

## Enbridge Energy and North Dakota Parks and Recreation

# Revegetation Project Plan

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This Revegetation plan was formally submitted to Enbridge on September 28, 2012 by North Dakota Parks and Recreation Department.

### Project Background

As part of Enbridge Energy's commitment to fulfill obligations Enbridge has to the North Dakota Public Service Commission (PSC) Enbridge is funding the Grahams Island State Park revegetation project, to replace trees and shrubs removed during a pipeline construction in Pembina County. Enbridge partnered with North Dakota Parks and Recreation Department (Department) to plant 2,438 trees and 10,430 shrubs on several sites in around the Grahams Island State Park, Ramsey County, North Dakota.

The Department formally entered into this Tree and Shrub Planting Agreement with Enbridge Energy, Limited Partnership and Enbridge Pipelines (Southern Lights) L.L.C. in September 2012.

Grahams Island State Park Boundary



Figure 1 Grahams Island State Park

## Revegetation Objectives

1. To meet ND PCS's regulatory commitment for Enbridge to replace on a two for one basis the trees and shrubs removed during a pipeline construction in Pembina County.
2. To re-plant 12,868 trees and shrubs at Grahams Island State Park in Ramsey County, North Dakota.
3. To improve enhance recreational experience at Grahams Island State Park.



Figure 2 Grahams Island Typical Planting Site



Figure 3 Grahams Island Recreational Area

1. To reestablish tree and shrub cover by planting a combination of trees and shrubs suitable to the area.
  - Planting for wildlife habitat to provide food, living space, and cover for a variety of wildlife species. Diversity plantings of trees and fruit bearing shrubs will supply shelter and food such as fruit, foliage, buds, and twigs.
  - Woody plantings will provide nesting habitats for many songbirds.
  - Multiple layers of different shrub and tree plantings will be of greater value to wildlife and multiple groupings of 5 or more trees of mixed species will be beneficial for many wildlife species.



Figure 4 Black-capped Chickadee



Figure 5 Squirrel

### Site Location

Grahams Island State Park (GISP) is an 1122-acre recreation area located in Ramsey County and Benson County. Grahams Island is located 16 miles west of the town of Devils Lake on Highway 19.

The planting area consists of 7 sites ranging in size from 0.1 – 5.1 acres totaling approximately 17 acres. The planting sites fall adjacent to and within the parks campground use area.

