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**SOUTH DAKOTA WEED MANAGEMENT PLAN  
ROLLING TILL PRAIRIE MLRA – 102A**

**EXHIBIT  
C**



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**HEARTLAND GREENWAY PIPELINE SYSTEM**

**SOUTH DAKOTA WEED MANAGEMENT PLAN  
ROLLING TILL PRAIRIE MLRA – 102A**

**May 2023**



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## SOUTH DAKOTA WEED MANAGEMENT PLAN ROLLING TILL PRAIRIE MLRA – 102A

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## **INTRODUCTION**

This Weed Management Plan was developed by Navigator Heartland Greenway, LLC (NHG) for the Heartland Greenway Pipeline System (HGPS), to comply with State and Local statutes. NHG is committed to preventing new infestations of weeds along the HGPS Right-of-Way (ROW). The purpose of the Weed Management Plan (Plan) is to avoid exacerbating areas of existing infestations.

Weed treatment methods may include herbicide application and/or mechanical treatments (mowing, disking, hand pulling); which will reduce competition with desirable species and will prohibit the introduction of additional weed seed into the soil.

This plan addresses affected counties in the Rolling Till Prairie (RTP) Major Land Resource Area (MLRA), which spans through South Dakota, Minnesota, and into North Dakota. The pipeline will be installed in the RTP area of South Dakota and affects the Counties of Brookings and Moody.

## **IDENTIFICATION**

A weed survey should be conducted prior to construction to identify noxious weeds and other undesirable species. State and local noxious weeds are identified below (Appendix B, Table 1). Weedy species not listed below may be treated as deemed necessary by weed surveyors and/or agriculture inspectors.

### **A. Threshold Requirements**

All State and County noxious weeds will be treated regardless of density or size of infestation area. Non-noxious species will be treated if an infestation area reaches 10 square feet in size.

## **PRE-CONSTRUCTION TREATMENT**

Herbicide use history is to be obtained from landowners so that herbicides with residual effects are known. (e.g., Atrazine will be a potential problem). If herbicide use with residual impacts are reported, the Weed Management Plan may then be amended to address the side effects of such residual impacts.

Weed treatment will begin as soon as practical upon weed surveying of non-row crop areas. Weed Infested areas are to be identified during survey and geospatially documented. Excessive or heavy traffic in weed infested areas should be avoided to reduce impacts of transporting weed seed along the ROW. Weedy areas will be treated within a target time of 15 days but not to exceed 30 days of surveying using a labelled contact kill chemical application by a state licensed commercial chemical applicator. All herbicide treatment is to occur prior to seed ripening. Herbicide selection will be based on target species and applied per the label. Pre-emergent application is not to be utilized due to the potential to negatively affect future seeding germination. If herbicide treatments cannot be applied to identified areas, then weedy areas will be addressed during construction during the topsoil segregation process or via mechanical treatment, so long as the weed seeds do not ripen before said treatment.

## **DURING CONSTRUCTION TREATMENT**

Disking or stockpiling of topsoil throughout ROW will address untreated weedy vegetation from pre-construction surveys. Temporary stabilization of stockpiles per the Topsoil Stockpile Seeding Protocol (see below) will aid in the prevention of infestation and weed establishment. An agriculture inspector will monitor stockpiles and ROW for weed encroachment and schedule herbicide treatment prior to weedy vegetation creating viable seed.



Seasons will be defined as the following:

Spring: April, May,  
Summer: June, July, August,  
Fall: September, October,  
Winter: November, December, January, February, March

A. Topsoil (and subsoil) Stockpile Seeding Protocol

To prevent weedy infestations of topsoil and subsoil stockpiles, temporary seeding of said areas is needed. Temporary seed must be properly labeled and tested within 9 months of application for germination viability. Purity and germination percentages are to be equal to or greater than industry standards for the respective species. Seed cannot contain any prohibited noxious weed seeds, and restricted noxious weed seeds shall not exceed a cumulative total of 20 per pound.

In accordance with project SWPPP plans, and not greater than 7 days after stockpiling the soil, the stockpiles will be temporarily seeded to accomplish soil stabilization and prevent weedy vegetation establishment.

The seeding of the soil stockpiles will be completed in accordance with Natural Resource Conservation Service (NRCS) Conservation Practice 327 via broadcast seeding methodology.

Seeding windows and species selection per NRCS:

- March 15 - May 15 - Perennial Ryegrass - 10 pounds per acre
- May 16 - August 30 - Sudangrass - 20 pounds per acre
- September 1 - December 15 - Winter Rye - 2 bushels per acre
- December 16 - March 14 - Spring Wheat - 2 bushels per acre

Mulch stabilization is warranted if 30% vegetative ground cover is not achieved after 14 days from seed being planted to achieve soil stabilization and prevent weedy vegetation establishment.

Mulch options and related specifications are as follows:

**Hydromulch**

- Type: KoTon Hydromulch
- Rate: 5,000 lbs per acre
- Tackifier: PAM at a rate of 1 pound per 1000 gallons of slurry.
- Equivalent hydromulch substitution must be approved by the agricultural inspector.

**Certified Weed Free Straw mulch**

- Type: any agricultural small grain crop biomass in which the seed has been previously harvested utilizing NAISMA standards to help prevent unwanted noxious weeds
- Application Rate: 2 tons per acre
- Anchor method: Tackifier: PAM at a rate of 1 pound per 1000 gallons of water. One gallon of water is to be applied to 10 square feet.



## **POST CONSTRUCTION TREATMENT**

Upon completion and restoration of the ROW, post construction weed monitoring surveyor will begin the following growing season. Monitoring will continue for two calendar years following completion of construction. In areas of persistent infestation, a third year of monitoring may be required. Any identified weedy areas will be treated within a target time of 15 days but not to exceed 30 days of surveying using a labelled contact kill chemical application by a state licensed commercial chemical applicator. All herbicide treatment is to occur prior to seed ripening. Herbicide selection will be based on target species and applied per the label. Pre-emergent application is not to be utilized due to the potential to negatively affect future seeding germination. If herbicide treatments cannot be applied to identified areas, then weedy areas will via mechanical treatment, so long as the weed seeds do not ripen before said treatment.

Weed surveying and treatment should occur in spring and late summer. Locations with noxious/invasive weeds should be mowed, tilled or sprayed prior to flowering and seed head production. When a weed infestation is surveyed, a chemical treatment will be applied within a target time of 15 days but not to exceed 30 days and a late summer or fall chemical application will be applied to the same area. All selected chemicals must be labeled for the target species. If a water feature is present (e.g. wetland or waterbody), spraying should be conducted using an aquatic herbicide for the targeted species.

A site-specific remediation plan will be developed for areas of material weed infestation (large plot) caused by construction impacts (not caused by adjacent, offsite weed encroachment). This plan will likely include existing vegetation termination, tillage, and reseeding.

## **WEED MANAGEMENT REPORTING AND DOCUMENTATION**

Weed treatment methods may include herbicide application or mechanical treatments (mowing, disking, hand pulling). Methods will reduce competition with desirable species and will prohibit the introduction of additional weed seed into the soil.

