

September 12, 2018

# NEBRASKA PUBLIC POWER DISTRICT

---

## **R-Project**

*Restoration Management Plan*

## *Restoration Management Plan*

*PREPARED FOR: NEBRASKA PUBLIC POWER DISTRICT*

*PREPARED BY: BEN BAINBRIDGE*

*208-788-0391*

*BEN.BAINBRIDGE@POWERENG.COM*

---

## TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION</b> .....	<b>1</b>
1.1	PURPOSE .....	1
1.1.1	Restoration Zones .....	1
1.2	TIMELINE .....	1
1.3	PLAN UPDATES .....	2
<b>2.0</b>	<b>TEMPORARY DISTURBANCE ACTIVITIES</b> .....	<b>4</b>
<b>3.0</b>	<b>RESTORATION</b> .....	<b>6</b>
3.1	GRASSLAND TYPES IN DISTURBANCE AREAS .....	6
3.2	SOIL MANAGEMENT .....	7
3.2.1	Soil Compaction Relief .....	7
3.2.2	Seedbed Preparation .....	7
3.2.3	Fertilization.....	7
3.2.4	Erosion Protection .....	7
3.3	REVEGETATION .....	8
3.3.1	Seeding Dates .....	8
3.3.2	Seeding Methods .....	8
3.3.3	Seeding Rate.....	8
3.3.4	Seed Mixes .....	9
3.3.5	Restoration Area Protection.....	10
<b>4.0</b>	<b>MONITORING</b> .....	<b>11</b>
4.1	EFFECTIVENESS MONITORING.....	11
4.2	PERFORMANCE STANDARDS.....	11
4.3	EFFECTIVENESS MONITORING REPORTING .....	12
4.4	RESTORATION ADAPTIVE MANAGEMENT .....	12
<b>5.0</b>	<b>NOXIOUS WEEDS</b> .....	<b>14</b>
5.1	NOXIOUS WEED SPECIES .....	14
5.2	PREVENTATIVE MEASURES .....	15
<b>6.0</b>	<b>HERBICIDE USE</b> .....	<b>16</b>
6.1	NOXIOUS WEED TREATMENT.....	16
6.2	STUMP TREATMENT.....	16
6.3	HERBICIDE APPLICATION AND HANDLING .....	17
6.4	HERBICIDE SPILLS AND CLEANUP .....	18
6.5	HERBICIDE USE REPORTING .....	18
<b>7.0</b>	<b>REFERENCES</b> .....	<b>20</b>

### FIGURES:

FIGURE 1	HCP PERMIT AREA.....	3
----------	----------------------	---

**TABLES:**

TABLE 1	TEMPORARY DISTURBANCE ACTIVITIES .....	4
TABLE 2	NEBRASKA EASTERN SANDHILLS (MLRA 65E) SEED MIX, SEMI-ARID SANDHILLS RESTORATION AREAS .....	9
TABLE 3	NEBRASKA EASTERN SANDHILLS (MLRA 65E) SEED MIX, MESIC GRASSLAND AND WET MEADOW RESTORATION AREAS.....	10
TABLE 4	NOXIOUS WEEDS IN THE R-PROJECT COUNTIES.....	14

## ACRONYMS AND ABBREVIATIONS

ABB	American burying beetle
APHIS	Animal and Plant Health Inspection Service
BMP(s)	best management practice(s)
CFR	Code of Federal Regulations
ft <sup>2</sup>	square foot
GPS	global positioning system
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
kV	kilovolt
MLRA	Major Land Resource Area
NDA	Nebraska Department of Agriculture
NGPC	Nebraska Game and Parks Commission
NPPD	Nebraska Public Power District
NRCS	Natural Resources Conservation Service
Plan	Restoration Management Plan
PLS	pure live seed
ROW	right-of-way
R-Project	Gerald Gentleman Station to Holt County 345 kV Transmission Project
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTV	utility task vehicle
WEAP	Worker Educational Awareness Program
Western	Western Area Power Administration

## **1.0 INTRODUCTION**

### **1.1 Purpose**

Nebraska Public Power District (NPPD) proposes to construct a new 345 kilovolt (kV) (345,000 volt) electric transmission line and two new substations in north central Nebraska (R-Project). The R-Project will run from the NPPD Gerald Gentleman Station near Sutherland north to a new substation to be sited adjacent to NPPD's existing substation east of Thedford, and then east to a new substation to be constructed in Holt County for interconnection to Western Area Power Administration's (Western) Fort Thompson to Grand Island 345 kV transmission line (Figure 1). The approximate length of the transmission line is 225 miles. This includes a large portion of the Nebraska Sandhills that is home to the federally endangered American burying beetle (*Nicrophorus americanus*; ABB). NPPD has prepared a Habitat Conservation Plan (HCP) to support the application of an Incidental Take Permit (ITP) for this species.

The purpose of this Restoration Management Plan (Plan) is to describe the methods and activities that will be executed to restore temporary disturbances to grasslands in the Sandhills potentially disturbed by construction of the R-Project, including habitat that supports ABB. This Plan is applicable to temporary disturbances from construction activities and temporary disturbances that may be caused by emergency repair activities. Potential disturbances to croplands are not included as part of this Plan. NPPD will use their standard restoration practices in cropland. In an effort to reduce long-term impacts to the landscape, NPPD will restore grasslands temporarily disturbed by construction activities. This Plan details the restoration methods, monitoring, and project design features, committed to by NPPD for all areas temporarily disturbed by the R-Project.

Future landowner input is an important part of this Plan and will be incorporated into restoration efforts to the extent that the suggestions are legal, comply with the HCP, are accepted restoration practices, and will help result in successful restoration.

#### **1.1.1 Restoration Zones**

Zone 1 is defined as the R-Project HCP Permit Area where all disturbance activities that may impact ABB will be in compliance with the federal Endangered Species Act through an ITP. Funding for the successful restoration of ABB habitat in Zone 1 will be assured by an Escrow Account. Because the Escrow Account is to assure funding for the successful restoration of ABB habitat, it is only applicable to the Permit Area as depicted in Figure 1.

Zone 2 is defined as all disturbance activities outside the R-Project HCP Permit Area. NPPD understands the concern over restoration, and unless requested otherwise by the landowner, NPPD will employ the same restoration methodologies and monitoring as within Zone 1. However, there is no regulatory nexus and accompanying compliance requirement in Zone 2.

