

**Savage Bakken Petroleum Hub
Interconnect Reclamation
Williams County, North Dakota**

Prepared for:
Savage Bakken Connector Incorporated

Prepared by:
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Reclamation Plan



June 2017



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CHAPTER 1 INTRODUCTION

KLJ was contracted by Savage Bakken Connector, Incorporated (Savage) to complete a reclamation plan for the Savage Bakken Petroleum Hub Interconnect pipeline project. The reclamation plan will consist of a grass seed design, grass establishment guidelines, and noxious weed control. The grass seed design will have two main objectives: meeting North Dakota Natural Resources Conservation Service's (NRCS) standards and specifications and providing optimum erosion control.

The northern two-thirds of the pipeline corridor occur on active farmland and industrial areas. The farmland will be reclaimed to its previous contours and reseeded at the discretion of the landowner. The industrial areas (rail hub, parking lot, etc.) will be reclaimed to their previous use. The industrial areas were not previously vegetated; therefore, will not be seeded. The southern portion of the pipeline is located within an idle grassland between railroad tracks and Highway 1804. Please refer to **Figure 1, Reclamation Overview Map**. The grassland area will be reclaimed to its previous contours and reseeded to grasses similar to the adjacent areas. The grassland reclamation area will be the focus of the rest of this document. The grassland reclamation site (area to be reseeded) is located within the NRCS defined *clayey subsoil* and *loam* Forage Suitability Groups (FSG). Please refer to **Figure 2, Grassland Reclamation Map**.