Applicators are responsible for logging the following data per treatment area: Geospatially referenced polygon of entire treatment area, parcel ID, treatment type, herbicides used (if any), herbicide applicator name (if applicable).

Herbicide SDS sheets are to be provided to Navigator prior to use.



## **REFERENCES**

USDA

<https://www.nrcs.usda.gov/resources/guides-and-instructions/conservation-cover-ac-327-conservation-practice-standard>

South Dakota Department of Agriculture and Natural Resources

<https://danr.sd.gov/Conservation/PlantIndustry/WeedPest/WeedandPestInfo/StateNoxious/default.aspx>

<https://danr.sd.gov/Conservation/PlantIndustry/WeedFreeForageProgram/WeedFreeForage.aspx>

<https://danr.sd.gov/Conservation/PlantIndustry/WeedPest/WeedandPestInfo/LocalNoxious/default.aspx>

<https://danr.sd.gov/Conservation/PlantIndustry/Seed/docs/2019%20Seed%20Inspection%20Brochure.pdf>

South Dakota State University Extension

<https://extension.sdstate.edu/noxious-weeds-south-dakota>

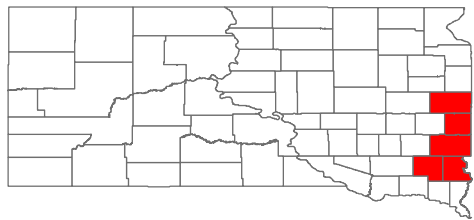
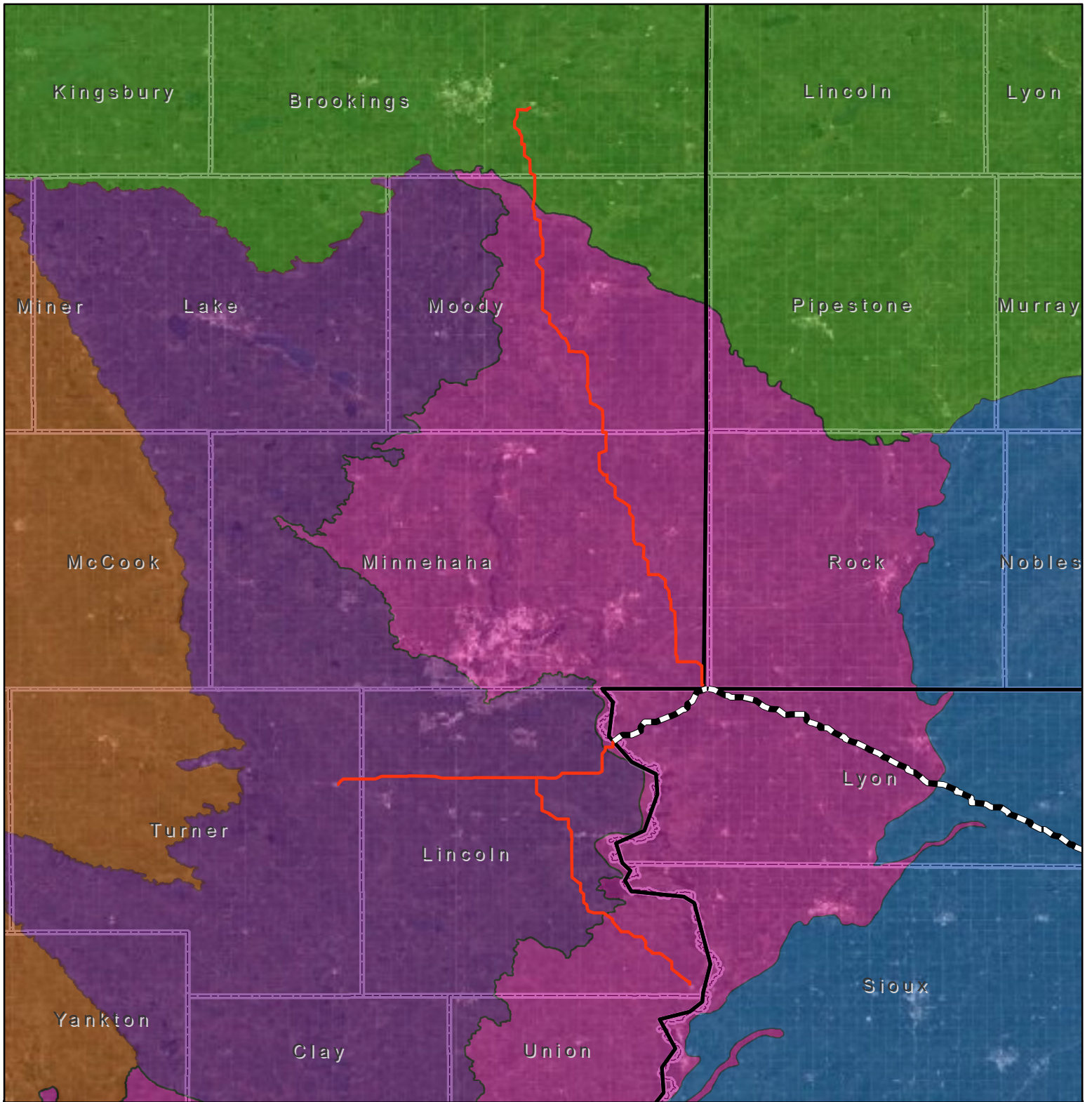
North Dakota State University

<https://www.ag.ndsu.edu/pubs/plantsci/weeds/w1411-01.pdf>

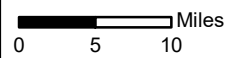
Brookings County

<https://www.brookingscountysd.gov/261/Weed-Pest>

**APPENDIX A: MAJOR LAND RESOURCE AREA MAP**



- South Dakota Project Centerline
- Iowa Project Centerline
- State Boundary
- County Boundary
- Iowa and Minnesota Loess Hills
- Loess Uplands
- Rolling Till Prairie
- Southern Black Glaciated Plains
- Till Plains



**MLRA Map**  
**Heartland Greenway Pipeline System**  
**Navigator Heartland Greenway, LLC**  
**Brookings, Lincoln, Minnehaha,**  
**Moody & Turner Counties, South Dakota**

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NAD 83 UTM 15N ft	Date: April 2023





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**APPENDIX B: NOXIOUS WEEDS**






**Table 1. Noxious Weed List - South Dakota, MLRA 102A\***

<b>Common Name</b>	<b>Scientific Name</b>	<b>Area of Concern</b>
Absinth wormwood	<i>Artemisia absinthium</i>	Statewide
Bull thistle	<i>Cirsium vulgare</i>	Brookings Co.
Canada thistle	<i>Cirsium arvense</i>	Statewide
Hoary cress	<i>Cardaria draba</i>	Statewide
Leafy spurge	<i>Euphorbia esula</i>	Statewide
Musk thistle	<i>Carduus nutans</i>	Brookings
Plumeless thistle	<i>Carduus acanthoides</i>	Brookings
Purple loosestrife	<i>Lythrum salicaria</i>	Statewide
Saltcedar	<i>Tamarix spp.</i>	Statewide
Perennial Sow Thistle	<i>Sonchus arvensis</i>	Statewide