Approximately 160 miles of the R-Project fall within Zone 1, while approximately 65 miles fall within Zone 2.

### **1.2 Timeline**

An Escrow Agreement will be in place prior to the initiation of construction activities in Zone 1. Restoration efforts as detailed in this Plan will begin after construction activities are completed in an

area. Revegetation will be implemented during late fall or early spring (October 15 to May 15) when weather and soil conditions permit. Erosion control will be implemented if revegetation is not implemented within one week after construction activities are completed in an area. This Plan assumes all restoration, in both zones, will meet the restoration success criteria (Section 4.2) within five years post construction. If the restoration success criteria are not met within the five-year period, adaptive management will be initiated and restoration efforts will continue. At no point in Zone 1 will NPPD cease restoration efforts if restoration success criteria have not been met. Restoration efforts in Zone 2 will only cease when the success criteria have been met, or NPPD and the landowner agree to a different criteria.

### **1.3 Plan Updates**

This Plan may be revised periodically based on updates to the noxious weed list, feedback from adaptive management, additional or new information provided by Natural Resource Conservation Service (NRCS) personnel, and the involvement of the selected construction contractor and landowners.



## 2.0 TEMPORARY DISTURBANCE ACTIVITIES

Construction activities that may cause temporary disturbance are summarized in Table 1. These activities will occur along the entire R-Project and will require restoration efforts as described in this Plan. Temporary improvements such as culverts or temporary fill will be removed following completion of construction activities.

**TABLE 1 TEMPORARY DISTURBANCE ACTIVITIES**

ACTIVITY	SUMMARY	ACRES WITHIN PERMIT AREA (ZONE 1)	ACRES OUTSIDE PERMIT AREA (ZONE 2)
<b>CONSTRUCTION</b>			
<b>Access</b>			
Temporary access routes	Temporary access routes include improvements such as blading, and placement of fill material on geofabric where required.	192	66
<b>Right-of-Way (ROW) Preparation</b>			
ROW tree clearing	Complete removal of trees and tall brush.	29	20
<b>Temporary Work Areas</b>			
Fly yards/Assembly areas	Base location for helicopter construction and lattice tower assembly. Will require a graded pad with gravel, geotextile with gravel overlaid, or protective ground matting.	156	37
Construction yard/Staging areas	Base location for staging construction materials and construction offices. Will require a graded pad with gravel or geotextile with gravel overlaid.	82	121
Pulling and Tensioning sites	Area used by heavy equipment to pull and tension the transmission line conductor, overhead shield wire, and fiber-optic shield wire.	192	83
<b>Temporary Structure Work Areas</b>			
Lattice tower	100-foot x 100-foot work area at each lattice tower. Includes installation of helical pier foundations and leg extension erection.	129	46
Steel monopole	200-foot x 200-foot work area at each steel monopole. Includes installation of poured	219	92

ACTIVITY	SUMMARY	ACRES WITHIN PERMIT AREA (ZONE 1)	ACRES OUTSIDE PERMIT AREA (ZONE 2)
	concrete foundation and structure assembly and erection.		
<b>Distribution Power Line Relocation</b>			
Distribution power line relocation	Relocation of existing distribution power lines that would interfere with the R-Project.	43	0
<b>Well Relocation</b>			
Well relocation	Relocation of existing irrigation wells that would interfere with the R-Project.	0.40	0
<b>CONSTRUCTION SUBTOTAL</b>		<b>1,042.4</b>	<b>465</b>
<b>Operation and Maintenance<sup>1</sup></b>			
Emergency Repairs <sup>1</sup>	Repairs necessary for continued safe operation of transmission line. Estimated at 20% of temporary disturbance.	208	93
<b>TOTAL</b>		<b>1,250.4</b>	<b>558</b>

<sup>1</sup> Disturbance from emergency repairs is estimated at 20% of the total temporary disturbance from construction. Disturbed areas would be restored if conditions require restoration efforts.

## 3.0 RESTORATION

### 3.1 Grassland Types in Disturbance Areas

Grassland that will be disturbed by construction activities includes mesic grassland and wet meadows, and semi-arid Sandhills. These are the habitat types that are included under this Restoration Management Plan. Habitat in Zone 1 is a mix of mesic grassland and wet meadows, semi-arid Sandhills, and trees. The presence of mesic grassland and wet meadow habitat increases from west to east across Zone 1. Grasslands in Zone 2 are typically much drier and consist mostly of semi-arid Sandhills and trees along the North Platte River and South Platte River. In areas with trees, the trees will be removed and the land cover type converted to grassland during the restoration process.

**Mesic grassland and wet meadows** – The mesic grassland and wet meadows land cover type corresponds to parts of the valley wetlands vegetation type identified by LANDFIRE data (USGS 2013). Mesic grassland and wet meadows are those that have areas of elevated soil moisture. Mesic grassland and wet meadows typically have sandy to fine sandy loam soils and occur in the intergrade between wetlands and uplands. Associated species commonly include switchgrass (*Panicum virgatum*), big bluestem (*Andropogon gerardii*), Indiangrass (*Sorghastrum nutans*), sedges (*Carex* spp.), spikerushes (*Eleocharis* spp.), prairie cordgrass (*Spartina pectinata*), false indigo-bush (*Amorpha fruticosa*), leadplant (*Amorpha canescens*), and sandbar willow (*Salix exigua* spp. *interior*) (Kaul et al. 2006; NatureServe 2009; Schneider et al. 2011).

Some mesic grassland and wet meadows areas may fall within the parameters of wetlands under the jurisdiction of the United States Army Corps of Engineers (USACE). Areas identified as jurisdictional wetlands will not require restoration of vegetation cover since no clearing, grading, or fill is proposed in these areas. Temporary matting and other typical wetland best management practices (BMPs) will be used when crossing or working in jurisdictional wetlands and removed upon completion.