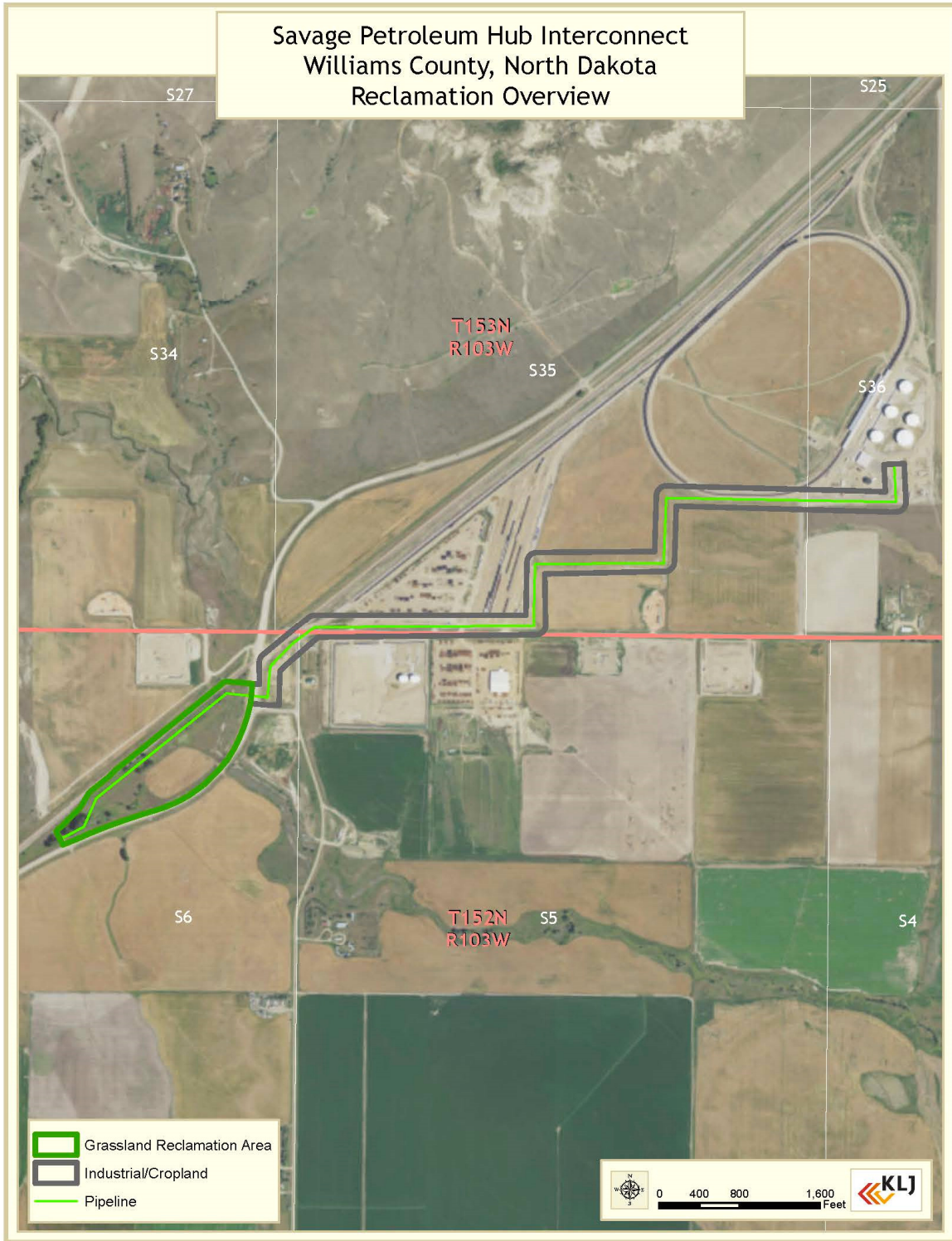


Figure 1, Reclamation Overview Map



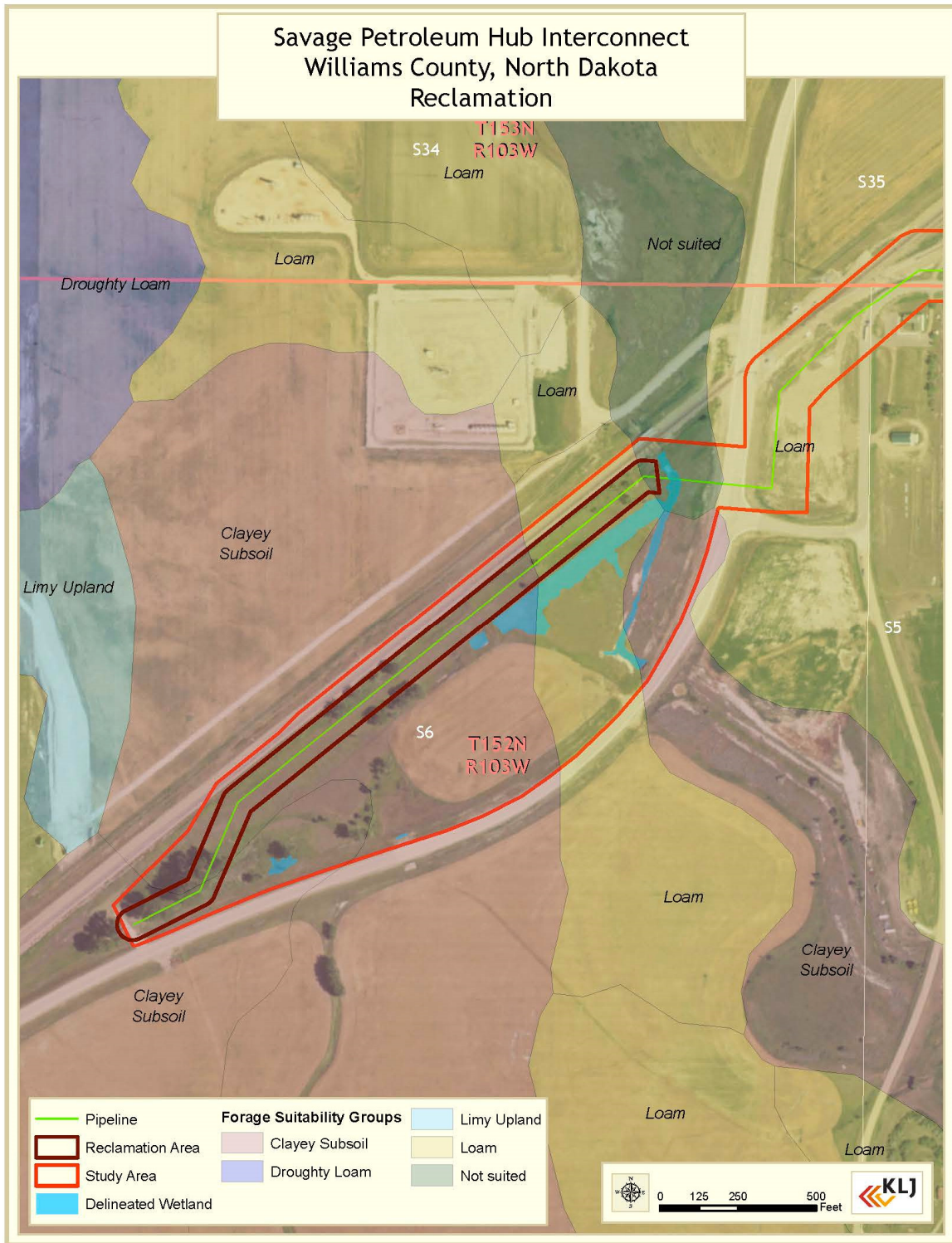


Figure 2, Grassland Reclamation Map



CHAPTER 2 GRASS SEED DESIGN

The proposed grass seed mixture, based on Pure Live Seed (PLS), was designed according to the North Dakota NRCS standards and specifications by Mike Gerbig, Rangeland Management Specialist, from the NRCS Dickinson Area Office. Please refer to attached email correspondence **Reclamation Plan for Savage Pipeline**. Species selected for the grass seed mixture are compatible with the NRCS FSGs within the grassland reclamation site.

The seed mixture, provided by NRCS, consists of two introduced cool-season grasses with a total PLS application rate of 10.9 lbs./acre. Please refer to **Table 1, NRCS Seed Mixture** for the grass seed design. This grass mixture should be quick to establish and provide adequate erosion control.

Preliminary environmental field surveys were completed in September 2016. Crested wheatgrass (*Agropyron cristatum*) and smooth brome grass (*Bromus inermis*) were recorded as the dominant vegetation within the grassland reclamation site. Crested wheatgrass will be used as part of the seed mixture; however, smooth brome grass has recently been listed as an invasive species and no longer meets ND NRCS standards and specifications. Pubescent wheatgrass (*Thinopyrum intermedium*) will be planted in its place since they have similar rhizomatous growth forms.