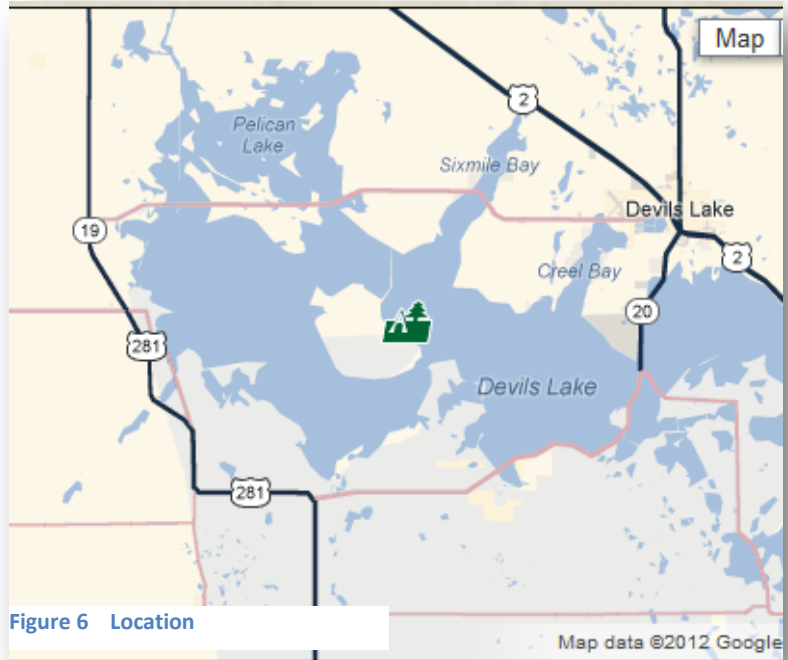


Figure 6 Location

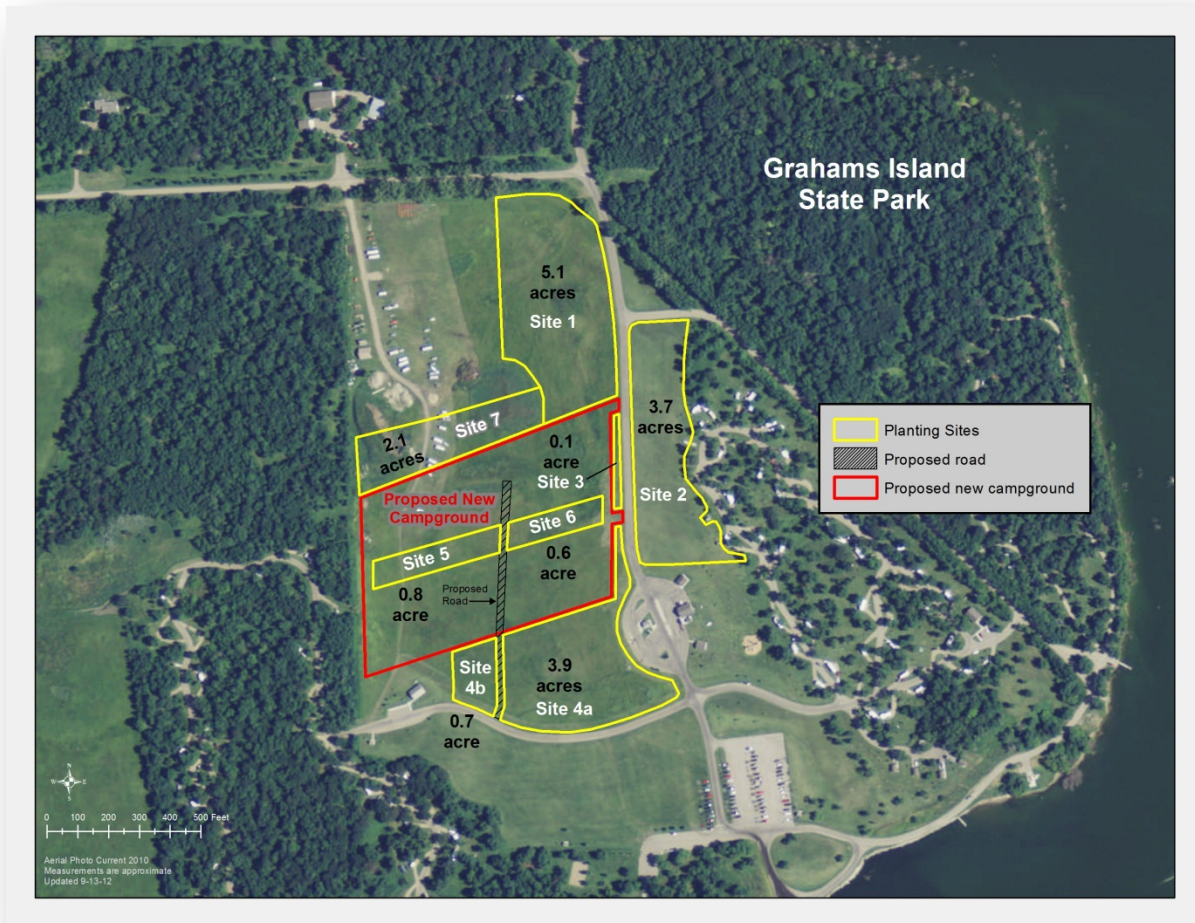


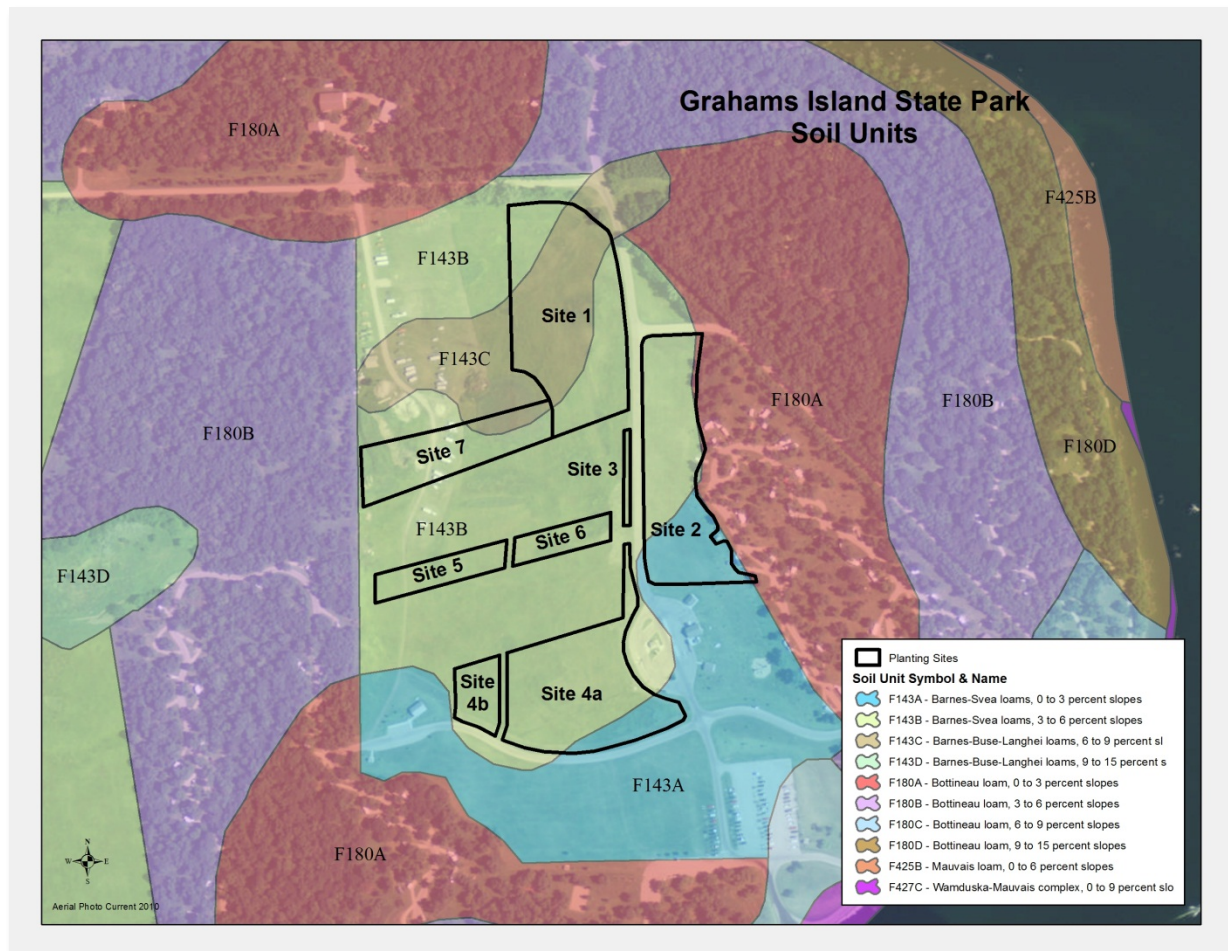
Figure7 Planting Sites

## Site Descriptions

Grahams Island falls within the *Glaciated Plains* which are a rolling, glaciated landscape also known as the drift prairie. The planting sites all fall within the *USDA Woody Plant Hardiness Zone 2*.

## Soils

Soils that occur in and adjacent to the planting sites are typical of moraines on glacial till plains. A majority of the sites fall within Barnes-Svea loam soils with slopes ranging from 0 to 6 percent. The Barnes soil is on the side slopes. The Buse soil is on the summits and shoulder slopes. The Barnes soil is suited to most climatically adapted tree and shrub species while the Buse soils are suited to drought tolerant tree and shrub species.



**Figure 8 Soils**

The majority of the planting sites fall within *Wind Suitability Groups 1 and 3* which are well-suited for growing trees. Moisture is usually not a problem. A couple of the sites are a combination of both. A very small portion of planting sites fall within a Barnes-Buse-Langhei group. Buse soils fall within Wind Suitability Group 8. Species selection within this suitability group will be limited to species such as buffaloberry, ash, rocky mountain juniper, or ponderosa pine.

## Vegetation

The majority of the planting sites fall within the classified vegetation type of western wheatgrass-green needlegrass restored grassland. These restored sites were once cropland that was seeded to both native and non-native species in 1993. Almost all the sites are now dominated by quackgrass. Noxious weeds and invasive species mapped within these restored sites include Canada thistle, leafy spurge, smooth brome and wormwood.

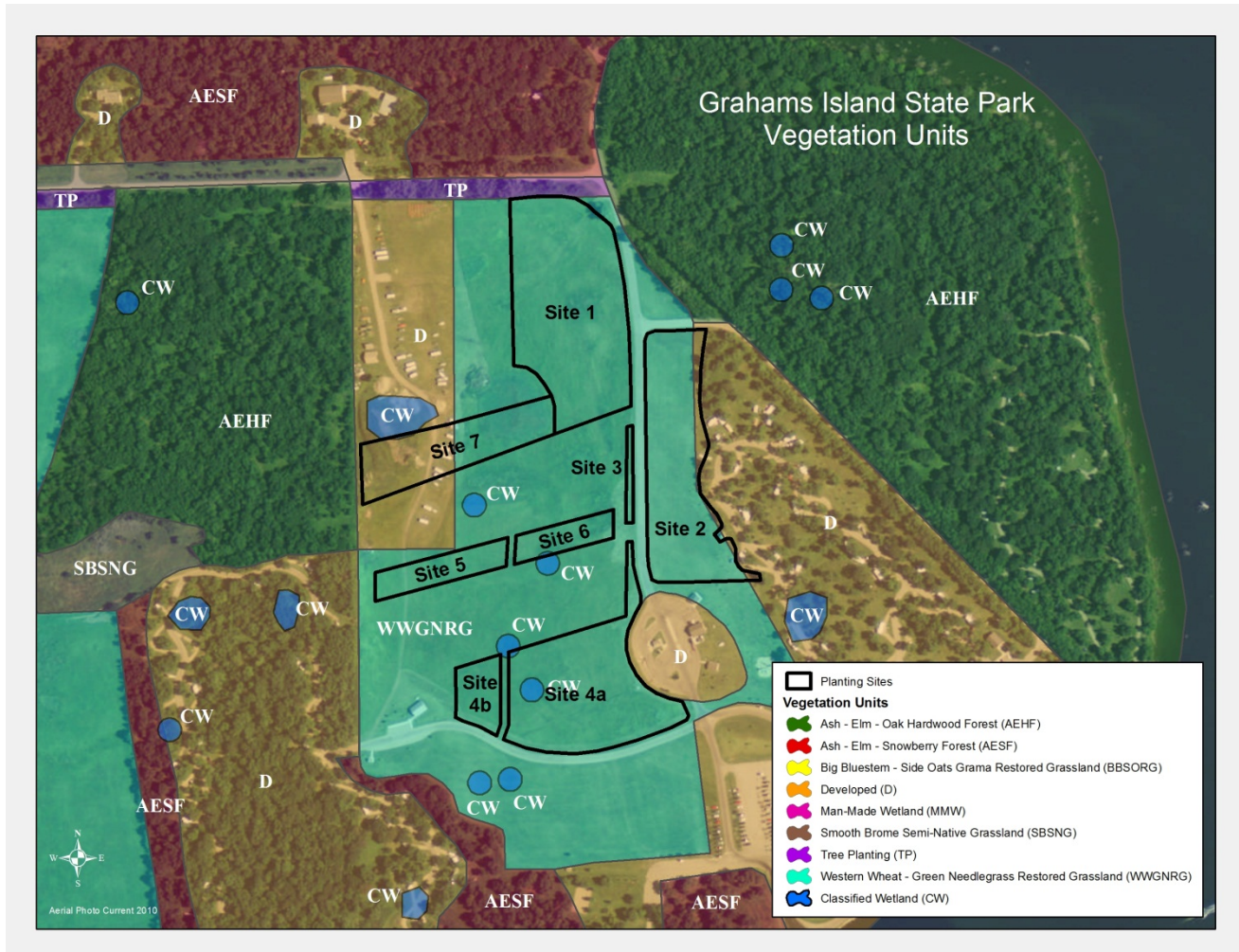


Figure 9 Vegetation

## Wetlands

Several temporarily flooded wetlands including, palustrine emergent temporarily flooded (PEMA) and a Palustrine Emergent Seasonally Flooded (PEMC) fall within and adjacent to the planting sites. Species selection in these disturbed wetlands will be limited to species such as willows, false indigo, silver maple, bur oak, boxelder, cottonwood and ash.