**Semi-arid Sandhills** – Semi-arid Sandhills with minimal soil moisture corresponds to the dune prairie and shrubland vegetation type identified by LANDFIRE data (USGS 2013). The sandy soils are highly permeable and susceptible to wind erosion, which creates wind-sculpted features such as blowouts and sand draws (NatureServe 2009). The dune prairie and shrubland vegetation type consists of a mixture of grasses adapted to the sandy conditions and may include sand bluestem (*Andropogon hallii*), prairie sandreed (*Calamovilfa longifolia*), little bluestem (*Schizachyrium scoparium*), and hairy grama (*Bouteloua hirsuta*). Shrublands may include sand cherry (*Prunus pumila* var. *besseyi*), leadplant, and yucca (*Yucca glauca*). Common forbs that may be present are stiff sunflower (*Helianthus pauciflorus*), bush morning glory (*Ipomoea leptophylla*), gilia (*Gilia* spp.), annual wild-buckwheat (*Eriogonum annuum*), and gayfeather (*Liatris* spp.) (NatureServe 2009; Schneider et al. 2011).

**Trees** – Trees include shelterbelts and riparian areas that correspond to the floodplain vegetation type identified by LANDFIRE data (USGS 2013). Sandy to dense clay soils are primarily alluvial and typically sustain flooding every five to 25 years. Dominant trees and shrubs that may occur include Plains cottonwood (*Populus deltoids* ssp. *monilifera*), peach-leaf willow (*Salix amygdaloides*), and sandbar willow. Tallgrass species grow underneath the trees and may include switchgrass and big bluestem (Kaul et al. 2006; NatureServe 2009; Schneider et al. 2011).

## **3.2 Soil Management**

Soil management includes soil compaction relief, seedbed preparation, fertilization, and erosion protection after temporary disturbances occur. Areas affected by temporary disturbances will hereafter be defined as “restoration areas.” No earthwork will occur in rivers, stream channels, or any other wetlands under the jurisdiction of USACE without the proper federal and state permits. Matting and other typical wetland BMPs will be used when crossing or working in wetlands.

### **3.2.1 Soil Compaction Relief**

If needed, soil compaction relief will be implemented upon the completion of temporary disturbance and when weather and soil conditions permit. Ripping, discing, and/or deep chiseling will be conducted only as needed to relieve soil compaction to, as nearly as possible, the condition in which it was found prior to the start of construction. Alleviation of compaction will be performed during suitable weather conditions and should not be performed under extremely wet or other soil conditions that may adversely affect future production capacity of the land. Soil compaction relief may be done in conjunction with seedbed preparation below, if appropriate.

### **3.2.2 Seedbed Preparation**

Prior to seeding, the seedbed may be loosened to a minimum depth of two inches by discing, harrowing, or other tillage methods. Existing weeds shall be destroyed and incorporated into the soil during seedbed preparation. Ruts and gullies will be filled so the seedbed is continuous. The desired seedbed should be free of large clods, firm, smooth, and weed free.

### **3.2.3 Fertilization**

Sandhills soils generally have little topsoil and disturbance may result in exposed mineral soil, which lacks soil microbes needed for grass establishment. Fertilization will be applied uniformly if necessary to facilitate grass establishment and may include nutrients such as potassium, phosphorus, sulfur, and micronutrients. The local NRCS office will be consulted to determine the proper fertilizer formula and application rates based on the land use and soil type. Soils tests may be conducted as needed to determine site-specific nutrient deficiencies.

### **3.2.4 Erosion Protection**

Erosion control will be managed to achieve erosion that is equal to or less than the surrounding undisturbed area so that water naturally infiltrates into the soil and gullying, headcutting, slumping, and deep or excessive filling is not observed. Erosion protection measures at each restoration area shall be implemented by mulching or straw matting if the grade is greater than three percent (3%) and either of the following conditions is met:

- Temporary disturbance activities are complete, and revegetation will not occur for more than one week; or
- Revegetation is complete.

Mulch will be mature, native grass hay, threshed grain straw, or hay. Hay and straw must be inspected to ensure that it is free of noxious weed seed. Hay harvested late in the season from Conservation Reserve Program plantings of warm-season prairie grasses would be excellent mulching material and will be used if available. Additional options for acquiring native hay and straw include, but are not limited to, purchasing certified hay or straw, specifying that hay or straw be from sources located in

the Sandhills, contracting with local landowners for hay from native meadows, and utilizing hay from local areas restored in the past with native grasses. Mulch shall be applied at a planned rate of approximately 2.0 tons/acre; however, actual rates may vary from site to site depending on variations in local conditions. Weather permitting, mulch will be applied within 48 hours of seeding, with a mulch blowing or spreading machine that will obtain uniform coverage. Mulch can be hand spread on steep slopes where machinery cannot be operated.

Mulch shall be properly anchored to the soil by using a crimping machine weighted sufficiently to push the mulch into the soil. Steep slopes where mulch is applied by hand can be anchored by placing small piles of soil at three-foot intervals over the mulch. Straw or mulch matting that is used for erosion control over seeded areas shall have photodegradable mesh and biodegradable pins to hold matting in place. Metal pins are not allowed. Hydroseeding provides another option for carrying seed and mulch.

### **3.3 Revegetation**

Revegetation procedures described below include seeding dates, seeding methods, seeding rates, seed mixes, and protection of restoration areas. At a minimum, the established plant community will consist of species included in the seed mix and/or desirable species occurring in the surrounding natural vegetation.

#### **3.3.1 Seeding Dates**

Revegetation of the restoration areas will be implemented during late fall or early spring (October 15 to May 15) after soil management is complete and weather and soil conditions permit. Seeding will be avoided when the soil is wet or frozen. To avoid “winter kill,” fall seeding will not occur until soil temperature has cooled sufficiently so that germination is delayed until spring.

#### **3.3.2 Seeding Methods**

On areas accessible to drilling, a grass drill will be used that is equipped for handling “fluffy” seed (appropriate agitator and meters) and has depth control of seed placement from 0.25 to 0.75 inch. Some types of grass drills that may be used include grassland drills, grassland inter-seedeers, hydraulic seeders, and no-till grass drills. The grass drill will be pulled by a utility task vehicle (UTV) or tractor for broadcast seeding operations in most areas. On steep slopes not accessible to field equipment, hand seedbed preparation and seeding followed by raking is an acceptable practice. On smaller areas where drilling is not practical, hand seedbed preparation and hand broadcast seeding followed by raking is an acceptable practice. Appropriate hydro-seeding methods may also be applied to distribute seed.