Crested wheatgrass is a long-lived cool-season bunch grass that is known for its drought tolerance and ease of establishment. The fairway variety has less tendency to form large clumps with age. Pubescent wheatgrass was recommended for the seed mixture since it is a fast-growing, rhizomatous, sod-forming grass that would provide excellent erosion control. The Manska variety is recommended due to its drought tolerance and improved seedling vigor.

Table 1, NRCS Seed Mixture

SPECIES	SEEDING RATE	PERCENT IN MIX	TOTAL ACRES	TOTAL LBS. PLS NEEDED
GRASS SEED DESIGN				
Crested Wheatgrass Fairway Variety	4.5 lbs. PLS/acre	50%	5.5	24.8 lbs. PLS
Pubescent Wheatgrass Manska Variety	6.4 lbs. PLS/acre	50%	5.5	35.2 lbs. PLS



CHAPTER 3 GRASS ESTABLISHMENT GUIDELINES

3.1 Seeding Dates

The recommended seeding dates are based on the NRCS Herbaceous Vegetation Establishment Guide. These dates are encouraged to ensure optimum growing conditions and establishment of adventitious roots in order for the plant to survive stressful environmental conditions, such as hot, dry summers and cold, open winters. The seeding date recommendations in North Dakota are based on location and species type. Please refer to **Figure 3, North Dakota Seeding Date Map** and **Table 2, Seeding Date Recommendations**.