\* To be updated per the South Dakota locally noxious weed pest list ([noxiousweeds.pdf \(sd.gov\)](https://www.sd.gov/land-use-and-natural-resources/land-use-and-natural-resources-101/noxious-weeds))





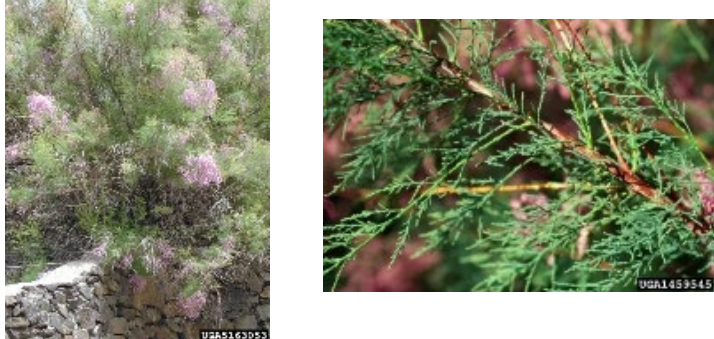
**Table 2. Noxious weed Mechanical/Cultural Treatment and Species Photos**

Common Name	Mechanical/Cultural Treatment	Photo of Species
Absinth Wormwood	Mowing and tillage has a negligible effect on reducing absinth. Herbicide treatment is the most effective method to treat and reduce populations.	
Bull Thistle	Cultivation or hand digging during the rosette stage prior to bolting will kill this plant. Herbicide treatment is the most effective method to treat and reduce populations.	
Canada Thistle	Cattle, goats, and sheep will graze young, succulent Canada thistle. Tillage and hand pulling are generally ineffective for reducing Canada thistle as root fragments can stimulate new growth. Mowing can be effective if completed every 10 to 21 days to cause root depletion. Mow when the plants are in early bud growth stage to prevent seed spread. Herbicide treatment is the most effective method to treat and reduce populations.	



Common Name	Mechanical/Cultural Treatment	Photo of Species
Hoary Cress	<p>Repeated cultivation is effective during the growing season for two to four years. Herbicide treatment is the most effective method to treat and reduce populations. In areas of small infestations digging could be used as a mechanism for removal if the entire root is removed, however this is not the primary method of removal.</p>	
Leafy Spurge	<p>Grazing (sheep and goats) can be effective at reducing growth, infestation, and spread of spurge, but will not eradicate the species. Cutting, mowing, or pulling is often ineffective as pieces of roots as small as 0.5 inch long and 0.1 inch diameter can produce new shoots. Intensive cultivation (tillage to 4 inches every 3 weeks until soil freezes) or cultivation of 3 to 6 inch tall plants post-harvest can be effective at reducing leafy spurge. Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Musk Thistle	<p>Mowing prior to seed set and flowering will reduce infestation. Cut below the terminal bud before the stem elongates. Herbicide treatment prior to plant bolting is the most effective method to treat and reduce populations. Herbicide effectiveness is severely diminished after late plant bolting and should then mow plants off to prevent seeding.</p>	




Common Name	Mechanical/Cultural Treatment	Photo of Species
Plumeless Thistle	<p>Grazing of young, immature plants early on can help control thistle. Hand pulling or tillage can be effective if the thistle plants are severed 2 to 4 inches below the soil surface. Repeat mowing can deplete root stores and cause root dieback. Small and/or isolated infestations can be controlled by removing the seed head and placing in bags for disposal. This is effective for reducing further spread or seedling establishment. Proper disposal is required to prevent seed spread. Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Purple Loosestrife	<p>Small infestations should be controlled by digging. Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Saltcedar	<p>Do not remove top growth for three years following herbicide application due to resprouting. Burning and bulldozing have been unsuccessful. Herbicide treatment is the most effective method to treat and reduce populations.</p>	



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Common Name	Mechanical/Cultural Treatment	Photo of Species
Perennial Sow Thistle	Cultivation will reduce populations. Do not spread roots to noninfested areas. Herbicide treatment is the most effective method to treat and reduce populations.	



### **Photo Sources**

<https://cropwatch.unl.edu/2017/absinth-wormwood-new-invasive-species-nebraska-panhandle>

<https://www.nwcb.wa.gov/weeds/bull-thistle>

<https://kingcounty.gov/services/environment/animals-and-plants/noxious-weeds/weed-identification/bull-thistle.aspx>

<https://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist/canadathistle>

<https://www.nwcb.wa.gov/weeds/canada-thistle>

<https://tswcd.org/noxious-weeds/hoary-cress/>

<https://www.ndsu.edu/pubweb/chiwonlee/plsc211/student%20papers/articles06/kalevanbruggen/kvanbruggen.html>

[https://weedid.missouri.edu/weedinfo.cfm?weed\\_id=49](https://weedid.missouri.edu/weedinfo.cfm?weed_id=49)

<https://www.nwcb.wa.gov/weeds/plumeless-thistle>

<https://kingcounty.gov/services/environment/animals-and-plants/noxious-weeds/weed-identification/purple-loosestrife.aspx>

<https://www.nwcb.wa.gov/weeds/purple-loosestrife>

<https://www.nps.gov/sagu/learn/nature/tamarisk.htm>

<https://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist/spottedknapweed>

<https://www.canr.msu.edu/resources/spotted-knapweed-centaurea-stoebe>

[https://www.illinoiswildflowers.info/weeds/plants/per\\_sowthistle.htm](https://www.illinoiswildflowers.info/weeds/plants/per_sowthistle.htm)

<https://www.canr.msu.edu/resources/perennial-sowthistle-sonchus-arvensis>



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**SOUTH DAKOTA WEED MANAGEMENT PLAN  
TILL PLAINS MLRA – 102B**



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**HEARTLAND GREENWAY PIPELINE SYSTEM**

**SOUTH DAKOTA WEED MANAGEMENT PLAN  
TILL PLAINS MLRA – 102B**

**May 2023**





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## **INTRODUCTION**

This Weed Management Plan was developed by Navigator Heartland Greenway, LLC (NHG) for the Heartland Greenway Pipeline System (HGPS), to comply with State and Local statutes. NHG is committed to preventing new infestations of weeds along the HGPS Right-of-Way (ROW). The purpose of the Weed Management Plan (Plan) is to avoid exacerbating areas of existing infestations.

Weed treatment methods may include herbicide application and/or mechanical treatments (mowing, disking, hand pulling); which will reduce competition with desirable species and will prohibit the introduction of additional weed seed into the soil.

This plan addresses affected counties in the Till Plains (TP) Major Land Resource Area (MLRA), which spans through South Dakota. The pipeline will be installed in the TP area of South Dakota and affects the Counties of Turner and Lincoln.