#### **3.3.3 Seeding Rate**

The seeding rate is based on classifying the areas to be seeded as a “critical area seeding,” which doubles the seeding rate normally used for good field conditions. Seed mix application rates will be on a pure live seed (PLS) basis. This is expressed in PLS pounds per acre and is based on planting a predetermined number of live seeds per square foot (ft<sup>2</sup>) to achieve a specific plant density. The seeding rate for drilled seeding is 60 PLS/ft<sup>2</sup>. The seeding rate for broadcast seeding is double that of drilled seeding, or 120 PLS/ft<sup>2</sup>.

### 3.3.4 Seed Mixes

Seed mixes will be certified noxious-weed free, include species adapted to the restoration site, and be consistent with the vegetation of the area to be restored. Landowner input will be considered. Native species and varieties will be used except in the case of sterile annual companion crops used for quickly establishing cover where there are erosion concerns. There will generally be a minimum of six grass species and 60 percent sod-forming grass species in each seed mixture. Increasing species diversity in seed mixes tends to provide better results, and sod-forming grasses are better for long-term soil stabilization. Bunchgrasses establish much faster than sod-forming grasses, which may take several years to establish. Quick establishment of perennial cover will be enhanced as appropriate by including bunch grasses such as little bluestem to the seed mixture.

Restoration areas included in this plan occur in NRCS-designated Major Land Resource Area (MLRA) 65E – Eastern Sandhills. Table 2 provides details for an example seed mix for semi-arid Sandhills in MLRA 65E. Table 3 provides details for an example seed mix for mesic grasslands and wet meadows in MLRA 65E. Areas where trees are removed will be revegetated with the seed mixes in Tables 2 and 3 that are appropriate for the surrounding area. In some instances, sterile, annual grasses such as a triticale (e.g., QuickGuard) or wheat hybrid (e.g., ReGreen) may be included in the seed mix to help establish a quick stand for erosion control. The cover crop species and application rates to be used will be determined through consultation with the local NRCS office.

**TABLE 2 NEBRASKA EASTERN SANDHILLS (MLRA 65E) SEED MIX, SEMI-ARID SANDHILLS RESTORATION AREAS**

SPECIES NAME	SEEDING RATE IN LBS/AC @ 20 PLS/FT <sup>2</sup>	MINIMUM (%)	MAXIMUM (%)	EXAMPLE SEED MIX (DRILLED)	
				LBS/AC PLS	GRASSES (%)
Sand bluestem <i>Andropogon hallii</i>	7.7	20	40	5.8	25
Blue grama <i>Bouteloua gracilis</i>	1.1	0	10	0.3	10
Prairie sandreed <i>Calamovilfa longifolia</i>	3.2	15	25	1.9	20
Sand lovegrass <i>Eragrostis trichodes</i>	0.7	5	15	0.2	8
Green needlegrass <i>Nassella viridula</i>	4.8	0	5	0.3	2
Switchgrass <i>Panicum virgatum</i>	2.2	5	15	0.7	10
Western wheatgrass <i>Pascopyrum smithii</i>	7.9	0	5	1.2	5
Little bluestem <i>Schizachyrium scoparium</i>	3.4	15	25	1.5	15
Indiangrass <i>Sorghastrum nutans</i>	5.0	5	15	0.8	5
Other native perennials	-	0	5	-	-
TOTAL	-	-	-	12.6 lbs/ac 60.0 PLS/ft <sup>2</sup>	100% (60% sod-forming)

Sources: Stubbendieck 2005, NRCS 2009.

**TABLE 3 NEBRASKA EASTERN SANDHILLS (MLRA 65E) SEED MIX, MESIC GRASSLAND AND WET MEADOW RESTORATION AREAS**

SPECIES NAME	SEEDING RATE IN LBS/AC @ 20 PLS/FT2	MINIMUM (%)	MAXIMUM (%)	EXAMPLE SEED MIX (DRILLED)	
				LBS/AC PLS	GRASSES (%)
Big bluestem <i>Andropogon gerardii</i>	5.3	30	40	5.6	35
Canada wildrye <i>Elymus canadensis</i>	7.6	0	5	1.1	5
Virginia wildrye <i>Elymus virginicus</i>	11.9	0	10	-	-
Switchgrass <i>Panicum virgatum</i>	2.2	5	20	0.7	10
Western wheatgrass <i>Pascopyrum smithii</i>	7.9	0	5	1.2	5
Little bluestem <i>Schizachyrium scoparium</i>	3.4	10	20	1.5	15
Indiangrass <i>Sorghastrum nutans</i>	5.0	15	30	3.0	20
Prairie cordgrass <i>Spartina pectinata</i>	8.3	0	15	2.5	10
Other native perennials	-	0	5	-	-
TOTAL	-	-	-	15.6 lbs/ac 60.0 PLS/ft <sup>2</sup>	100% (80% sod- forming)

Sources: Stubbendieck 2005, NRCS 2009.

### 3.3.5 Restoration Area Protection

Protection from grazing and trampling is generally desirable during the first growing season to allow establishment of the new seedlings. However, implementation of this practice is highly variable because of grazing demands and management practices of each individual landowner. Some of the options for restoration area protection that may be used are described below. Landowner input will be considered.

1. Use of temporary fencing may be necessary in grazed areas to prevent livestock disturbance until such time that vegetation is adequately restored. If temporary fencing is utilized, fencing will be accomplished by installing single-wire electric fence and providing a solar fence charger. For small areas of seeding, this is not practical, so temporary fencing may encompass a larger area that includes several smaller areas. NPPD is responsible for all restoration area protection, which may include NPPD completing installation, maintenance, and removal, as appropriate, of temporary fencing or contracting with landowners for installation, maintenance, and removal of temporary fencing.
2. When newly seeded areas are within a pasture unit that is part of a several pasture rotation system, the pasture that contains the new seeding could be deferred until after the growing season, thus accomplishing a growing season deferment for the newly seeded areas. This would nullify the necessity to erect fencing as suggested under item #1.
3. NPPD may reimburse landowners for forage loss of restoration areas during the first growing season after losses have occurred, and additional years as needed for successful establishment of restoration areas. Forage loss will be calculated using the following variables: pasture productivity, class of animal, time (years), and the going rate for pasture lease per animal unit.