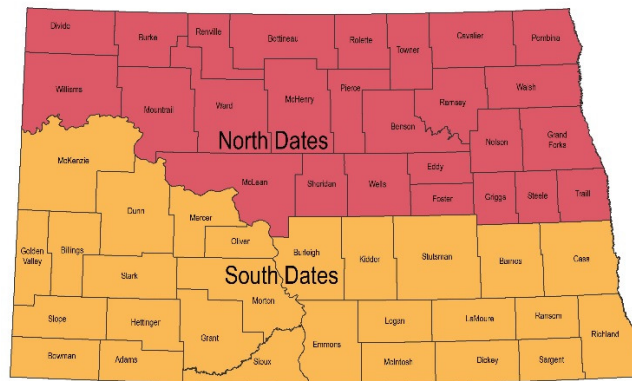


Figure 3, North Dakota Seeding Date Map

Table 2, Seeding Date Recommendations

SPECIES TYPE AND SEASON OF PLANTING	SEEDING DATES	
	NORTH	SOUTH
COOL-SEASON SPECIES		
Spring	Prior to May 20	Prior to May 10
Late Summer¹	August 10 to September 1	August 10 to September 15
Late Fall	Once soil temperatures drop to 40°F for 5 consecutive days	Once soil temperatures drop to 40°F for 5 consecutive days
WARM-SEASON SPECIES		
Spring	May 10 to June 25	May 10 to June 25
WARM/COOL-SEASON MIX		
Spring	May 1 to June 15	April 20 to June 1

¹ If legumes are part of the mixture, such as alfalfa, seed by August 25 for winter survival.



3.2 Seedbed Preparation

The seedbed should be firm in order to achieve the desired seeding depth. A firm seedbed is achieved when an adult footprint is barely visible. A loose, fluffy seedbed will result in seeds being placed too deep, reducing the germination rate. The seedbed should also be free of competing vegetation. Any weeds present should be controlled with herbicide prior to seeding.

3.3 Seed Quality Requirements

All seed must meet the requirements of North Dakota state seed laws and regulations. All seed needs to be tested by a recognized laboratory for germination, purity, and weed seed percentage within 12 months of the delivery date in order to accurately calculate PLS. Noxious weeds should not be listed on any seed tags. The North Dakota NRCS Herbaceous Establishment Guide encourages using named varieties when available and to limit the origins of non-varietal (common) seed to North Dakota, South Dakota, Nebraska, Montana, Minnesota, Wyoming, and Canada. A copy of the certification including the purity and viability of the seed mixture shall be supplied to the Project Manager.

$$\text{PLS} = (\text{Percent Purity} \times \text{Percent Germination})/100$$

3.4 Seed Depth

Seeding depth is one of the major limiting factors for successful establishment of vegetation. Light plays a key role in the germination of many species; therefore, it is vital that seeds be planted at a shallow depth of ¼ to ½ inch. It is common to see a few seeds at the soil surface in properly seeded areas. A grass drill is the recommended seeding implement. Steep slopes may require broadcasting the seed with hand-held spreaders or with ATV mounts, followed up by a drag implement to provide light soil cover.

3.5 Cover Crops

A cover crop is recommended if the area is ready to be seeded but the recommended seeding date for the species type has passed. The cover crop's purpose is to reduce erosion, prevent weeds, and enhance soil biology making a more favorable seedbed for the permanent grass seeding. The species selected for a cover crop mixture, depends on the time of year it is planted. North Dakota NRCS recommends a predominately cool-season mixture if planting would occur from April 1 through June 15 or August 15 through September 20. A predominately warm-season mixture should be used if planting would occur from June 15 through August 15. Please refer to **Table 3, Recommended Cover Crop Mixes for Each Season.**



Table 3, Recommended Cover Crop Mixes for Each Season

COVER CROP SEEDING DATES		
SPRING COOL-SEASON MIX April 1 to June 15	SUMMER WARM-SEASON MIX June 15 to August 15	FALL COOL-SEASON MIX August 15 to September 15
Oat—60 lbs/acre	Sudan grass—10 lbs/acre	Winter Triticale/Wheat—75 lbs/acre
Field Pea—40 lbs/acre	Cowpea or Soybean—25 lbs/acre	Field Pea—30 lbs/acre
Turnip—2 lb/acre	Radish—2 lb/acre	Radish—2 lb/acre

Cover crops should be planted one-inch deep. Cover crops will need to be hayed prior to winter to remove excess residue and a herbicide should be applied to any volunteer cover crops prior to the permanent grass seeding. The permanent grass mixture can be seeded into the terminated cover crop residue with a grass drill. Tillage is not recommended.

