. Consult the vendor on the best time for planting for each species. A planting gel is recommended, as it

retains moisture at the roots after planting. The saplings should not be allowed to dry out during the planting process. To avoid saplings drying out and ensure proper tree planting, the following instructions should be followed:

Care and Handling

- Protection from Sun, Wind, and Adverse Temperature - Saplings should be handled, stored, and transported in a manner to protect them from sun and wind. Only one bag/bundle of saplings should be opened at one time. Partially used bags should be kept closed to prevent exposure of sapling roots to air. Any bag that is torn, separated, or otherwise opened should be immediately patched or otherwise resealed. Partially used bundles should be kept rolled and tied to prevent exposure of sapling roots to air.

- Keeping Sapling Roots Moist – Sapling roots should be kept moist at all times prior to and during planting. Water the roots of saplings in opened bags or bundles if the roots begin to dry. Sapings not being planted should be kept under a tarp in a protected and shaded area.

- Protection from Contamination and Damage - Saplings should be protected from contamination by materials such as gasoline, diesel fuel, oils, or chemicals. Do not crush or abuse saplings by hitting the root or striking the roots across an object to remove excess soil. Roots should not be cut or pruned.

Planting Procedures

- Saplings should not be separated prior to placement in planting bags. One bag should be opened at a time. Another bag should not be opened until the previously opened bag is empty. Planting bags should be free of tears and holes.

- Only one sapling at a time should be removed from the planting bag. This should be done after the planting hole has been made in the ground with a dibble bar, auger, or other suitable planting tool.

- Plant each sapling in a vertical position in a debris-free hole.

- Plant each sapling to a depth where groundline is at approximate root collar level.

- Pack soil firmly around each planted sapling. Close planting hole first at the bottom and finish by closing at the top. Soil should be firmly packed around each sapling and free from air pockets.

- Plant saplings in a manner to prevent "U" roots, "J" roots, "L" roots, and twisted or balled roots.

- Do not plant saplings in frozen ground or during freezing weather.

- Do not plant trees or shrubs in standing water.

- If a large rock is encountered and removed while digging planting holes, place the large rock far enough off to the side or into the forest to protect maintenance equipment when mowing.

- To avoid possible root damage, do not use planting tool to maneuver roots of saplings into holes.

Planting Configuration and Select Fencing

Planting Configuration

- Those species that form low, bushy, dense cover are to be planted in a clump or offset rows, as indicated in the tables. At least ten individuals should be planted at the specified spacing distances in order to form that cover or thicket.

- Those species that are more of a tree form are to be planted at the specified spacing distances with at least five individuals together for those that are monoecious in reproductive morphology (having male and female flowers on the same plant). For those trees and shrubs that are dioecious (having male and female flowers on different plants), as indicated in the tables, at least ten individuals need to be planted together at the specified distances if the sexes of the plants are unknown. If the sexes of the saplings are known, then five plants can be planted instead of ten with one male to four females.

- More than the above-mentioned minimums may be planted for each species in a given location, but there needs to be a variety of species in the area. For instance, instead of planting 200 gray inkberry plants together, plant 20, then 15 common spicebush, then 5 Washington hawthorns, and on down the line.

Select Fencing

Apple, plum, hazelnut, and persimmon trees should be individually fenced immediately after planting to protect from deer browse. Five- to six-foot tall, 12- to 14-gauge welded wire fence with 2”x4” openings between wires is recommend. The fence/cage around each of the above-mentioned saplings should be four feet in circumference to allow for crown spread within the fence. Each fence should be staked using two metal t-posts or other strong support and secured to the fence using metal clips, wire, or zip ties.

Monitoring, Replacement, and Maintenance

Trees and shrubs should be monitored for survival and fencing conditions. Monitoring should occur one year and three years after planting and should be performed anytime from bud break in the spring to leaf drop in the fall. If survival in any clump of planted species is less than 50%,

dead plants should be replaced. If survival of a particular species continues to be low in any given area, fencing may be required, or a more deer-resistant species should be substituted. Fencing that is damaged enough to impede the growth of the plants they protect should be repaired or replaced.

Maintenance of the pipeline opening adjacent to these plantings should be only through mechanical mowing and should occur outside of the bird nesting season, as outlined in the *Migratory Bird Plan*. Herbicide should **not** be used on these native plantings. Many of the shrubs spread through suckers, so herbicide use on these species would kill the entire plants.

References

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