## **4.0 MONITORING**

### **4.1 Effectiveness Monitoring**

Effectiveness monitoring of restoration efforts will include visual assessment and photographs where soil disturbance has occurred, along with sampling basal cover at 45 paired disturbance and reference plots (total of 90 plots) each year. Thirty of the paired disturbance and reference plots (60 total plots) occur in Zone 1, while 15 of the paired plots (30 total plots) occur in Zone 2. However, NPPD will conduct the same monitoring measures for all plots regardless of location. The same paired disturbance and reference plots will be sampled each year until success criteria are achieved. Disturbance plots will be stratified by the grassland types described above so that the number of plots is representative of the number of structures within these habitats, with a minimum of five plots for each type. Effectiveness monitoring will be conducted during late summer for five consecutive years following restoration, unless success criteria are achieved earlier.

Disturbance plots will be established at randomly selected structures at the beginning of effectiveness monitoring, which will be repeated annually until performance standards are met. Each disturbance plot will start three meters from the structure. A meter tape will be laid out at the start and extended 15 meters using a randomly selected azimuth from the structure. A reference plot will be randomly located at an undisturbed area with similar vegetation as the vegetation immediately adjacent to the disturbance plot, in the same grazing pasture, and located no farther than the nearest structures in the right-of-way (ROW) in either direction. The reference plot will follow the same methods as the disturbance plot so they can be used to quantify compliance with performance standards.

Starting at the 1-meter mark of a tape stretched tautly for 15 meters and marked with a sub-meter global positioning system (GPS) unit at the 0- and 15-meter marks, a meter stick will be laid on the ground perpendicular to the tape. The number of centimeters intercepted by basal vegetation along the meter stick will be recorded by species. This will be repeated at one meter intervals for a total of 15 readings, ending at the 15-meter mark. The sub-meter GPS points will ensure that the tape starts and ends at the same location each year during monitoring. Before measuring basal vegetation each year, one photograph will be taken three meters back from the start of each plot (standing at the structure for disturbance plots) and another from three meters back from the end of the tape.

### **4.2 Performance Standards**

Restoration areas must develop a trend of vegetative cover diversity and species dominance that is similar to the naturally occurring plant communities in adjacent reference plots. Restoration areas will be successfully restored if a self-sustaining, diverse, native (or otherwise approved) plant community appropriate to the surrounding landscape is established on the site. At a minimum, the established plant community will consist of species included in the seed mix and/or desirable species occurring in the surrounding natural vegetation. Restoration of permanent vegetative cover will be determined successful when the basal cover is at least 80 percent of the basal cover of the adjacent reference plot.

Erosion of the disturbed area will be equal to or less than the surrounding area and erosion control will be sufficient so that water naturally infiltrates into the soil and gulying, headcutting, slumping, and deep or excessive filling is not observed.

The site will be free of noxious weeds, unless the weeds were present at the site prior to construction or are present in surrounding areas. Noxious weeds do not count towards the 80 percent standard,

though other non-native plant species may count towards the 80 percent standard if they are representative of the immediate area (species occur in a similar proportion in the nearest reference plot and/or adjacent areas in the same pasture), as approved. See Section 5.0 for a discussion of noxious weeds.

Once an area has met the performance standards, the restoration area will be considered restored and monitoring efforts will not be repeated at that plot. If performance standards are not met within the five-year monitoring period, adaptive management measures, as described in Section 4.4, will be implemented and monitoring will be extended until the standards are met. At no point prior to successful restoration will NPPD cease restoration efforts in Zone 1. In Zone 2, NPPD and the landowner may agree to different performance standards in Zone 2.

### **4.3 Effectiveness Monitoring Reporting**

A formal Effectiveness Monitoring Report will be submitted to USFWS only for Zone 1, because that is the area of the project under USFWS jurisdiction through the ITP. The annual report will be prepared following each late-summer monitoring session, which will include results from the effectiveness monitoring and document progress toward achieving the performance standards. If performance standards are met, the fifth annual report (end of five-year monitoring) will be the final report on restoration effectiveness. If performance standards are not met within the initial five-year monitoring period, adaptive management measures will be implemented and post-construction restoration effectiveness monitoring will be extended until the standards are met. Any data collected for Zone 2 will be kept by NPPD to document restoration success.

### **4.4 Restoration Adaptive Management**

Formal restoration adaptive management described below is only applicable to Zone 1, because that is the area of the project under USFWS jurisdiction through the ITP. However, NPPD will continue to work with landowners to ensure the success of restoration in Zone 2 should the efforts not meet the performance standards described above. Adaptive management may be implemented during the course of vegetation restoration if, after five years, restoration has not met the 80 percent coverage objective described in Section 4.2. As described earlier, funding to complete adaptive management and ensure the successful restoration of Zone 1 will be assured by an Escrow Account. The Escrow Account will not be applied in Zone 2. NPPD and the landowner may agree to different adaptive management steps or measures than those described here to ensure successful restoration in Zone 2. The following presents a breakdown of the four adaptive management steps and how they may be applied to restoration efforts.

- 1. Identifying areas of uncertainty and questions that need to be addressed to resolve the uncertainty.* Areas of uncertainty associated with restoration include the effectiveness of restoration activities and the duration it may take for restoration activities to meet the success criteria. It is possible that restoration may not meet success criteria identified in Section 4.2 within five years if the Sandhills experience prolonged drought during restoration efforts.
- 2. Developing alternative management strategies and determining which experimental strategies to implement.* Restoration activities will be based on guidance and recommendations from local NRCS offices, landowners, and other restoration experts. Restoration efforts in the Sandhills have been successfully completed on previous development projects and lessons learned from previous efforts will be incorporated into the R-Project restoration. Alternative management strategies will be developed in coordination with NRCS offices, landowners, and restoration experts in the event

that initial restoration efforts do not meet success criteria. Alternative management strategies may include additional seeding, alternate seed mixes, or alternate methods of applying seed.