## **IDENTIFICATION**

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To prevent weedy infestations of topsoil and subsoil stockpiles, temporary seeding of said areas is needed. Temporary seed must be properly labeled and tested within 9 months of application for germination viability. Purity and germination percentages are to be equal to or greater than industry standards for the respective species. Seed cannot contain any prohibited noxious weed seeds, and restricted noxious weed seeds shall not exceed a cumulative total of 20 per pound.

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The seeding of the soil stockpiles will be completed in accordance with Natural Resource Conservation Service (NRCS) Conservation Practice 327 via broadcast seeding methodology.

Seeding windows and species selection per NRCS:

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Mulch stabilization is warranted if 30% vegetative ground cover is not achieved after 14 days from seed being planted to achieve soil stabilization and prevent weedy vegetation establishment.

Mulch options and related specifications are as follows:

**Hydromulch**

- Type: KoTon Hydromulch
- Rate: 5,000 lbs per acre
- Tackifier: PAM at a rate of 1 pound per 1000 gallons of slurry
- Equivalent hydromulch substitution must be approved by the agricultural inspector.

**Certified Weed Free Straw mulch**

- Type: any agricultural small grain crop biomass in which the seed has been previously harvested utilizing NAISMA standards to help prevent unwanted noxious weeds
- Application Rate: 2 tons per acre
- Anchor method: Tackifier: PAM at a rate of 1 pound per 1000 gallons of water. One gallon of water is to be applied to 10 square feet.



## **POST CONSTRUCTION TREATMENT**

Upon completion and restoration of the ROW, post construction weed monitoring surveyor will begin the following growing season. Monitoring will continue for two calendar years following completion of construction. In areas of persistent infestation, a third year of monitoring may be required. Any identified weedy areas will be treated within a target time of 15 days but not to exceed 30 days of surveying using a labelled contact kill chemical application by a state licensed commercial chemical applicator. All herbicide treatment is to occur prior to seed ripening. Herbicide selection will be based on target species and applied per the label. Pre-emergent application is not to be utilized due to the potential to negatively affect future seeding germination. If herbicide treatments cannot be applied to identified areas, then weedy areas will via mechanical treatment, so long as the weed seeds do not ripen before said treatment.

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## **WEED MANAGEMENT REPORTING AND DOCUMENTATION**

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Applicators are responsible for logging the following data per treatment area: Geospatially referenced polygon of entire treatment area, parcel ID, treatment type, herbicides used (if any), herbicide applicator name (if applicable).

Herbicide SDS sheets are to be provided to Navigator prior to use.



## REFERENCES

USDA

<https://www.nrcs.usda.gov/resources/guides-and-instructions/conservation-cover-ac-327-conservation-practice-standard>

South Dakota Department of Agriculture and Natural Resources

<https://danr.sd.gov/Conservation/PlantIndustry/WeedPest/WeedandPestInfo/StateNoxious/default.aspx>

<https://danr.sd.gov/Conservation/PlantIndustry/WeedFreeForageProgram/WeedFreeForage.aspx>

<https://danr.sd.gov/Conservation/PlantIndustry/WeedPest/WeedandPestInfo/LocalNoxious/default.aspx>

<https://danr.sd.gov/Conservation/PlantIndustry/Seed/docs/2019%20Seed%20Inspection%20Brochure.pdf>

South Dakota State University Extension

<https://extension.sdstate.edu/noxious-weeds-south-dakota>

North Dakota State University

<https://www.ag.ndsu.edu/pubs/plantsci/weeds/w1411-01.pdf>

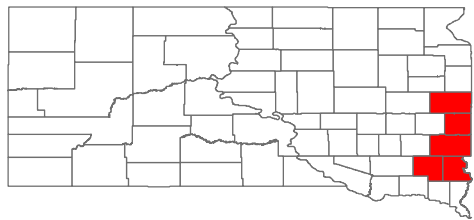
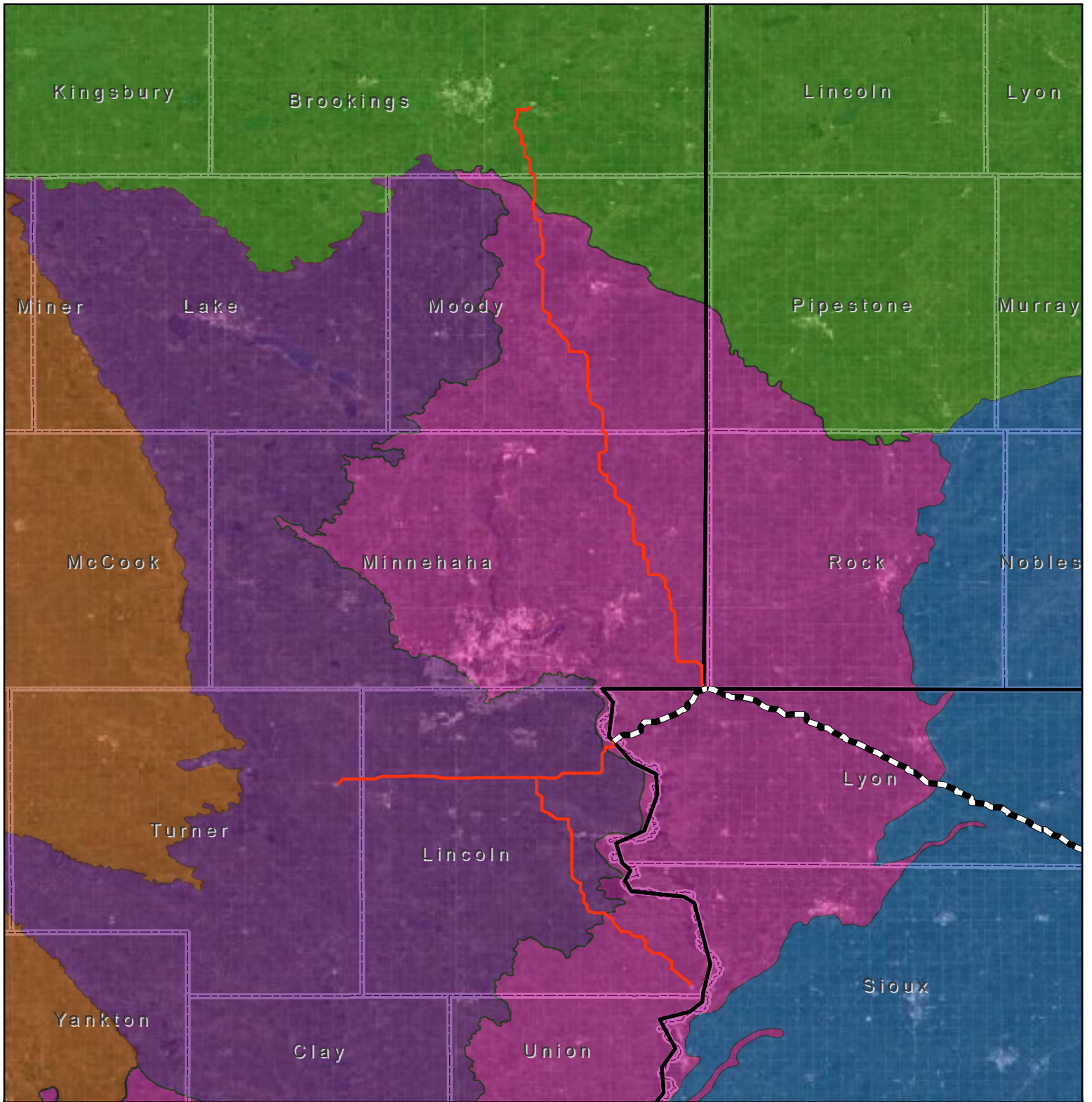
Turner County