3.6 Weed Control

Any type of soil disturbance could draw weed seeds to the soil surface. Bare ground gives opportunistic annual weeds a chance to germinate and reproduce by seed in a short amount of time; consequently, adding to the weed seed bank. Weeds can be controlled by clipping the tops of the weeds or applying herbicide before seed set or maturity. When using herbicides to control weeds, be sure to follow the manufacturer’s label. Noxious weeds must be controlled in accordance with North Dakota State Law. Please refer to **Chapter 4 Noxious Weeds**.

Weed control during the establishment phase should be limited to clipping. If clipping is not possible because of limited access, selective spot spraying would be recommended.



CHAPTER 4 NOXIOUS WEEDS

The North Dakota Century Code 4.1-47-02 requires landowners to control the spread of noxious weeds. The State of North Dakota has designated 11 species as noxious weeds:

- » Absinth wormwood (*Artemisia absinthium*)
- » Canada thistle (*Cirsium arvense*)
- » Dalmatian toadflax (*Linaria dalmatica* subspecies *dalmatica*)
- » Diffuse knapweed (*Centaurea diffusa*)
- » Leafy spurge (*Euphorbia esula*)
- » Musk thistle (*Carduus nutans*)
- » Purple loosestrife (*Lythrum salicaria*, *Lythrum vigatum* and all cultivars)
- » Russian knapweed (*Acroptilon repens*)
- » Saltcedar (*Tamarix chinensis*, *Tamarix parviflor* and *Tamarix ramosissima*)
- » Spotted knapweed (*Centaurea stoebe* subspecies *micranthos*)
- » Yellow toadflax (*Linaria vulgaris*)

Noxious weeds are plants that are difficult to control, easily spread, and injurious to public health, crops, livestock, land and other property.

In addition to the state-listed noxious weeds, counties and cities have the option to add additional noxious weeds for enforcement in their jurisdiction. Williams County has not designated any additional species as noxious weeds for 2017. Canada thistle and leafy spurge were the only noxious weed species identified during field surveys, and were only observed in the grassland area. Noxious weeds have the potential to germinate and invade any portion of the pipeline disturbance area; however, there is an increased probability of invasion in areas where noxious weeds were identified within or adjacent to the project disturbance area. Please refer to **Figure 3, Noxious Weed Map**.

Canada thistle is a long-lived perennial with alternate dark green leaves that have spiny-toothed edges. It has multiple, ¾ inch diameter, purple flower heads that appear on the upper stems. Flowering occurs from June to September and can produce up to 80 seeds per head, which typically remain on the plant until winter. Canada thistle has an extensive root system, often reaching soil depths of 10 feet or greater and can grow laterally 12 to 15 feet per year. The lateral roots produce new shoots whenever conditions are favorable. Herbicide control is most effective when it is applied to the rosette form of Canada thistle in the early summer or fall. Repeated mowing can also reduce Canada thistle infestations. It is important to mow as close to the soil surface as possible and before the flowers start showing color, so they can't produce any viable seed. Several mowings per year would likely be needed.

Leafy spurge is a long-lived perennial that produces several upright stems with numerous, smooth, bluish-green, linear-shaped leaves. It produces a cluster of lime-green bracts surrounding the true flowers, appearing in late May and early June. An average of 140 seeds are produced per stem, which are borne in pods. The pods burst when mature, throwing seeds up to 15 feet away from the parent plant. These seeds can remain viable in the soil for at least eight years. Leafy spurge also has an extensive root system with numerous buds capable of spreading up to three feet per year through new shoots. Leafy spurge control requires long-term management. Typically, less than six inches of the root system is destroyed from control efforts regardless of the control method. North Dakota State University research suggests using multiple control methods for reducing or eradicating leafy spurge.



Herbicide control is most effective when applied in June or early to mid-September. Grazing and introducing flea beetles can be effective control methods for leafy spurge; however, these options may not be feasible due to the small amount of leafy spurge currently present. Mowing and burning are not effective in controlling leafy spurge; however, may result in more uniform regrowth to increase herbicide success.