3. *Integrating a monitoring program that is able to acquire the necessary information for effective strategy evaluation.* Effectiveness monitoring methods identified in Section 4.1 were designed to be implemented in association with adaptive management. Effectiveness monitoring will quantify the basal cover of areas undergoing restoration efforts and compare those areas to adjacent control plots.
4. *Incorporating feedback loops that link implementation and monitoring to a decision-making process that result in appropriate changes in management.* Effectiveness monitoring will provide quantifiable data that would support decision making when considering alternative management strategies. Vegetation in the Sandhills varies from year to year given the amount of precipitation. With that in mind, effectiveness monitoring allows for five years of monitoring for the restoration efforts to meet the success criteria before alternative management strategies will be applied. Results of effectiveness monitoring in Zone 1 will be included in the annual reports to the USFWS as described in Section 4.3. NPPD will coordinate with USFWS, should the results of effectiveness monitoring indicate that alternative management strategies are necessary. Results of any effectiveness monitoring in Zone 2 will be kept by NPPD.

Some adaptive management options will be developed in advance of a determination that performance standards have not been met. For the most part, adaptive management will not be applied until Year 5 of monitoring, recognizing that annual weather patterns greatly influence restoration. However, annual monitoring will note any areas with conditions to be addressed prior to Year 5, if necessary (e.g., a blowout begins to form).

## 5.0 NOXIOUS WEEDS

The restoration areas will be managed to be free of noxious weeds, unless the weeds were present at the site prior to construction or are present in surrounding areas. The following section describes the noxious weed species that are known to the Sandhills and measures that will be implemented to prevent weed infestations.

### 5.1 Noxious Weed Species

Noxious weed species are regulated federally by Animal and Plant Health Inspection Service (7 Code of Federal Regulations [CFR] Part 360; APHIS 2010) and at the state level under the Noxious Weed Control Act by the Nebraska Department of Agriculture (NDA; Neb. Rev. Stat. §§ 2-945.01 to 2-968). Noxious weeds are legally defined in a given jurisdictional entity for prioritizing weed prevention and control efforts to those species that are considered to have the greatest negative economic and ecological impacts. Species included on these lists are nearly always non-native and have demonstrated invasive characteristics. Table 4 lists all noxious weed species for the Sandhills. Negative impacts from noxious weeds include habitat degradation of native prairies, wetland, and riparian habitats; decreased crop and livestock production; and land devaluation and associated tax revenue loss. Nebraska's Noxious Weed Control Act delegates to the NDA and Nebraska's counties the authority to require landowners to effectively control noxious weeds on their lands.

**TABLE 4 NOXIOUS WEEDS IN THE R-PROJECT COUNTIES**

COMMON NAME <sup>1</sup>	SCIENTIFIC NAME <sup>1</sup>	STATUS <sup>1</sup>	COUNTY OCCURRENCE IN THE PERMIT AREA <sup>2</sup>
Musk thistle	<i>Carduus nutans</i>	State Noxious	Blaine, Brown, Garfield, Holt, Lincoln, Logan, Loup, Rock, Wheeler (Roeth et al. 2003)
Diffuse knapweed	<i>Centaurea diffusa</i>	State Noxious	Brown, Holt, Rock, Wheeler (Gaussoin et al. 2010)
Spotted knapweed	<i>Centaurea stoebe</i> ssp. <i>micranthos</i>	State Noxious	Brown, Holt, Rock, Wheeler (Gaussoin et al. 2010)
Canada thistle	<i>Cirsium arvense</i>	State Noxious	All counties except Blaine (Wilson 2009)
Bull thistle	<i>Cirsium vulgare</i>	County Noxious – Rock	Blaine, Loup, Wheeler
Houndstongue	<i>Cynoglossum officinale</i>	State Watch List (Category 2)	Holt
Leafy spurge	<i>Euphorbia esula</i>	State Noxious	All counties (Sandell and Knezevic 2001)
Japanese knotweed (cultivars and hybrids)	<i>Fallopia japonica</i> and hybrids	State Noxious	Garfield (NWCA 2012)
Broadleaf pepperwort/ Perennial pepperweed	<i>Lepidium latifolium</i>	State Watch List (Category 2)	Lincoln
Purple loosestrife (cultivars and hybrids)	<i>Lythrum salicaria</i>	State Noxious	Brown, Holt, Lincoln, and Rock (Knezevic 2003)
Eurasian water-milfoil	<i>Myriophyllum spicatum</i>	State Watch List (Category 2)	Wheeler
Eurasian common reed (Phragmites)	<i>Phragmites australis</i> ssp. <i>australis</i>	State Noxious	Blaine, Brown, Garfield, Holt, Lincoln, Rock, Thomas, Wheeler (Knezevic et al. 2008)
Sulphur cinquefoil	<i>Potentilla recta</i>	State Watch List (Category 2)	Blaine, Brown, Garfield, Holt, Wheeler

COMMON NAME <sup>1</sup>	SCIENTIFIC NAME <sup>1</sup>	STATUS <sup>1</sup>	COUNTY OCCURRENCE IN THE PERMIT AREA <sup>2</sup>
Saltcedar	<i>Tamarix ramosissima</i> and hybrids	State Noxious	Lincoln, Rock (Wilson and Knezevic 2006)

Sources:

<sup>1</sup>APHIS 2010 (no federal noxious species occur in R-Project counties); NDA 2014.

<sup>2</sup> Kaul et al. 2006 in addition to any citations listed.

## 5.2 Preventative Measures

NPPD recognizes that prevention is the most effective approach to noxious-weed management. The following preventive measures will be implemented where practicable to minimize the spread of noxious weeds:

- Inspect material sources (e.g., soil stockpiles, mulches) and ensure that they are free of visible noxious weeds before use and transport. Treat weed-infested sources to eradicate plant parts, and strip and stockpile contaminated material before any use of pit material.
- Prevent weed establishment by minimizing driving through noxious-weed-infested areas when the spread of seeds or propagules is most likely.
- Before construction activities start, identify sites where construction vehicles, temporary wetland matting, and equipment can be cleaned. Site cleaning stations in construction yard/staging areas in noxious weed-free designated areas at least 100 feet from streams and wetlands. Place barriers where needed around each cleaning station to prevent migration of wastewater and/or sediments into water bodies.
- At cleaning sites, use a high-pressured washer or air compressor to clean construction vehicles, temporary matting, and equipment if they have been in known areas containing noxious weeds before entering and leaving the ROW. Clean construction vehicles and equipment when entering each county for the first time.
- Collect material resulting from vehicle and temporary matting cleaning and dispose of at an approved landfill if doing so is determined to be necessary and appropriate.
- Engage landowners regarding any concerns over noxious weeds.
- Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing and equipment.