<https://turner.sdcounties.org/weed-pest/2021-notice-of-responsibility-to-control-noxious-weeds/>

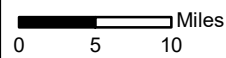
Lincoln County

<https://www.lincolncountysd.org/357/Weed-Department>

**APPENDIX A: MAJOR LAND RESOURCE AREA MAP**



- South Dakota Project Centerline
- Iowa Project Centerline
- State Boundary
- County Boundary
- Iowa and Minnesota Loess Hills
- Loess Uplands
- Rolling Till Prairie
- Southern Black Glaciated Plains
- Till Plains



**MLRA Map**  
**Heartland Greenway Pipeline System**  
**Navigator Heartland Greenway, LLC**  
**Brookings, Lincoln, Minnehaha,**  
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NAD 83 UTM 15N ft	Date: April 2023



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**SOUTH DAKOTA WEED MANAGEMENT PLAN  
TILL PLAINS MLRA – 102B**

**APPENDIX B: NOXIOUS WEEDS**








**Table 1. Noxious Weed List - South Dakota, MLRA 102B Till Plains\***

<b>Common Name</b>	<b>Scientific Name</b>	<b>Area of Concern</b>
Absinth wormwood	<i>Artemisia absinthium</i>	Statewide
Bull thistle	<i>Cirsium vulgare</i>	Turner Co.
Canada thistle	<i>Cirsium arvense</i>	Statewide
Hoary cress	<i>Cardaria draba</i>	Statewide
Leafy spurge	<i>Euphorbia esula</i>	Statewide
Musk thistle	<i>Carduus nutans</i>	Lincoln Co.
Plumeless thistle	<i>Carduus acanthoides</i>	Lincoln Co.
Purple loosestrife	<i>Lythrum salicaria</i>	Statewide
Saltcedar	<i>Tamarix spp.</i>	Statewide
Spotted knapweed	<i>Centaurea biebersteinii</i>	Lincoln Co.
Perennial Sow Thistle	<i>Sonchus arvensis</i>	Statewide




\* To be updated per the South Dakota locally noxious weed pest list ([noxiousweeds.pdf \(sd.gov\)](#))





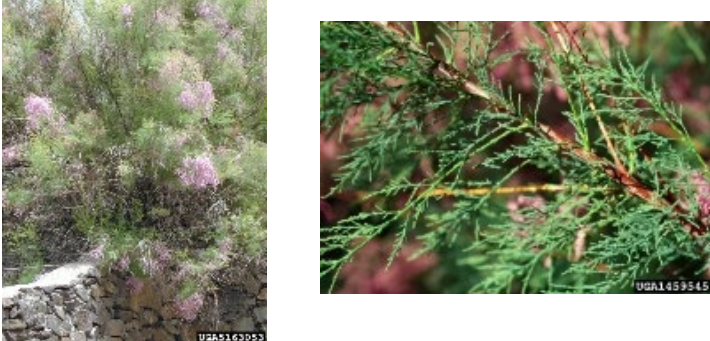
**Table 2. Noxious weed Mechanical/Cultural Treatment and Species Photos**

Common Name	Mechanical/Cultural Treatment	Photo of Species
Absinth Wormwood	Mowing and tillage has a negligible effect on reducing absinth. Herbicide treatment is the most effective method to treat and reduce populations.	
Bull Thistle	Cultivation or hand digging during the rosette stage prior to bolting will kill this plant. Herbicide treatment is the most effective method to treat and reduce populations.	
Canada Thistle	Cattle, goats, and sheep will graze young, succulent Canada thistle. Tillage and hand pulling are generally ineffective for reducing Canada thistle as root fragments can stimulate new growth. Mowing can be effective if completed every 10 to 21 days to cause root depletion. Mow when the plants are in early bud growth stage to prevent seed spread. Herbicide treatment is the most effective method to treat and reduce populations.	





Common Name	Mechanical/Cultural Treatment	Photo of Species
Hoary Cress	<p>Repeated cultivation is effective during the growing season for two to four years. Herbicide treatment is the most effective method to treat and reduce populations. In areas of small infestations digging could be used as a mechanism for removal if the entire root is removed, however this is not the primary method of removal.</p>	
Leafy Spurge	<p>Grazing (sheep and goats) can be effective at reducing growth, infestation, and spread of spurge, but will not eradicate the species. Cutting, mowing, or pulling is often ineffective as pieces of roots as small as 0.5 inch long and 0.1 inch diameter can produce new shoots. Intensive cultivation (tillage to 4 inches every 3 weeks until soil freezes) or cultivation of 3 to 6 inch tall plants post-harvest can be effective at reducing leafy spurge. Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Musk Thistle	<p>Mowing prior to seed set and flowering will reduce infestation. Cut below the terminal bud before the stem elongates. Herbicide treatment prior to plant bolting is the most effective method to treat and reduce populations. Herbicide effectiveness is severely diminished after late plant bolting and should then mow plants off to prevent seeding.</p>	



Common Name	Mechanical/Cultural Treatment	Photo of Species
Plumeless Thistle	<p>Grazing of young, immature plants early on can help control thistle. Hand pulling or tillage can be effective if the thistle plants are severed 2 to 4 inches below the soil surface. Repeat mowing can deplete root stores and cause root dieback. Small and/or isolated infestations can be controlled by removing the seed head and placing in bags for disposal. This is effective for reducing further spread or seedling establishment. Proper disposal is required to prevent seed spread. Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Purple Loosestrife	<p>Small infestations should be controlled by digging. Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Saltcedar	<p>Do not remove top growth for three years following herbicide application due to resprouting. Burning and bulldozing have been unsuccessful. Herbicide treatment is the most effective method to treat and reduce populations.</p>	



Common Name	Mechanical/Cultural Treatment	Photo of Species
Spotted Knapweed	<p>When found in a small infestation, hand pulling is the most effective option. Large infestations should be "removed and destroyed by burning or mulching." Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Perennial Sow Thistle	<p>Cultivation will reduce populations. Do not spread roots to noninfested areas. Herbicide treatment is the most effective method to treat and reduce populations.</p>	



### **Photo Sources**

<https://cropwatch.unl.edu/2017/absinth-wormwood-new-invasive-species-nebraska-panhandle>

<https://www.nwcb.wa.gov/weeds/bull-thistle>

<https://kingcounty.gov/services/environment/animals-and-plants/noxious-weeds/weed-identification/bull-thistle.aspx>