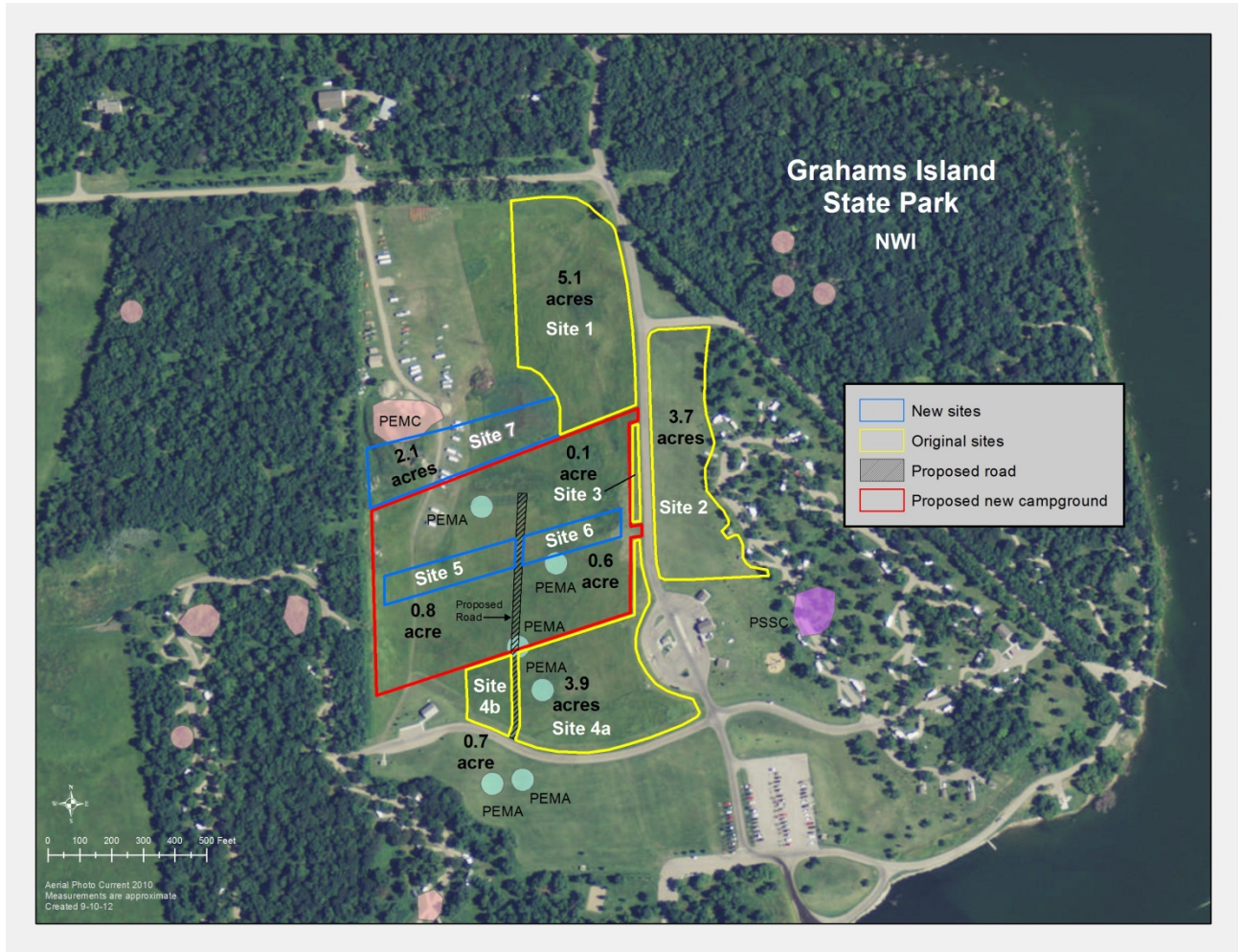


Figure 10 Wetlands

## Tree and Shrub Selection

One of the most important factors in the success of this tree and shrub planting project is species selection. To ensure that the trees and shrubs grow and thrive we have chosen tree and shrub species suitable to the site and park needs. Site characteristics and limitations looked at included soils, hardiness zone, site aspect, annual precipitation, animal depredation (fences and tree shelters to be used), buildings, power lines, and underground utilities. We have also considered the purposes for the tree and shrub plantings when selecting the 20 tree and shrub species.

Common Name	Scientific Name	Size	Height	Crown	Spacing
Woods Rose	<i>Rosa woodsii</i>	2-3' 2 yr	4-5	4-6	3-5
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	3' + 2 yr	4-8	3-6	3-5
American Plum	<i>Prunus americana</i>	2-3'	5-8	8-10	3-6
American Plum	<i>Prunus americana</i>	3'+ 1yr	5-9	8-11	3-7
Smooth Sumac	<i>Rhus glabra</i>	2-3'	5-12	10-15	3-6
False Indigo	<i>Amorpha fruticosa</i>	3' + 2yr	6-8	6-10	3-6
Buffaloberry	<i>Shepherdia argentea</i>	3' + 3yr	6-12	8-14	3-6
Nannyberry	<i>Viburnum lentago</i>	2-3' 2 yr	8-12	8-12	3-6
Hawthorne, Downy	<i>Crataegus mollis</i>	3' + 2 yr	10-12	15-20	3-6
Amur Maple	<i>Acer ginnala</i>	3'+3 yr	10-12	15-20	4-6
Chokecherry	<i>Prunus virginiana</i>	3' + 2yr	10-12	10-20	4-6
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	Conservation grade c-1	10-12	10-20	4-6
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	2-3' 2yr	10-12	10-20	4-7
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	Plant band	10-12	12-20	6-10
Pin Cherry	<i>Prunus pennsylvanica</i>	2-3' 2 yr	15-30	15-30	4-6
Blackhills Spruce	<i>Picea glauca</i>	10-18" 1 gallon pot	16-20	15-25	10-12
Ponderosa Pine	<i>Pinus ponderosa</i>	10-16" 1 gallon pot & bareroot	16-20	25-30	10-12
Boxelder	<i>Acer negundo</i>	2-3' 2 yr	18-20	30-60	8-10
Bur Oak	<i>Quercus macrocarpa</i>	3' +2 yr	18-20	35-60	8-10
Hackberry	<i>Celtis occidentalis</i>	2-3' 2 yr	18-22	25-45	8-10
Golden Willow	<i>Salix alba "Vitelina"</i>	Conservation grade c-1	20-25	40-55	8-10
Green Ash	<i>Fraxinus pennsylvanica</i>	conservation grade	20-30	30-40	8-10
Silver Maple	<i>Acer saccharinum</i>	3' + 2 & 4 yr	50-70	40-60	10-12

Table 1 Selected Tree and Shrubs

## Tree and Shrub Stock Resources

The nursery stock consisting of 19 species of trees and shrubs will be sole-source ordered in October of 2012 through Lincoln-Oakes Nursery, which is owned and operated by the North Dakota Association of Soil Conservation Districts. Lincoln-Oakes offers conservation grade tree and shrub seedlings up to 3' stock. Lincoln-Oakes also offer potted deciduous stock in 1-3 gallons pots. Orders are booked subject to crop growing conditions and with the understanding that orders shall be void should injury befall the stock from drought, flood, fire, frost, hail, other weather conditions, errors in count, insect and disease injury or any other causes beyond our control. <http://lincolnoakes.com/stock/pc/home.asp>



## Planting Designs

Initially the “*Plant Quantity Calculator*” developed by Sound Native Plant was used to calculate tree and shrub quantities for each revegetation site. Factored in was the space occupied by plant types that are more widely spaced when determining quantities of smaller types of vegetation. Tree and shrub numbers reflected below are more than required as when ordering you must order in bundles of 5, 10, 25 etc.

<http://www.soundnativeplants.com/calculator>

Plant Type	Goal for Spacing	Spacing
Trees	Dense	8-10' on center (o.c)
	Average	10-15' o.c.
	Sparse	16-18' o.c.
Shrubs		
	Dense	3-4' o.c.
	Average	4-6' o.c.
	Sparse	6-8' o.c.