Specific herbicide recommendations for controlling Canada thistle and leafy spurge can be obtained from Williams County Weed Control. Jerry Summerville is the Williams County Weed Officer and can be contacted at jerrys@co.williams.nd.us or (701) 580-1628. Please refer to attached email correspondence **Noxious Weed Guidance for Reclamation Plan**.



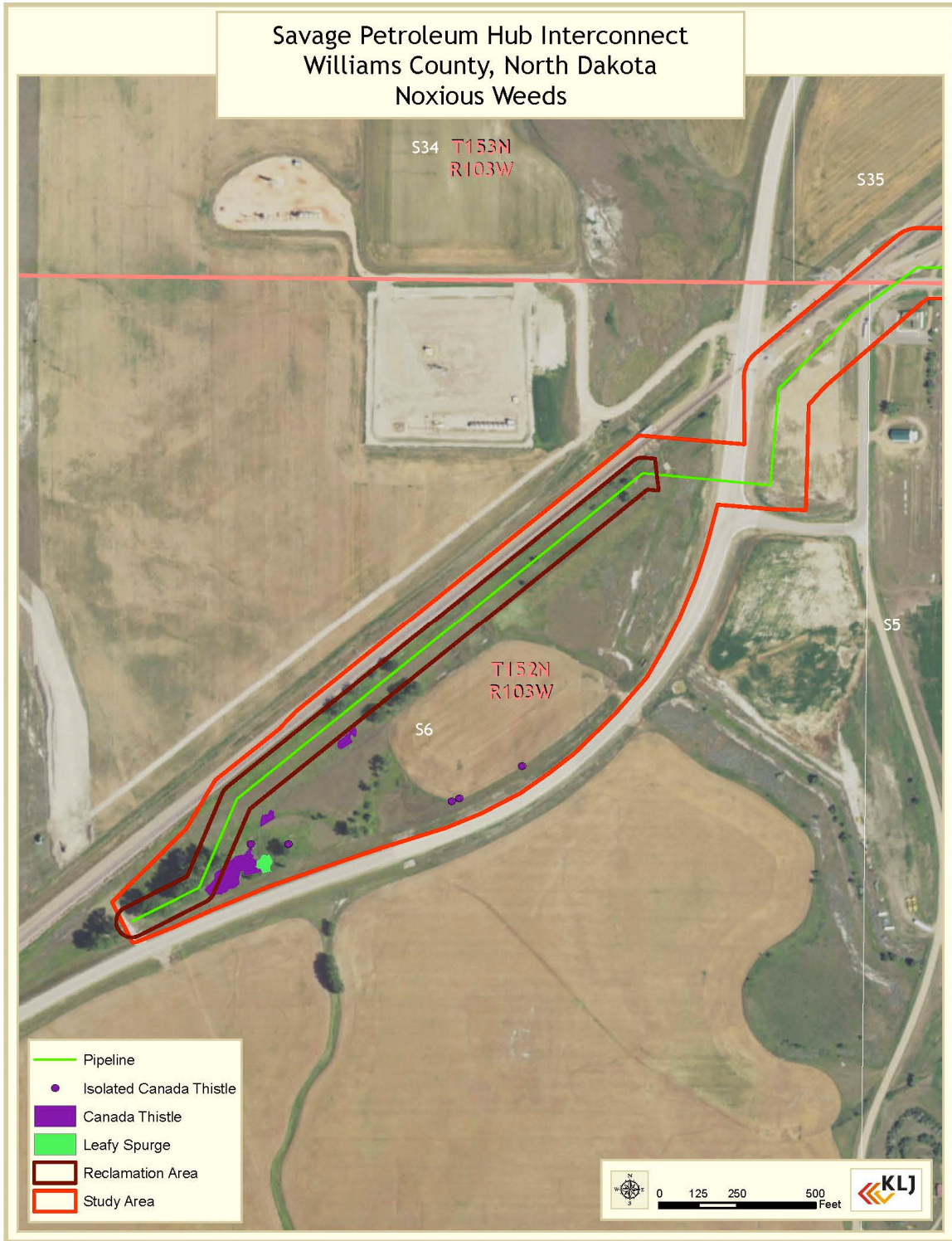


Figure 4, Noxious Weed Map



CHAPTER 5 REFERENCES

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- U.S. Department of Agriculture, Natural Resources Conservation Service. Herbaceous Vegetation Establishment Guide. 2015. FOTG—Section I—Reference Subject—Plant Materials.
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From: Gerbig, Mike - NRCS, Dickinson, ND
To: [Corie Ereth](#)
Subject: RE: Reclamation Plan for Savage Pipeline Thursday, June 15, 2017
Date: 10:24:29 AM
Attachments:

Hey Corie,

Since the area is currently dominated by Crested Wheatgrass and Smooth Brome I would recommend that introduced species be reseeded. Via the Critical Area seeding (342) specification I would recommend a mixture of 50% Crested Wheatgrass (Fairway variety) and 50% Pubescent Wheatgrass (Manska variety). The rationale for the Pubescent Wheatgrass is to have at least 50% rhizomatous species in the mix for erosion control. With that mixture the PLS seeding rate per species would be Crested Wheat at 4.50 PLS/Ac and Pubescent Wheatgrass at 6.40 PLS/Ac. If you have any questions please feel free to let me know.

Mike Gerbig
NRCS Rangeland Management Specialist
Dickinson Area Office
135 Sims Street, Suite 210
Dickinson, ND 58601
Ph-701-495-7560

From: Corie Ereth [mailto:Corie.Ereth@kljeng.com]
Sent: Thursday, June 15, 2017 8:57 AM
To: Gerbig, Mike - NRCS, Dickinson, ND <Mike.Gerbig@nd.usda.gov>
Subject: [CAUTION: Suspicious Link]Reclamation Plan for Savage Pipeline

Good morning Mike,

I am writing a reclamation plan for a 10" oil pipeline located in the NE quarter of Section 6, Township 152 North, Range 103 West in Williams County, North Dakota. The area being reclaimed is between railroad tracks and Highway 1804. It is likely that the area has had previous disturbance. Dominant

vegetation is smooth bromegrass and crested wheatgrass. The Forage Suitability Groups for the project is clayey subsoil (85%) and loam (15%). I attached two photos of the study area.

This pipeline is being sited through the Public Service Commission (PSC). The PSC requires that reclamation, fertilization, and reseeding is done according to the Natural Resources Conservation Service recommendations.

Could we please get your recommendations for reseeding this project?

Thanks,

Corie Ereth



701-250-5904 **Direct**
701-955-0537 **Cell**
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Bismarck, ND 58503-0431
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From: Weed Control
To: [Corie Ereth](#)
Cc: [Jerry Summerville](#)
Subject: RE: Noxious Weed Guidance for Reclamation Plan
Date: Friday, June 16, 2017 8:28:02 AM
Attachments:

Corie,

Thank you for reaching out to us. We use 8 oz of Tordon 22K, 4 oz of Plateau and 1 qt MSO per acre of treated land. Keep in mind that these rates are specific to many factors related to the equipment that we use. For the best recommendation for your situation, we would recommend contacting our Territory Manager with Crop Production Services, Bill Walker. I have attached the information from his business card below. He would be able to help you with equipment and proper chemical rates and types.

Good luck to you in your spraying,
Mackenzie Hanson
Williams County Weed Control



From: Corie Ereth [<mailto:Corie.Ereth@kljeng.com>]
Sent: Thursday, June 15, 2017 4:56 PM
To: Jerry Summerville
Subject: Noxious Weed Guidance for Reclamation Plan

Good afternoon Jerry,

I am writing a reclamation report for a Savage pipeline located in Sections 5 and 6 (T152N, R103W) and 35 and 36 (T153N, R103W) in Williams County (approximately 3.5 miles southwest of Trenton). The pipeline is approximately 2 miles in length and crosses farm fields, industrial areas, wetlands, and a small grassland. I had completed a preliminary environmental survey late last summer and identified leafy spurge and Canada thistle within the study area.

Can you provide me with noxious weed control recommendations to include in the report for both

of these species? For example, the best product to use, the best time to spray, buffers from surface water, etc. Please let me know if you have any questions.

Thank you,

Corie Ereth



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