<https://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist/canadathistle>

<https://www.nwcb.wa.gov/weeds/canada-thistle>

<https://tswcd.org/noxious-weeds/hoary-cress/>

<https://www.ndsu.edu/pubweb/chiwonlee/plsc211/student%20papers/articles06/kalevanbruggen/kvanbruggen.html>

[https://weedid.missouri.edu/weedinfo.cfm?weed\\_id=49](https://weedid.missouri.edu/weedinfo.cfm?weed_id=49)

<https://www.nwcb.wa.gov/weeds/plumeless-thistle>

<https://kingcounty.gov/services/environment/animals-and-plants/noxious-weeds/weed-identification/purple-loosestrife.aspx>

<https://www.nwcb.wa.gov/weeds/purple-loosestrife>

<https://www.nps.gov/sagu/learn/nature/tamarisk.htm>

<https://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist/spottedknapweed>

<https://www.canr.msu.edu/resources/spotted-knapweed-centaurea-stoebe>

[https://www.illinoiswildflowers.info/weeds/plants/per\\_sowthistle.htm](https://www.illinoiswildflowers.info/weeds/plants/per_sowthistle.htm)

<https://www.canr.msu.edu/resources/perennial-sowthistle-sonchus-arvensis>



**HEARTLAND  
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**SOUTH DAKOTA WEED MANAGEMENT PLAN  
LOESS UPLANDS MLRA – 102C**



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**HEARTLAND GREENWAY PIPELINE SYSTEM**

**SOUTH DAKOTA WEED MANAGEMENT PLAN  
LOESS UPLANDS MLRA – 102C**

**May 2023**



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## **INTRODUCTION**

This Weed Management Plan was developed by Navigator Heartland Greenway, LLC (NHG) for the Heartland Greenway Pipeline System (HGPS), to comply with State and Local statutes. NHG is committed to preventing new infestations of weeds along the HGPS Right-of-Way (ROW). The purpose of the Weed Management Plan (Plan) is to avoid exacerbating areas of existing infestations.

Weed treatment methods may include herbicide application and/or mechanical treatments (mowing, disking, hand pulling); which will reduce competition with desirable species and will prohibit the introduction of additional weed seed into the soil.

This plan addresses affected counties in the Loess Uplands (LU) Major Land Resource Area (MLRA), which spans through South Dakota, Nebraska, and Iowa. The pipeline will be installed in the LU area of South Dakota and affects the Counties of Moody, Minnehaha, and Lincoln.

## **IDENTIFICATION**

A weed survey should be conducted prior to construction to identify noxious weeds and/or undesirable species. State and local noxious weeds are identified below (Appendix B, Table 1). Weedy species not listed below may be treated as deemed necessary by weed surveyors and/or agriculture inspectors.

### **A. Threshold Requirements**

All State and County noxious weeds will be treated regardless of density or size of infestation area. Non-noxious species will be treated when an infestation area reaches 10 square feet in size.

## **PRE-CONSTRUCTION TREATMENT**

Herbicide use history is to be obtained from landowners so that herbicides with residual effects are known. (e.g., Atrazine will be a potential problem). If herbicide use with residual impacts are reported, the Weed Management Plan may then be amended to address the side effects of such residual impacts.

Weed treatment will begin as soon as practical upon weed surveying of non-row crop areas. Weed Infested areas are to be identified during survey and geospatially documented. Excessive or heavy traffic in weed infested areas should be avoided to reduce impacts of transporting weed seed along the ROW. Weedy areas will be treated within a target time of 15 days but not to exceed 30 days of surveying using a labelled contact kill chemical application by a state licensed commercial chemical applicator. All herbicide treatment is to occur prior to seed ripening. Herbicide selection will be based on target species and applied per the label. Pre-emergent application is not to be utilized due to the potential to negatively affect future seeding germination. If herbicide treatments cannot be applied to identified areas, then weedy areas will be addressed during construction during the topsoil segregation process or via mechanical treatment, so long as the weed seeds do not ripen before said treatment.

## **DURING CONSTRUCTION TREATMENT**

Disking or stockpiling of topsoil throughout ROW will address untreated weedy vegetation from pre-construction surveys. Temporary stabilization of stockpiles per the Topsoil Stockpile Seeding Protocol (see below) will aid in the prevention of infestation and weed establishment. An agriculture inspector will monitor stockpiles and ROW for weed encroachment and schedule herbicide treatment prior to weedy vegetation creating viable seed.



Seasons will be defined as the following:

- Spring: April, May,
- Summer: June, July, August,
- Fall: September, October,
- Winter: November, December, January, February, March

A. Topsoil (and subsoil) Stockpile Seeding Protocol

To prevent weedy infestations of topsoil and subsoil stockpiles, temporary seeding of said areas is needed. Temporary seed must be properly labeled and tested within 9 months of application for germination viability. Purity and germination percentages are to be equal to or greater than industry standards for the respective species. Seed cannot contain any prohibited noxious weed seeds, and restricted noxious weed seeds shall not exceed a cumulative total of 20 per pound.

In accordance with project SWPPP plans, and not greater than 7 days after stockpiling the soil, the stockpiles will be temporarily seeded to accomplish soil stabilization and prevent weedy vegetation establishment.

The seeding of the soil stockpiles will be completed in accordance with Natural Resource Conservation Service (NRCS) Conservation Practice 327 via broadcast seeding methodology.

Seeding windows and species selection per NRCS:

- March 15 - May 15 - Perennial Ryegrass - 10 pounds per acre
- May 16 - August 30 - Sudangrass - 20 pounds per acre
- September 1 - December 15 - Winter Rye - 2 bushels per acre
- December 16 - March 14 - Spring Wheat - 2 bushels per acre

Mulch stabilization is warranted if 30% vegetative ground cover is not achieved after 14 days from seed being planted to achieve soil stabilization and prevent weedy vegetation establishment.

Mulch options and related specifications are as follows:

**Hydromulch**

- Type: KoTon Hydromulch
- Rate: 5,000 lbs per acre
- Tackifier: PAM at a rate of 1 pound per 1000 gallons of slurry.
- Equivalent hydromulch substitution must be approved by agricultural inspector

**Certified Weed Free Straw mulch**

- Type: any agricultural small grain crop biomass in which the seed has been previously harvested utilizing NAISMA standards to help prevent unwanted noxious weeds
- Application Rate: 2 tons per acre
- Anchor method: Tackifier: PAM at a rate of 1 pound per 1000 gallons of water. One gallon of water is to be applied to 10 square feet.



## **POST CONSTRUCTION TREATMENT**

Upon completion and restoration of the ROW, post construction weed monitoring surveyor will begin the following growing season. Monitoring will continue for two calendar years following completion of construction. In areas of persistent infestation, a 3rd year of monitoring may be required. Any identified weedy areas will be treated within a target time of 15 days but not to exceed 30 days of surveying using a labelled contact kill chemical application by a state licensed commercial chemical applicator. All herbicide treatment is to occur prior to seed ripening. Herbicide selection will be based on target species and applied per the label. Pre-emergent application is not to be utilized due to the potential to negatively affect future seeding germination. If herbicide treatments cannot be applied to identified areas, then weedy areas will via mechanical treatment, so long as the weed seeds do not ripen before said treatment.