Table 2 Tree and Shrub Spacing

Site name	Acres	Perimeter ft.	Square ft.	Approx. Tree #’s	Approx. Shrub #’s
Site 1	5.1	1982	223449.7	727	3360
Site 2	3.7	2242	159656.9	499	1845
Site 3	0.1	648	6168.5	25	100
Site 4a	3.9	2182	168902.8	600	2100
Site 4b	0.7	705	28974.1	100	580
Site 5	0.8	1037	36919	100	500
Site 6	0.6	818	27355.3	75	380
Site 7	2.1	1570	92650.7	324	1590
				2450	10455

Table 3 Approximate Number of Trees and Shrubs per Site

*SmartDraw Landscape Design software* will be used to design and layout each planting site. These designs will not only guide the planting process but will aid in the site monitoring and replacement process. Site specific designs with species lists will be included in a separate document prepared as an on-site planting guide.



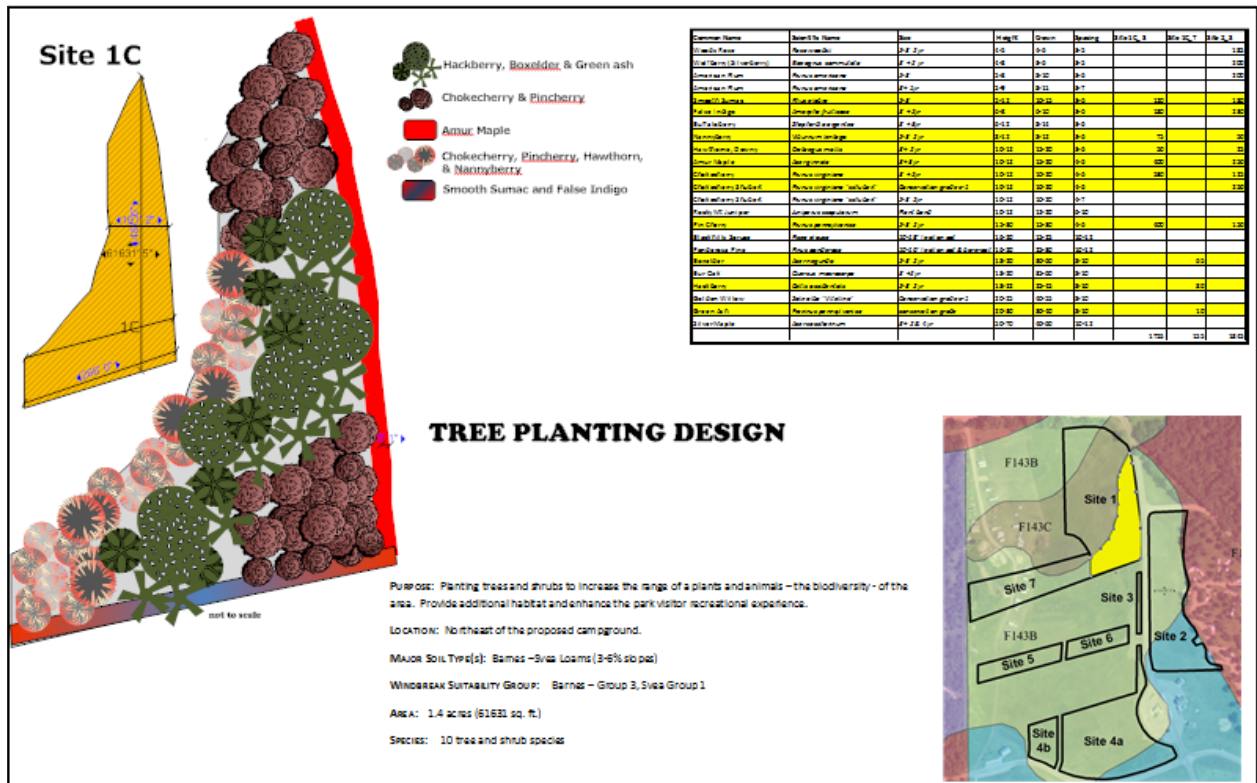


Figure 11 Tree and shrub Planting Planning Document

## Site Specific Tree and Shrub Planting Plans

### *Site Number 1A*

**PURPOSE:** Planting trees and shrubs to increase the range of a plants and animals – the biodiversity - of the area. Provide additional habitat and enhance the park visitor recreational experience.

**LOCATION:** Northeast of the proposed campground.

**MAJOR SOIL TYPE(s):** Barnes –Svea Loams (3-6% slopes)

**WINDBREAK SUITABILITY GROUP:** Barnes – Group 3, Svea Group 1

**AREA:** 1.1 acres (47916 sq. ft)

**SPECIES:** 10 tree and shrub species

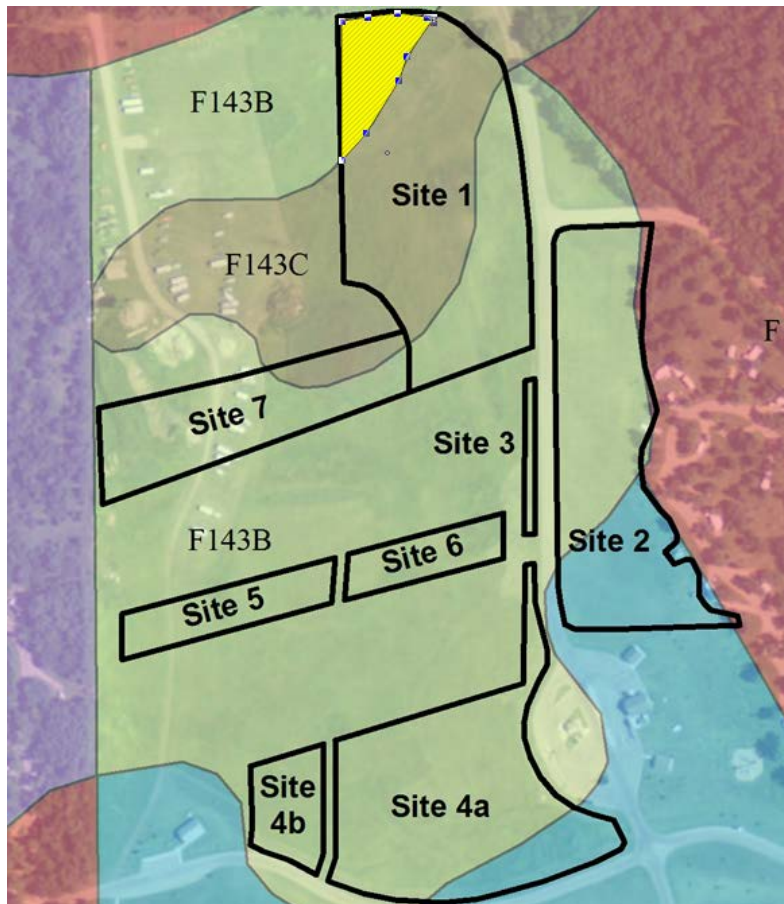


Figure 12 Site Location

## Site Specific Tree and Shrub Planting Plans

### Site Number 1A



Figure 13 Site Photo

Common Name	Scientific Name	Height	Crown	Spacing	Site 1A_S	Site 1A_T
Woods Rose	<i>Rosa woodsii</i>	4-5	4-6	3-5	100	
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	4-8	3-6	3-5		
American Plum	<i>Prunus americana</i>	5-8	8-10	3-6	105	
American Plum	<i>Prunus americana</i>	5-9	8-11	3-7		
Smooth Sumac	<i>Rhus glabra</i>	5-12	10-15	3-6		
False Indigo	<i>Amorpha fruticosa</i>	6-8	6-10	3-6	100	
Buffaloberry	<i>Shepherdia argentea</i>	6-12	8-14	3-6	200	
Nannyberry	<i>Viburnum lentago</i>	8-12	8-12	3-6	50	
Hawthorne, Downy	<i>Crataegus mollis</i>	10-12	15-20	3-6	50	
Amur Maple	<i>Acer ginnala</i>	10-12	15-20	4-6		
Chokecherry	<i>Prunus virginiana</i>	10-12	10-20	4-6		
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-6		
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-7		
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	10-12	12-20	6-10		
Pin Cherry	<i>Prunus pennsylvanica</i>	15-30	15-30	4-6		
Blackhills Spruce	<i>Picea glauca</i>	16-20	15-25	10-12		
Ponderosa Pine	<i>Pinus ponderosa</i>	16-20	25-30	10-12		
Boxelder	<i>Acer negundo</i>	18-20	30-60	8-10		35
Bur Oak	<i>Quercus macrocarpa</i>	18-20	35-60	8-10		90
Hackberry	<i>Celtis occidentalis</i>	18-22	25-45	8-10		40
Golden Willow	<i>Salix alba "Vitellina"</i>	20-25	40-55	8-10		
Green Ash	<i>Fraxinus pennsylvanica</i>	20-30	30-40	8-10		10
Silver Maple	<i>Acer saccharinum</i>	50-70	40-60	10-12		
					605	175

Table 4 Selected Tree and Shrubs

## Site Specific Tree and Shrub Planting Plans

### *Site Number 1B:*

**PURPOSE:** Planting trees and shrubs to increase the range of a plants and animals – the biodiversity - of the area. Provide additional habitat and enhance the park visitor recreational experience.