## **6.0 HERBICIDE USE**

Herbicides will be used to control noxious weeds in restoration areas until criteria for restoration of vegetative cover in disturbed areas are met. Once vegetative cover has been successfully restored in disturbed areas, responsibility for on-going control of noxious weeds on the land, including land within the ROW, reverts back to the landowner. The following sections describe landowner notification, noxious-weed treatment, stump treatment, herbicide application and handling (applies to both noxious-weed and stump treatment), herbicide spills and cleanup, and herbicide-use reporting.

### **6.1 Noxious Weed Treatment**

NPPD will conduct herbicide treatments on all noxious weeds listed in Table 4 until criteria for restoration of vegetative cover in disturbed areas are met. Restricted use herbicides would be approved by USFWS and Nebraska Game and Parks Commission (NGPC) prior to use in restoration areas. Restricted use herbicides are not available for purchase or use by the general public and must be applied by a certified applicator. Special attention would be given to state-designated noxious weeds (versus county-listed noxious and state-watch-list noxious weeds). Where there is a pre-existing high occurrence of noxious weeds in or adjacent to the R-Project, NPPD will control noxious weeds within areas disturbed by the project until criteria for restoration of vegetative cover are met. NPPD will not control weeds beyond that required for project-specific restoration efforts. Once vegetative cover has been successfully restored in restoration areas, responsibility for on-going control of noxious weeds on the land becomes the responsibility of the landowner.

NPPD would consult with the USFWS and NGPC in situations where herbicide treatment may not be an appropriate option (e.g., near known special-status species locations). Alternative treatments (e.g., biological controls, mechanical treatments) may be implemented if recommended by the appropriate agency and agreed by the landowner where herbicide treatment is not an option. Timing of treatment for noxious weeds would vary depending on species targeted, and multiple treatments may be required in a given year to effectively treat all noxious weeds.

### **6.2 Stump Treatment**

NPPD's intent is to establish and maintain a ROW that is primarily grass and low-growing herbaceous plants with little or no woody growth (excluding cultivated land). Tree and vegetation control for the R-Project will be maintained for the entire ROW (generally 100 feet on each side of center line) (clearance width). Trees located off the clearance width that upon falling would come within 15 feet of the line conductor's worst case sag position, i.e., danger trees, will also be removed under this specification.

All tree stumps cut for ROW and danger tree clearing will be treated with herbicides to prevent regrowth. Vegetation control shall be accomplished by cutting all woody growth and applying herbicide(s) to the stumps to prevent re-growth. Woody vegetation that is less than eight feet in height does not have to be cut but can be treated with herbicide(s) and left in place. Herbicide treatment will consist of spraying or painting the cut surfaces of freshly cut stumps or stubs in accordance with the manufacturer's recommendations. The cambium area next to the bark is the most vital area to chemically treat. Painting or spraying should be performed the same day that brush and tree cutting removal work is completed, but in no event later than the manufacturer's recommendations.

### 6.3 Herbicide Application and Handling

Herbicide application and handling procedures follow numerous federal and state regulations. The following measures for herbicide application and handling will be required for all herbicide treatments:

- All herbicide label instructions (<http://www.cdms.net/Label-Database>) will be followed for all herbicide applications.
- NPPD will notify landowners by mail of pending herbicide application on their property. Follow-up landowner notification(s) either in person or by phone will be conducted at least 72 hours prior to working on private property. All landowner notifications will be documented as described in *Herbicide Use Reporting* below. If livestock is in the area or will be in the area, the landowner will be notified and their permission obtained before herbicide treatment is started.
- Only Nebraska Certified Pesticide Applicators will be used for herbicide application. All herbicide applicator personnel shall go through the HCP Worker Educational Awareness Program (WEAP) and receive training on the requirements of NPPD's Transmission Vegetation Management Program and Imminent Threat Communication Process before any treatments are conducted. See Section 6.2.1 of the HCP for a description of the WEAP.
- Copies of Material Safety Data Sheets for materials to be used on the jobsite will be available at the jobsite. Employees will be provided with adequate training as to the hazards associated with materials used on the jobsite and protection measures as specified in 29 CFR Part 1910.1200.
- Herbicide application and handling will avoid surface waters. In areas requiring herbicide treatment in the vicinity of surface waters, only herbicides approved for aquatic use will be used.
- When applying herbicides near waters of the State of Nebraska, the *Endangered and Threatened Species Standard Procedures for General NPDES Permit Number NEP 100000 for Pesticide Applications To, Over, or Near Waters of the State of Nebraska* will be used.
- Application of herbicide treatment during cold months when the ground may be continuously frozen or during periods when marsh or low ground cover may be or is about to be flooded will be delayed until conditions will allow adequate herbicide penetration to the roots in accordance with the manufacturer's recommendations.
- Safety equipment suitable to the hazards involved and confirming to the safety regulations on the project will be used when applicable.
- Weather and wind conditions in the area and the location of other vegetation (e.g., special status plants, cropland) in the area near or adjacent to the treatment site will be identified before applying herbicides. Herbicides will be applied in a manner that prevents drift or runoff so that no damage is done to other vegetation or listed species in any areas adjacent to or in the vicinity of the treatments.

- Herbicides that could drift should be applied using a large droplet size in order to minimize drift. Nozzles with higher rated flows and use of the lowest recommended spray pressure for a nozzle will produce larger droplets.
- Landowner-planted trees and shrubs within the clearance width that have been approved to stay will not be damaged.
- Equipment will be cleaned and rinsed in an area where the rinse water will not enter water bodies (lakes, ponds, rivers, streams, etc.) or contaminate groundwater.
- NPPD will comply with all applicable federal, state, and local laws and regulations concerning the use storage, proper labeling, transportation, and disposal of hazardous materials. These substances include but are not limited to insecticides, herbicides, fungicides, rodenticides, petroleum products, wood preservatives, and solvents.
- Herbicide treatments for noxious weeds will be completed during the day time. This will eliminate the possibility that herbicides could be applied directly to an ABB within the Permit Area because individuals would be underground when herbicides are applied.

## **6.4 Herbicide Spills and Cleanup**

The following measures will be followed in the event of an herbicide spill. Additional details regarding spills and cleanup will be provided in the Spill Prevention and Response Plan. The R-Project-specific Spill Prevention and Response Plan will be developed by the selected construction contractor.