Weed surveying and treatment should occur in spring and late summer. Locations with noxious/invasive weeds should be mowed, tilled or sprayed prior to flowering and seed head production. When a weed infestation is surveyed, a chemical treatment will be applied within a target time of 15 days but not to exceed 30 days and a late summer or fall chemical application will be applied to the same area. All selected chemicals must be labeled for the target species. If a water feature is present (e.g. wetland or waterbody), spraying should be conducted using an aquatic herbicide for the targeted species.

A site-specific remediation plan will be developed for areas of material weed infestation (large plot) caused by construction impacts (not caused by adjacent, offsite weed encroachment). This plan will likely include existing vegetation termination, tillage, and reseeding.

## **WEED MANAGEMENT REPORTING AND DOCUMENTATION**

Weed treatment methods may include herbicide application or mechanical treatments (mowing, disking, hand pulling). Methods will reduce competition with desirable species and will prohibit the introduction of additional weed seed into the soil.

Applicators are responsible for logging the following data per treatment area: Geospatially referenced polygon of entire treatment area, parcel ID, treatment type, herbicides used (if any), herbicide applicator name (if applicable).

Herbicide SDS sheets are to be provided to Navigator prior to use.



## REFERENCES

USDA

<https://www.nrcs.usda.gov/resources/guides-and-instructions/conservation-cover-ac-327-conservation-practice-standard>

South Dakota Department of Agriculture and Natural Resources

<https://danr.sd.gov/Conservation/PlantIndustry/WeedPest/WeedandPestInfo/StateNoxious/default.aspx>

<https://danr.sd.gov/Conservation/PlantIndustry/WeedFreeForageProgram/WeedFreeForage.aspx>

<https://danr.sd.gov/Conservation/PlantIndustry/WeedPest/WeedandPestInfo/LocalNoxious/default.aspx>

<https://danr.sd.gov/Conservation/PlantIndustry/Seed/docs/2019%20Seed%20Inspection%20Brochure.pdf>

South Dakota State University Extension

<https://extension.sdstate.edu/noxious-weeds-south-dakota>

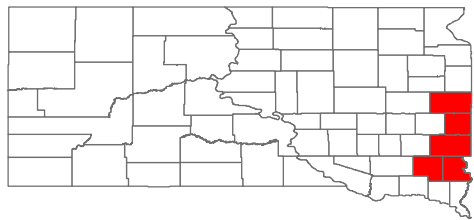
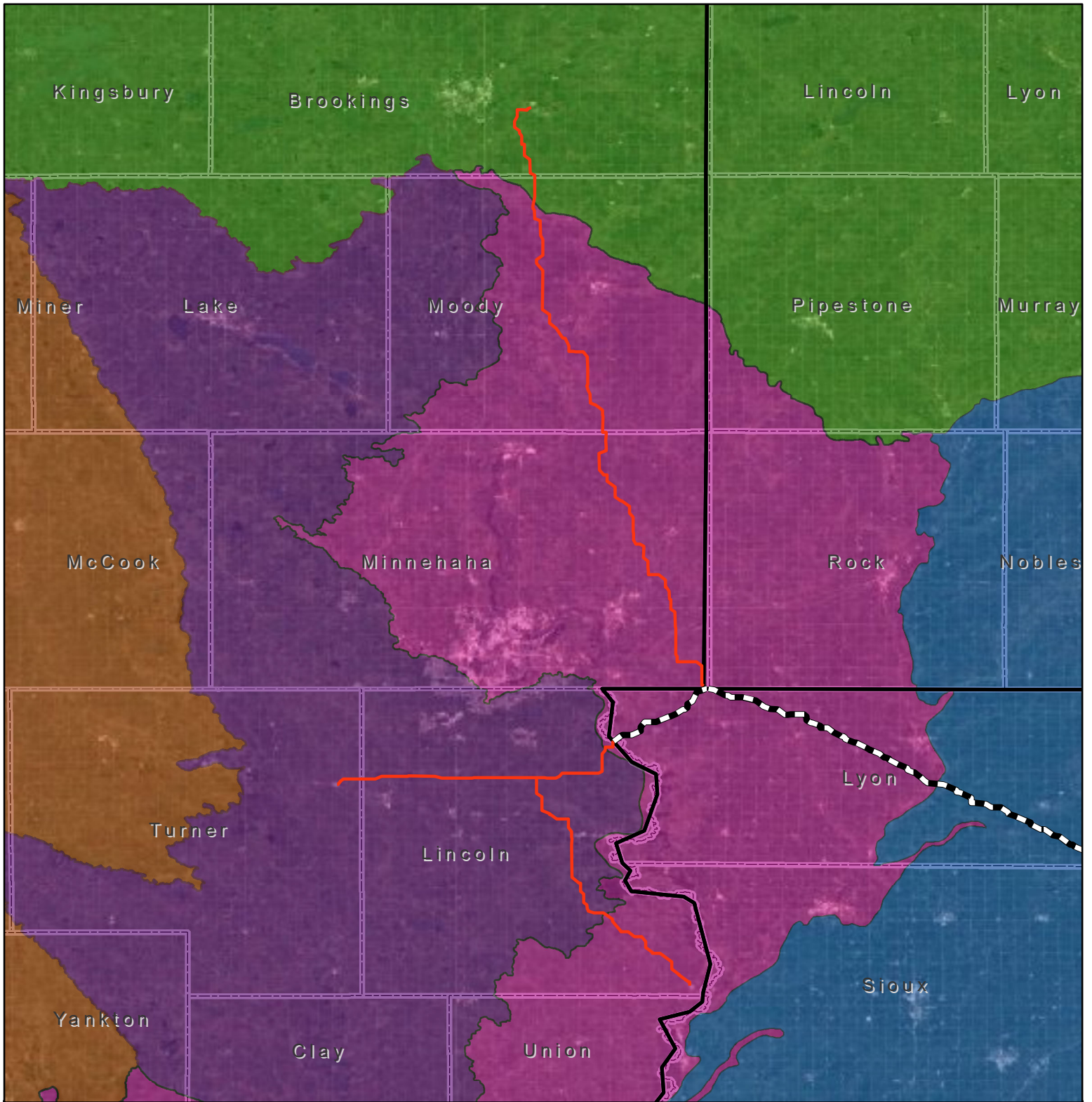
North Dakota State University

<https://www.ag.ndsu.edu/pubs/plantsci/weeds/w1411-01.pdf>

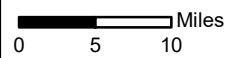
Lincoln County

<https://www.lincolncountysd.org/357/Weed-Department>

**APPENDIX A: MAJOR LAND RESOURCE AREA MAP**



- South Dakota Project Centerline
- Iowa Project Centerline
- State Boundary
- County Boundary
- Iowa and Minnesota Loess Hills
- Loess Uplands
- Rolling Till Prairie
- Southern Black Glaciated Plains
- Till Plains