**LOCATION:** Northeast of the proposed campground.

**MAJOR SOIL TYPE(s):** Barnes – Buse-Langhei Loams (6-9 % slopes)

**WINDBREAK SUITABILITY GROUP:** Barnes – Group 3, Buse Group 8

**AREA:** 2.6 acres ( 17501 sq. ft. )

**SPECIES:** 10 tree and shrub species

## Site Specific Tree and Shrub Planting Plans

### Site Number 1B:



Figure 15 Site Photo

Common Name	Scientific Name	Height	Crown	Spacing	Site 1B_S	Site 1B_T
Woods Rose	<i>Rosa woodsii</i>	4-5	4-6	3-5	250	
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	4-8	3-6	3-5	350	
American Plum	<i>Prunus americana</i>	5-8	8-10	3-6		
American Plum	<i>Prunus americana</i>	5-9	8-11	3-7		
Smooth Sumac	<i>Rhus glabra</i>	5-12	10-15	3-6		
False Indigo	<i>Amorpha fruticosa</i>	6-8	6-10	3-6		
Buffaloberry	<i>Shepherdia argentea</i>	6-12	8-14	3-6	150	
Nannyberry	<i>Viburnum lentago</i>	8-12	8-12	3-6		
Hawthorne, Downy	<i>Crataegus mollis</i>	10-12	15-20	3-6	50	
Amur Maple	<i>Acer ginnala</i>	10-12	15-20	4-6		
Chokecherry	<i>Prunus virginiana</i>	10-12	10-20	4-6	200	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-6		
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-7		
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	10-12	12-20	6-10		200
Pin Cherry	<i>Prunus pennsylvanica</i>	15-30	15-30	4-6		
Blackhills Spruce	<i>Picea glauca</i>	16-20	15-25	10-12		
Ponderosa Pine	<i>Pinus ponderosa</i>	16-20	25-30	10-12		107
Boxelder	<i>Acer negundo</i>	18-20	30-60	8-10		
Bur Oak	<i>Quercus macrocarpa</i>	18-20	35-60	8-10		40
Hackberry	<i>Celtis occidentalis</i>	18-22	25-45	8-10		40
Golden Willow	<i>Salix alba "Vitellina"</i>	20-25	40-55	8-10		
Green Ash	<i>Fraxinus pennsylvanica</i>	20-30	30-40	8-10		10
Silver Maple	<i>Acer saccharinum</i>	50-70	40-60	10-12		
					1000	397

Table 5 Selected Trees and Shrubs

## Site Specific Tree and Shrub Planting Plans

### *Site Number 1C:*

**PURPOSE:** Planting trees and shrubs to increase the range of a plants and animals – the biodiversity - of the area. Provide additional habitat and enhance the park visitor recreational experience.

**LOCATION:** Northeast of the proposed campground.

**MAJOR SOIL TYPE(s):** Barnes –Svea Loams (3-6% slopes)

**WINDBREAK SUITABILITY GROUP:** Barnes – Group 3, Svea Group 1

**AREA:** 1.4 acres (61631 sq. ft.)

**SPECIES:** 10 tree and shrub species

## Site Specific Tree and Shrub Planting Plans

### Site Number 1C:



Figure 17 Site Photo

Common Name	Scientific Name	Height	Crown	Spacing	Site 1C_ S	Site 1C_ T
Woods Rose	<i>Rosa woodsii</i>	4-5	4-6	3-5		
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	4-8	3-6	3-5		
American Plum	<i>Prunus americana</i>	5-8	8-10	3-6		
American Plum	<i>Prunus americana</i>	5-9	8-11	3-7		
Smooth Sumac	<i>Rhus glabra</i>	5-12	10-15	3-6	120	
False Indigo	<i>Amorpha fruticosa</i>	6-8	6-10	3-6	180	
Buffaloberry	<i>Shepherdia argentea</i>	6-12	8-14	3-6		
Nannyberry	<i>Viburnum lentago</i>	8-12	8-12	3-6	75	
Hawthorne, Downy	<i>Crataegus mollis</i>	10-12	15-20	3-6	50	
Amur Maple	<i>Acer ginnala</i>	10-12	15-20	4-6	400	
Chokecherry	<i>Prunus virginiana</i>	10-12	10-20	4-6	530	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-6		
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-7		
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	10-12	12-20	6-10		
Pin Cherry	<i>Prunus pennsylvanica</i>	15-30	15-30	4-6	400	
Blackhills Spruce	<i>Picea glauca</i>	16-20	15-25	10-12		
Ponderosa Pine	<i>Pinus ponderosa</i>	16-20	25-30	10-12		
Boxelder	<i>Acer negundo</i>	18-20	30-60	8-10		65
Bur Oak	<i>Quercus macrocarpa</i>	18-20	35-60	8-10		
Hackberry	<i>Celtis occidentalis</i>	18-22	25-45	8-10		80
Golden Willow	<i>Salix alba "Vitellina"</i>	20-25	40-55	8-10		
Green Ash	<i>Fraxinus pennsylvanica</i>	20-30	30-40	8-10		10
Silver Maple	<i>Acer saccharinum</i>	50-70	40-60	10-12		
					1755	155

Table 6 Selected Trees and Shrubs

## Site Specific Tree and Shrub Planting Plans

### *Site Number 2:*

**PURPOSE:** Planting trees and shrubs to increase the range of a plants and animals – the biodiversity - of the area. Provide additional habitat and enhance the park visitor recreational experience.