- NPPD will report to all appropriate landowners or agencies immediately if there are any herbicide spills, unplanned non-target herbicide applications, unusual occurrences of drift, unforeseen effects on wildlife or other resources, or any other situation that may affect public welfare. Herbicide clean-up and disposal is the responsibility of NPPD and will comply with all federal, state, and county requirements.
- All herbicide applicators will keep a spill kit in their vehicle. At a minimum the following items are suggested: shovel, 10 pounds of absorbent material (cat litter, soil, sawdust, or absorbent clay), large polyethylene bags with ties, safety goggles, rubber gloves, protective overalls, rubber boots, five-gallon pail, respirator and cartridges suited to the composition of the herbicide(s), dust pan, shop brush, portable eyewash, blank labels, first aid kit, apron, soap, water, and phone numbers of appropriate emergency personnel and CHEMTREC.

## **6.5 Herbicide Use Reporting**

Herbicide use reporting will be conducted daily for each application of herbicide treatment, as follows:

- NPPD's Form K142 – Pesticide Use Report will be completed for each application of herbicide treatment.

- NPPD's Form N159 – Vegetation Management Contractor's Daily Report shall be completed on a daily basis until criteria for restoration of vegetative cover in disturbed areas are met. All landowner notifications shall be documented in Form N159.

## 7.0 REFERENCES

- Animal and Plant Health Inspection Service (APHIS). 2010. Federal Noxious Weed List. Riverdale, MD. Available at [http://www.aphis.usda.gov/plant\\_health/plant\\_pest\\_info/weeds/downloads/weedlist.pdf](http://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/weedlist.pdf). Accessed September 22, 2014.
- Gaussoin, R.E., S.E. Knezevic, and J.L. Lindquist. 2010. Noxious Weeds of Nebraska: Spotted and Diffuse Knapweed. University of Nebraska-Lincoln Extension EC171. Available URL: <http://www.neweed.org/NeWeeds/knapweed.pdf>. Accessed August 19, 2014.
- Kaul, R.B., D. Sutherland, and S. Rolfsmeier. 2006. The Flora of Nebraska. School of Natural Resources, University of Nebraska-Lincoln. 966 pp.
- Knezevic, S.Z. 2003. Noxious Weeds of Nebraska: Purple Loosestrife. Historical Materials from University of Nebraska-Lincoln Extension EC03-177. Paper 1707. Available URL: <http://digitalcommons.unl.edu/extensionhist/1707>. Accessed August 19, 2014.
- Knezevic, S.Z., A. Datta, and R.E. Rapp. 2008. Noxious Weeds of Nebraska: Common Reed. University of Nebraska-Lincoln Extension EC-166. Available URL: <http://www.neweed.org/NeWeeds/phrag.pdf>. Accessed August 19, 2014.
- Natural Resources Conservation Service (NRCS). 2009. Range Planting Standard, Section IV of the Field Office Technical Guide: Practice Specifications. S-550-1. <https://efotg.sc.egov.usda.gov/references/public/NE/NE550s.pdf>. Accessed July 6, 2016.
- NatureServe. 2009. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA, U.S.A. Data current as of 06 February 2009.
- Nebraska Department of Agriculture (NDA). 2014. Invasive Plants Watchlist: 2014. Available URL: <http://www.neweed.org/Documents/Watchlist.pdf>. Accessed September 4, 2014.
- Nebraska Game and Parks Commission (NGPC). 2015. Approved Chemical List 2015. Lincoln, Nebraska. Received June 2, 2016.
- Nebraska Weed Control Association (NWCA). 2012. Fact Sheet: Knotweed “Alliance”. Available URL: <http://www.neweed.org/NeWeeds/knotweed.pdf>. Accessed August 19, 2014.
- Roeth, F., S.R. Melvin, and I.L. Schleufer. 2003. Noxious Weeds of Nebraska: Musk Thistle. Historical Materials from University of Nebraska-Lincoln Extension EC03-176. Paper 1708. Available URL: <http://digitalcommons.unl.edu/extensionhist/1708>. Accessed August 19, 2014.
- Sandell, L.D., and S. Knezevic. 2001. Noxious Weeds of Nebraska: Leafy Spurge. University of Nebraska-Lincoln Extension EC174. Available URL: <http://www.neweed.org/NeWeeds/spurge.pdf>. Accessed August 19, 2014.
- Schneider, R., K. Stoner, G. Steinauer, M. Panella, and M. Humpert (Eds.). 2011. The Nebraska Natural Legacy Project: State Wildlife Action Plan. 2<sup>nd</sup> ed. The Nebraska Game and Parks Commission, Lincoln. 344 pages. Available URL:

- [http://outdoornebraska.ne.gov/wildlife/programs/legacy/pdfs/NE %20Natural %20Legacy %20Project %20- %202nd %20edition.pdf](http://outdoornebraska.ne.gov/wildlife/programs/legacy/pdfs/NE%20Natural%20Legacy%20Project%20-%202nd%20edition.pdf). Accessed August 18, 2014.
- Stubbendick, J., and K.L. Kotas. 2005. EC05-170 Common Grasses of Nebraska: Prairies, Rangelands, Pasturelands. *Historical Materials from University of Nebraska-Lincoln Extension*. Paper 4786. <http://digitalcommons.unl.edu/extensionhist/4786>. Accessed July 6, 2016.
- United States Geological Survey (USGS). 2013. The National Map LANDFIRE: LANDFIRE National Existing Vegetation Type layer. Issue LANDFIRE 2010 (lf\_1.2.0). Wildland Fire Science, Earth Resources Observation and Science Center, Sioux Falls, SD. Updated March 31, 2013. Available at <http://www.landfire.gov>. Accessed September 17, 2014.
- Wilson, R. 2009. Noxious Weeds of Nebraska: Canada Thistle. University of Nebraska-Lincoln Extension EC171. Available URL: <http://www.neweed.org/NeWeeds/Canada.pdf>. Accessed August 19, 2014.
- Wilson, R. and S. Knezevic. 2006. Noxious Weeds of Nebraska: Saltcedar. University of Nebraska-Lincoln Extension EC164. Available URL: <http://www.neweed.org/NeWeeds/saltcedar.pdf>. Accessed August 19, 2014.