**MLRA Map**  
**Heartland Greenway Pipeline System**  
**Navigator Heartland Greenway, LLC**  
**Brookings, Lincoln, Minnehaha,**  
**Moody & Turner Counties, South Dakota**

Page 1 of 1	Scale: 1:800,000
NAD 83 UTM 15N ft	Date: April 2023



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**SOUTH DAKOTA WEED MANAGEMENT PLAN  
LOESS UPLANDS MLRA – 102C**

**APPENDIX B: NOXIOUS WEEDS**



## SOUTH DAKOTA WEED MANAGEMENT PLAN LOESS UPLANDS MLRA – 102C

**Table 1. Noxious Weed List - South Dakota, MLRA 102C Loess Uplands\***




<b>Common Name</b>	<b>Scientific Name</b>	<b>Area of Concern</b>
Absinth wormwood	<i>Artemisia absinthium</i>	Statewide
Canada thistle	<i>Cirsium arvense</i>	Statewide
Hoary cress	<i>Cardaria draba</i>	Statewide
Leafy spurge	<i>Euphorbia esula</i>	Statewide
Musk thistle	<i>Carduus nutans</i>	Lincoln Co.
Plumeless thistle	<i>Carduus acanthoides</i>	Lincoln Co.
Purple loosestrife	<i>Lythrum salicaria</i>	Statewide
Saltcedar	<i>Tamarix spp.</i>	Statewide
Spotted knapweed	<i>Centaurea biebersteinii</i>	Lincoln Co.
Perennial Sow Thistle	<i>Sonchus arvensis</i>	Statewide

\* To be updated per the South Dakota locally noxious weed pest list ([noxiousweeds.pdf \(sd.gov\)](http://noxiousweeds.pdf(sd.gov)))









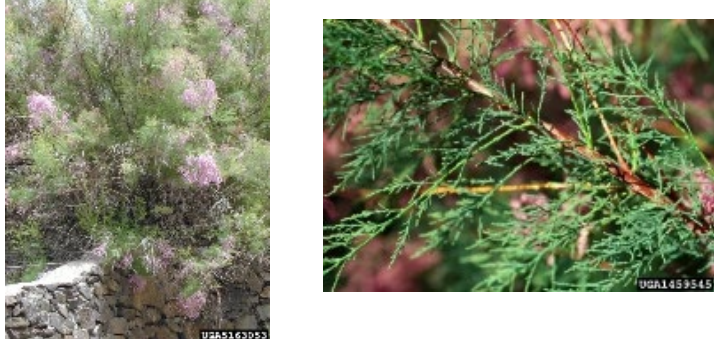
**Table 2. Noxious weed Mechanical/Cultural Treatment and Species Photos**

Common Name	Mechanical/Cultural Treatment	Photo of Species
Absinth Wormwood	Mowing and tillage has a negligible effect on reducing absinth. Herbicide treatment is the most effective method to treat and reduce populations.	
Canada Thistle	Cattle, goats, and sheep will graze young, succulent Canada thistle. Tillage and hand pulling are generally ineffective for reducing Canada thistle as root fragments can stimulate new growth. Mowing can be effective if completed every 10 to 21 days to cause root depletion. Mow when the plants are in early bud growth stage to prevent seed spread. Herbicide treatment is the most effective method to treat and reduce populations.	
Hoary Cress	Repeated cultivation is effective during the growing season for two to four years. Herbicide treatment is the most effective method to treat and reduce populations. In areas of small infestations digging could be used as a mechanism for removal if the entire root is removed, however this is not the primary method of removal.	





Common Name	Mechanical/Cultural Treatment	Photo of Species
Leafy Spurge	<p>Grazing (sheep and goats) can be effective at reducing growth, infestation, and spread of spurge, but will not eradicate the species. Cutting, mowing, or pulling is often ineffective as pieces of roots as small as 0.5 inch long and 0.1 inch diameter can produce new shoots. Intensive cultivation (tillage to 4 inches every 3 weeks until soil freezes) or cultivation of 3 to 6 inch tall plants post-harvest can be effective at reducing leafy spurge. Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Musk Thistle	<p>Mowing prior to seed set and flowering will reduce infestation. Cut below the terminal prior to plant bolting bud before the stem elongates. Herbicide treatment is the most effective method to treat and reduce populations. Herbicide effectiveness is severely diminished after late plant bolting and should then mow plants off to prevent seeding.</p>	



Common Name	Mechanical/Cultural Treatment	Photo of Species
Plumeless Thistle	<p>Grazing of young, immature plants early on can help control thistle. Hand pulling or tillage can be effective if the thistle plants are severed 2 to 4 inches below the soil surface. Repeat mowing can deplete root stores and cause root dieback. Small and/or isolated infestations can be controlled by removing the seed head and placing in bags for disposal. This is effective for reducing further spread or seedling establishment. Proper disposal is required to prevent seed spread. Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Purple Loosestrife	<p>Small infestations should be controlled by digging. Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Saltcedar	<p>Do not remove top growth for three years following herbicide application due to resprouting. Burning and bulldozing have been unsuccessful. Herbicide treatment is the most effective method to treat and reduce populations.</p>	



Common Name	Mechanical/Cultural Treatment	Photo of Species
Spotted Knapweed	<p>When found in a small infestation, hand pulling is the most effective option. Large infestations should be "removed and destroyed by burning or mulching." Herbicide treatment is the most effective method to treat and reduce populations.</p>	
Perennial Sow Thistle	<p>Cultivation will reduce populations. Do not spread roots to noninfested areas. Herbicide treatment is the most effective method to treat and reduce populations.</p>	



### **Photo Sources**

<https://cropwatch.unl.edu/2017/absinth-wormwood-new-invasive-species-nebraska-panhandle>

<https://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist/canadathistle>

<https://www.nwcb.wa.gov/weeds/canada-thistle>

<https://tswcd.org/noxious-weeds/hoary-cress/>

<https://www.ndsu.edu/pubweb/chiwonlee/plsc211/student%20papers/articles06/kalevanbruggen/kvanbruggen.html>

[https://weedid.missouri.edu/weedinfo.cfm?weed\\_id=49](https://weedid.missouri.edu/weedinfo.cfm?weed_id=49)

<https://www.nwcb.wa.gov/weeds/plumeless-thistle>

<https://kingcounty.gov/services/environment/animals-and-plants/noxious-weeds/weed-identification/purple-loosestrife.aspx>

<https://www.nwcb.wa.gov/weeds/purple-loosestrife>

<https://www.nps.gov/sagu/learn/nature/tamarisk.htm>

<https://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/noxiouslist/spottedknapweed>

<https://www.canr.msu.edu/resources/spotted-knapweed-centaurea-stoebe>

[https://www.illinoiswildflowers.info/weeds/plants/per\\_sowthistle.htm](https://www.illinoiswildflowers.info/weeds/plants/per_sowthistle.htm)

<https://www.canr.msu.edu/resources/perennial-sowthistle-sonchus-arvensis>