**LOCATION:** West of existing campground.

**MAJOR SOIL TYPE(S):** Barnes –Svea Loams (0-6% slopes)

**WINDBREAK SUITABILITY GROUP:** Barnes – Group 3, Svea Group 1

**AREA:** 3.7 acres (159656 sq. ft)

**SPECIES:** 19 trees and shrub species

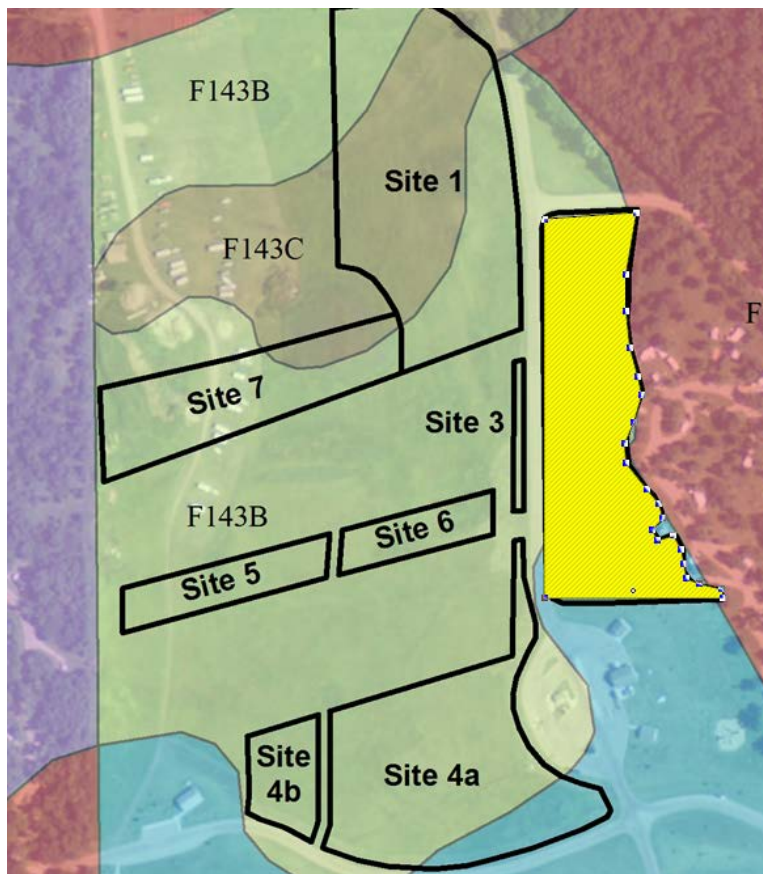


Figure 18 Site Location

## Site Specific Tree and Shrub Planting Plans

### Site Number 2:



Figure 19 Site Photo

Common Name	Scientific Name	Height	Crown	Spacing	Site 2_S	Site 2_T
Woods Rose	<i>Rosa woodsii</i>	4-5	4-6	3-5	185	
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	4-8	3-6	3-5	200	
American Plum	<i>Prunus americana</i>	5-8	8-10	3-6	200	
American Plum	<i>Prunus americana</i>	5-9	8-11	3-7		
Smooth Sumac	<i>Rhus glabra</i>	5-12	10-15	3-6	180	
False Indigo	<i>Amorpha fruticosa</i>	6-8	6-10	3-6	230	
Buffaloberry	<i>Shepherdia argentea</i>	6-12	8-14	3-6		
Nannyberry	<i>Viburnum lentago</i>	8-12	8-12	3-6	50	
Hawthorne, Downy	<i>Crataegus mollis</i>	10-12	15-20	3-6	25	
Amur Maple	<i>Acer ginnala</i>	10-12	15-20	4-6	250	
Chokecherry	<i>Prunus virginiana</i>	10-12	10-20	4-6	125	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-6	250	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-7		
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	10-12	12-20	6-10		55
Pin Cherry	<i>Prunus pennsylvanica</i>	15-30	15-30	4-6	150	
Blackhills Spruce	<i>Picea glauca</i>	16-20	15-25	10-12		45
Ponderosa Pine	<i>Pinus ponderosa</i>	16-20	25-30	10-12		59
Boxelder	<i>Acer negundo</i>	18-20	30-60	8-10		70
Bur Oak	<i>Quercus macrocarpa</i>	18-20	35-60	8-10		70
Hackberry	<i>Celtis occidentalis</i>	18-22	25-45	8-10		130
Golden Willow	<i>Salix alba "Vitellina"</i>	20-25	40-55	8-10		
Green Ash	<i>Fraxinus pennsylvanica</i>	20-30	30-40	8-10		10
Silver Maple	<i>Acer saccharinum</i>	50-70	40-60	10-12		60
					1845	499

Table 7 Selected Trees and Shrubs

## Site Specific Tree and Shrub Planting Plans

### *Site Number 3:*

**Purpose:** Planting trees and shrubs to increase the range of a plants and animals – the biodiversity - of the area. Provide additional habitat and enhance the park visitor recreational experience.

**Location:** West of road and west of existing campground.

**Major Soil Type(s):** Barnes –Svea Loams (0-6% slopes)

**Windbreak Suitability Group:** Barnes – Group 3, Svea Group 1

**Area:** 0.1 acres ( 6168 sq. ft.)

**Species:** 4 trees and shrub species

## Site Specific Tree and Shrub Planting Plans

### Site Number 3:



Figure 21 Site Photo

Common Name	Scientific Name	Height	Crown	Spacing	Site 3_S	Site 3_T
Woods Rose	<i>Rosa woodsii</i>	4-5	4-6	3-5		
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	4-8	3-6	3-5		
American Plum	<i>Prunus americana</i>	5-8	8-10	3-6		
American Plum	<i>Prunus americana</i>	5-9	8-11	3-7		
Smooth Sumac	<i>Rhus glabra</i>	5-12	10-15	3-6	50	
False Indigo	<i>Amorpha fruticosa</i>	6-8	6-10	3-6		
Buffaloberry	<i>Shepherdia argentea</i>	6-12	8-14	3-6		
Nannyberry	<i>Viburnum lentago</i>	8-12	8-12	3-6		
Hawthorne, Downy	<i>Crataegus mollis</i>	10-12	15-20	3-6		
Amur Maple	<i>Acer ginnala</i>	10-12	15-20	4-6	50	
Chokecherry	<i>Prunus virginiana</i>	10-12	10-20	4-6		
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-6		
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-7		
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	10-12	12-20	6-10		15
Pin Cherry	<i>Prunus pennsylvanica</i>	15-30	15-30	4-6		
Blackhills Spruce	<i>Picea glauca</i>	16-20	15-25	10-12		10
Ponderosa Pine	<i>Pinus ponderosa</i>	16-20	25-30	10-12		
Boxelder	<i>Acer negundo</i>	18-20	30-60	8-10		
Bur Oak	<i>Quercus macrocarpa</i>	18-20	35-60	8-10		
Hackberry	<i>Celtis occidentalis</i>	18-22	25-45	8-10		
Golden Willow	<i>Salix alba "Vitellina"</i>	20-25	40-55	8-10		
Green Ash	<i>Fraxinus pennsylvanica</i>	20-30	30-40	8-10		
Silver Maple	<i>Acer saccharinum</i>	50-70	40-60	10-12		
					100	25

Table 8 Selected Trees and Shrubs

## Site Specific Tree and Shrub Planting Plans

### *Site Number 4A:*

**Purpose:** Planting trees and shrubs to increase the range of a plants and animals – the biodiversity - of the area. Provide additional habitat and enhance the park visitor recreational experience.

**Location:** South of proposed campground,

**Major Soil Type(s):** Barnes –Svea Loams (0-6% slopes)

**Windbreak Suitability Group:** Barnes – Group 3, Svea Group 1

**Area:** 3.9 acres ( 168912 sq. ft.)

**Species:** 20 tree and shrub species

## Site Specific Tree and Shrub Planting Plans

### Site Number 4A:



Figure 23 Site Photo

Common Name	Scientific Name	Height	Crown	Spacing	Site 4a_S	Site 4a_T
Woods Rose	<i>Rosa woodsii</i>	4-5	4-6	3-5	250	
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	4-8	3-6	3-5	200	
American Plum	<i>Prunus americana</i>	5-8	8-10	3-6	100	
American Plum	<i>Prunus americana</i>	5-9	8-11	3-7		
Smooth Sumac	<i>Rhus glabra</i>	5-12	10-15	3-6	200	
False Indigo	<i>Amorpha fruticosa</i>	6-8	6-10	3-6	200	
Buffalobery	<i>Shepherdia argentea</i>	6-12	8-14	3-6	150	
Nannyberry	<i>Viburnum lentago</i>	8-12	8-12	3-6	150	
Hawthorne, Downy	<i>Crataegus mollis</i>	10-12	15-20	3-6	150	
Amur Maple	<i>Acer ginnala</i>	10-12	15-20	4-6	150	
Chokecherry	<i>Prunus virginiana</i>	10-12	10-20	4-6	50	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-6	350	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-7		
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	10-12	12-20	6-10		90
Pin Cherry	<i>Prunus pennsylvanica</i>	15-30	15-30	4-6	150	
Blackhills Spruce	<i>Picea glauca</i>	16-20	15-25	10-12		100
Ponderosa Pine	<i>Pinus ponderosa</i>	16-20	25-30	10-12		150
Boxelder	<i>Acer negundo</i>	18-20	30-60	8-10		
Bur Oak	<i>Quercus macrocarpa</i>	18-20	35-60	8-10		75
Hackberry	<i>Celtis occidentalis</i>	18-22	25-45	8-10		75
Golden Willow	<i>Salix alba "Vitelina"</i>	20-25	40-55	8-10		50
Green Ash	<i>Fraxinus pennsylvanica</i>	20-30	30-40	8-10		10
Silver Maple	<i>Acer saccharinum</i>	50-70	40-60	10-12		50
					2100	600

Table 9 Selected Trees and Shrubs

## Site Specific Tree and Shrub Planting Plans

### Site Number 4B:

**Purpose:** Planting trees and shrubs to increase the range of a plants and animals – the biodiversity - of the area. Provide additional habitat and enhance the park visitor recreational experience.

**Location:** South of proposed campground,

**Major Soil Type(s):** Barnes –Svea Loams (3-6% slopes)

**Windbreak Suitability Group:** Barnes – Group 3, Svea Group 1

**Area:** 0 .7 acres (28974.1 sq. ft.)

**Species:** 15 tree and shrub species

## Site Specific Tree and Shrub Planting Plans

### Site Number 4B:



Figure 25 Site Photo

Common Name	Scientific Name	Height	Crown	Spacing	Site 4b_S	Site 4b_T
Woods Rose	<i>Rosa woodsii</i>	4-5	4-6	3-5	200	
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	4-8	3-6	3-5		
American Plum	<i>Prunus americana</i>	5-8	8-10	3-6		
American Plum	<i>Prunus americana</i>	5-9	8-11	3-7		
Smooth Sumac	<i>Rhus glabra</i>	5-12	10-15	3-6	50	
False Indigo	<i>Amorpha fruticosa</i>	6-8	6-10	3-6	25	
Buffaloberry	<i>Shepherdia argentea</i>	6-12	8-14	3-6	80	
Nannyberry	<i>Viburnum lentago</i>	8-12	8-12	3-6	25	
Hawthorne, Downy	<i>Crataegus mollis</i>	10-12	15-20	3-6	25	
Amur Maple	<i>Acer ginnala</i>	10-12	15-20	4-6	100	
Chokecherry	<i>Prunus virginiana</i>	10-12	10-20	4-6		
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-6	50	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-7		
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	10-12	12-20	6-10		20
Pin Cherry	<i>Prunus pennsylvanica</i>	15-30	15-30	4-6	25	
Blackhills Spruce	<i>Picea glauca</i>	16-20	15-25	10-12		20
Ponderosa Pine	<i>Pinus ponderosa</i>	16-20	25-30	10-12		20
Boxelder	<i>Acer negundo</i>	18-20	30-60	8-10		
Bur Oak	<i>Quercus macrocarpa</i>	18-20	35-60	8-10		10
Hackberry	<i>Celtis occidentalis</i>	18-22	25-45	8-10		
Golden Willow	<i>Salix alba "Vitellina"</i>	20-25	40-55	8-10		10
Green Ash	<i>Fraxinus pennsylvanica</i>	20-30	30-40	8-10		
Silver Maple	<i>Acer saccharinum</i>	50-70	40-60	10-12		20
					580	100

Table 10 Selected Trees and Shrubs

## Site Specific Tree and Shrub Planting Plans

### *Site Number 5:*

**Purpose:** Planting trees and shrubs to increase the range of a plants and animals – the biodiversity - of the area. Provide additional habitat and enhance the park visitor recreational experience.

**Location:** In between proposed campground,

**Major Soil Type(s):** Barnes –Svea Loams (3-6% slopes)

**Windbreak Suitability Group:** Barnes – Group 3, Svea Group 1

**Acres:** 0 .8 acres (36919 sq. ft.)

**Species:** 10 tree and shrub species

Figure 26 Site Location

## Site Specific Tree and Shrub Planting Plans

### Site Number 5:



Figure 27 Site Photo

Common Name	Scientific Name	Height	Crown	Spacing	Site 5_S	Site 5_T
Woods Rose	<i>Rosa woodsii</i>	4-5	4-6	3-5		
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	4-8	3-6	3-5		
American Plum	<i>Prunus americana</i>	5-8	8-10	3-6		
American Plum	<i>Prunus americana</i>	5-9	8-11	3-7		
Smooth Sumac	<i>Rhus glabra</i>	5-12	10-15	3-6	150	
False Indigo	<i>Amorpha fruticosa</i>	6-8	6-10	3-6	150	
Buffaloberry	<i>Shepherdia argentea</i>	6-12	8-14	3-6		
Nannyberry	<i>Viburnum lentago</i>	8-12	8-12	3-6		
Hawthorne, Downy	<i>Crataegus mollis</i>	10-12	15-20	3-6		
Amur Maple	<i>Acer ginnala</i>	10-12	15-20	4-6	100	
Chokecherry	<i>Prunus virginiana</i>	10-12	10-20	4-6		
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-6	100	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-7		
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	10-12	12-20	6-10		15
Pin Cherry	<i>Prunus pennsylvanica</i>	15-30	15-30	4-6		
Blackhills Spruce	<i>Picea glauca</i>	16-20	15-25	10-12		15
Ponderosa Pine	<i>Pinus ponderosa</i>	16-20	25-30	10-12		
Boxelder	<i>Acer negundo</i>	18-20	30-60	8-10		20
Bur Oak	<i>Quercus macrocarpa</i>	18-20	35-60	8-10		20
Hackberry	<i>Celtis occidentalis</i>	18-22	25-45	8-10		15
Golden Willow	<i>Salix alba "Vitelina"</i>	20-25	40-55	8-10		
Green Ash	<i>Fraxinus pennsylvanica</i>	20-30	30-40	8-10		
Silver Maple	<i>Acer saccharinum</i>	50-70	40-60	10-12		15
					500	100

Table 11 Selected Trees and Shrubs

## Site Specific Tree and Shrub Planting Plans

### *Site Number 6:*

**Purpose:** Planting trees and shrubs to increase the range of a plants and animals – the biodiversity - of the area. Provide additional habitat and enhance the park visitor recreational experience.

**Location:** In between proposed campground

**Major Soil Type(s):** Barnes –Svea Loams (3-6% slopes)

**Windbreak Suitability Group:** Barnes – Group 3, Svea Group 1

**Acres:** 0.6 acres (27355 sq. ft.)

**Species:** 10 tree and shrub species

## Site Specific Tree and Shrub Planting Plans

### Site Number 6:



Figure 29 Site Photo

Common Name	Scientific Name	Height	Crown	Spacing	Site 6_S	Site 6_T
Woods Rose	<i>Rosa woodsii</i>	4-5	4-6	3-5		
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	4-8	3-6	3-5		
American Plum	<i>Prunus americana</i>	5-8	8-10	3-6		
American Plum	<i>Prunus americana</i>	5-9	8-11	3-7		
Smooth Sumac	<i>Rhus glabra</i>	5-12	10-15	3-6	115	
False Indigo	<i>Amorpha fruticosa</i>	6-8	6-10	3-6	110	
Buffaloberry	<i>Shepherdia argentea</i>	6-12	8-14	3-6		
Nannyberry	<i>Viburnum lentago</i>	8-12	8-12	3-6		
Hawthorne, Downy	<i>Crataegus mollis</i>	10-12	15-20	3-6		
Amur Maple	<i>Acer ginnala</i>	10-12	15-20	4-6	75	
Chokecherry	<i>Prunus virginiana</i>	10-12	10-20	4-6		
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-6	80	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-7		
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	10-12	12-20	6-10		10
Pin Cherry	<i>Prunus pennsylvanica</i>	15-30	15-30	4-6		
Blackhills Spruce	<i>Picea glauca</i>	16-20	15-25	10-12		12
Ponderosa Pine	<i>Pinus ponderosa</i>	16-20	25-30	10-12		
Boxelder	<i>Acer negundo</i>	18-20	30-60	8-10		15
Bur Oak	<i>Quercus macrocarpa</i>	18-20	35-60	8-10		15
Hackberry	<i>Celtis occidentalis</i>	18-22	25-45	8-10		12
Golden Willow	<i>Salix alba "Vitellina"</i>	20-25	40-55	8-10		
Green Ash	<i>Fraxinus pennsylvanica</i>	20-30	30-40	8-10		
Silver Maple	<i>Acer saccharinum</i>	50-70	40-60	10-12		11
					380	75

Table 12 Selected Trees and Shrubs

## Site Specific Tree and Shrub Planting Plans

### *Site Number 7:*

**Purpose:** Planting trees and shrubs to increase the range of a plants and animals – the biodiversity - of the area. Provide additional habitat and enhance the park visitor recreational experience.

**Location:** South of proposed campground,

**Major Soil Type(s):** Barnes –Svea Loams (3-6% slopes)

**Windbreak Suitability Group:** Barnes – Group 3, Svea Group 1

**Acres:** 2.1 acres (92650.7 sq. ft.)

**Species:** 19 tree and shrub species

Figure 30 Site Location

## Site Specific Tree and Shrub Planting Plans

### Site Number 7:



Figure 31 Site Photo

Common Name	Scientific Name	Height	Crown	Spacing	Site 7_S	Site 7_T
Woods Rose	<i>Rosa woodsii</i>	4-5	4-6	3-5	15	
Wolfberry (Silverberry)	<i>Elaeagnus commutata</i>	4-8	3-6	3-5	130	
American Plum	<i>Prunus americana</i>	5-8	8-10	3-6	380	
American Plum	<i>Prunus americana</i>	5-9	8-11	3-7		
Smooth Sumac	<i>Rhus glabra</i>	5-12	10-15	3-6	115	
False Indigo	<i>Amorpha fruticosa</i>	6-8	6-10	3-6	35	
Buffaloberry	<i>Shepherdia argentea</i>	6-12	8-14	3-6		
Nannyberry	<i>Viburnum lentago</i>	8-12	8-12	3-6	350	
Hawthorne, Downy	<i>Crataegus mollis</i>	10-12	15-20	3-6	350	
Amur Maple	<i>Acer ginnala</i>	10-12	15-20	4-6	25	
Chokecherry	<i>Prunus virginiana</i>	10-12	10-20	4-6	95	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-6	20	
Chokecherry Shubert	<i>Prunus virginiana "schubert"</i>	10-12	10-20	4-7		
Rocky Mt Juniper	<i>Juniperus scopulorum</i>	10-12	12-20	6-10		45
Pin Cherry	<i>Prunus pennsylvanica</i>	15-30	15-30	4-6	75	
Blackhills Spruce	<i>Picea glauca</i>	16-20	15-25	10-12		23
Ponderosa Pine	<i>Pinus ponderosa</i>	16-20	25-30	10-12		64
Boxelder	<i>Acer negundo</i>	18-20	30-60	8-10		20
Bur Oak	<i>Quercus macrocarpa</i>	18-20	35-60	8-10		55
Hackberry	<i>Celtis occidentalis</i>	18-22	25-45	8-10		58
Golden Willow	<i>Salix alba "Vitellina"</i>	20-25	40-55	8-10		15
Green Ash	<i>Fraxinus pennsylvanica</i>	20-30	30-40	8-10		
Silver Maple	<i>Acer saccharinum</i>	50-70	40-60	10-12		44
					1590	324

Table 13 Selected Trees and Shrubs

## Pre-Planting

Locate underground and above utility lines (ND One Call - <http://www.ndonecall.com/>)

### *Site Preparation*

Site preparation will be used to create favorable growing conditions where needed. Site preparation will include controlling undesirable vegetation vary from site to site. Limited site preparation will be needed but may include plowing, disking, mowing (most common), burning, and herbicide application.

## Planting Procedures

Planting will begin in spring of 2013. Proper planting of bareroot seedlings is a critical step in a successful conservation planting. The following guidelines will be taken to ensure success of the plantings. (Source: USDA-NRCS Plant Materials Program)

**Step 1:** Store trees and shrubs properly prior to planting. Ideal storage is 33 to 35°F, 95+% relative humidity, in a wind protected, shaded area with the roots moist. Keeping roots wrapped in moist burlap, straw, peat moss, shredded paper, etc., to prevent drying.

**Step 2:** If possible planting on cloudy, cool, humid days. Attempts will be made to avoid sunny, warm, dry, and windy conditions that desiccate seedling roots. Planting sensitive species like conifers in the early morning. Avoid planting when there is a risk of freezing the roots.

**Step 3:** Remove only enough stock from storage that can be planted in a specified area or allotted timeframe. Plant stock as quickly as possible after removal from storage. Do not leave roots exposed to drying conditions even briefly. Do not leave roots exposed when taking breaks, repairing equipment, preparing a hole, etc.

**Step 4:** Inspect all stock prior to planting and discard unhealthy plants.

**Step 5:** Keep roots moist (not saturated) and protected from wind and sun at all times. Root systems should never be exposed to drying conditions, even briefly. Conifers are particularly sensitive. Dip roots in water for a few seconds after removal from storage. Keep roots covered with moist (not saturated) straw, burlap until directly before placement in the planting hole. Conversely, never leave seedlings in standing water.

**Step 6:** Dig hole wide and deep enough to accept all roots. The hole should be two times wider and slightly deeper than the seedling root system.

**Step 7:** Properly place the seedling in the hole, roots vertical and fully extended, and root collar at or slightly below grade. Hold the seedling vertically in the hole with roots hanging straight down and the root collar at or just below grade.

**Step 8:** Backfill with loose soil. Holding the seedling in place, gently backfill the hole with loose (not clumpy) soil. The final planting depth should place the root collar at or slightly below grade. Soil amendments are generally unnecessary although additions of peat moss to sandy soils improve waterholding capacity.

**Step 9:** Saturate with water to remove air pockets. Add more soil and water if settling occurs. Use 3 to 5 gallons of water (more if necessary) to saturate the backfill and remove air pockets. Add water until a soupy consistency. If settling occurs, add more soil and water.

**Step 10:** Lightly firm the soil with your foot. After draining, lightly firm soil with your foot or hand to assure good root:soil contact and to secure the seedling in place. Never heel or stomp the backfill; it damages roots and soil structure.

**Step 11:** Install weed barrier, mulch, tree shelters, and deer fence to enhance survival and growth. Tree shelters and mulch enhance seedling survival and growth. Use ventilated tubes to provide animal protection.

## Post Planting

### *First Year*

1. Water tree during dry periods (rule of thumb, water every 7-10 days during dry periods). Continue watering right up till the ground freezes.
2. Inspect trees for disease or insect problems.
3. Monitor health and vigor of trees. Plant survival success rate goal of 75% or better after three years.
4. In fall wrap thin barked trees with tree wrap (e.g. silver maples).
5. Order replacement stock if necessary.
6. Install deer fence in fall.

### *Second Year*

1. Plant replacement stock if necessary.
2. Continue to monitor trees health and vigor. Plant survival success rate goal of 75% or better after three years
3. Inspect for disease and insect problems.
4. Inspect evergreen trees for winter injury and fruit trees for rodent damage.
5. Remove tree wrap from thin bark trees in spring.
6. Add more mulch if needed.
7. Begin corrective pruning trees one year after trees are planted (general rule of thumb is to remove no more than ¼ of the foliage at one time).
8. Continue watering trees when needed.
9. Reorder replacement trees and shrubs in fall
10. In the fall continue to water trees. Wrap thin bark trees with tree wrap.
11. Install deer fence in fall.

### ***Third Year***

1. Plant replacement stock if necessary.
2. Continue to monitor trees health and vigor. Inspect for disease and insect problems.
3. Inspect evergreen trees for winter injury and fruit trees for rodent damage.
4. Remove tree wrap from thin bark trees in spring.
5. Add more mulch if needed.
6. Replace dead trees as needed.
7. Continue watering trees when needed (deep watering). Do not over water.
8. Avoid tree injury, such as mechanical or herbicide injury.
9. Avoid trenching, soil compaction, or depositing de-icing salts around trees.
10. Install deer fence in fall.

## **Tree Inspection & Monitoring**

### ***Objectives:***

- Identify immediate maintenance needs to ensure trees survive and grow.
- Determine whether goals for plant survival success and growth are being met. Plant survival success *rate goal of 75% or better after three years.*
- Document project implementation and results.

### ***Annual Inspection***

Collaborate with the Enbridge consulting forester on three annual inspections.

### ***Periodic Visual Inspection***

The main purpose is to see how the planting is doing and to decide what, if any, corrective actions are needed to make sure trees survive and grow adequately to meet project goals. Conduct visual inspection of the planting site at least once per season completing tree planting assessment form (see attached).

### ***Photo monitoring***

A series of photos over time is a powerful tool for documenting starting conditions and changes over time. Photo points (reference points) will be set and documented utilizing GPS and compass heading indicating the compass heading the photographer is facing from the photo point.

## Tree Row Inventory/Assessment Form *SAMPLE*

Park: \_\_\_\_\_ Site #: \_\_\_\_\_ Date: \_\_\_\_\_ Surveyor: \_\_\_\_\_

Photo point GPS waypoint: \_\_\_\_\_ Compass Heading \_\_\_\_\_



Common Name	Height	Site 1C_S	Survival	Site 1C_T	Survival
Woods Rose					
Wolfberry (Silverberry)					
American Plum					
Smooth Sumac					
False Indigo					
Juneberry		300			
Buffaloberry					
Amur Maple		400			
Chokecherry		530			
Chokecherry Shubert					
Rocky Mt Juniper					
Pin Cherry		400			
Blackhills Spruce					
Ponderosa Pine					
Boxelder				65	
Bur Oak					
Hackberry				80	
Golden Willow					
Green Ash				4	
Silver Maple					
		1630		149	

### Digital Pictures

Disk	#	Comments

### Replacement Summary

Species	Total Count	Species	Total

Insect & Disease:

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Management Comments:

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## Reporting

Compile data into field season report by August 15th in each year and be transmitted to the Enbridge consulting forester no later than September 1<sup>st</sup> of each of the three years after the year of the initial revegetation planting.

## Project Contact:

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