


**APPENDIX A. SAGEBRUSH CONSTRUCTION/RECLAMATION UNIT**

**CONSTRUCTION/RECLAMATION UNIT SPECIFICATIONS: SAGE  
KEYSTONE XL STEELE CITY**

<b>UNIT NAME:</b>	<b>SAGEBRUSH</b>	
<b>UNIT CODE:</b>	<b>SAGE</b>	
<b>UNIT DESCRIPTION:</b>	Sagebrush vegetation types on the Keystone XL Project are dominated by Wyoming big sagebrush ( <i>Artemisia tridentata ssp.wyomingensis</i> ) and/or silver sagebrush ( <i>Artemisia cana</i> ). Big sagebrush and/or silver sagebrush communities provide habitat for greater sage grouse and several other important wildlife species.	
<b>UNIT LOCATION:</b>	Sagebrush occurs in limited areas north of the Missouri River and is scattered south of the Missouri River throughout Montana and northwest South Dakota to the Moreau River.	
<b>UNIT GOALS:</b>	<ul style="list-style-type: none"> <li>• Re-establish vegetation with a substantial component of big or silver sagebrush, and native perennial grasses and forbs.</li> <li>• Maintain wildlife habitat, especially sage-grouse and livestock grazing production.</li> <li>• Complete all work to standards specified in the CMR Plan, contract documents and Details, applicable permits, easement descriptions, and Keystone’s satisfaction.</li> </ul>	
<b>SPECIAL CONSIDERATIONS:</b>	<ol style="list-style-type: none"> <li>1. Note that timing restrictions to avoid impacts to greater sage grouse occur throughout this Con/Rec Unit. See Alignment Sheets for timing restriction locations.</li> <li>2. Avoid grading as much as practicable. Mow vegetation rather than grading where sagebrush occurs, maintaining sagebrush root structure promotes sagebrush reestablishment.</li> <li>3. Utilize trench and working side topsoil salvage to maintain sagebrush root structures on the spoil side where shown on Alignment Sheets or directed by Keystone.</li> <li>4. Broadcast seed mixture.</li> </ol>	
<b>CONSTRUCTION</b>		
<b>ROW WIDTH:</b>	Typically 110 feet.	
<b>CLEARING:</b>	As specified in the CMR Plan. <u>ADDITIONAL REQUIREMENTS:</u> <ol style="list-style-type: none"> <li>A. Mow or otherwise remove (e.g. hydroaxe) woody vegetation to ground level as directed by Keystone.</li> <li>B. Leave root crowns and root structures in place to the maximum extent practicable.</li> <li>C. Minimize clearing equipment on the ROW.</li> </ol>	
<b>TOPSOIL SALVAGE:</b>	As specified in the CMR Plan to maintain the topsoil resource and reclamation potential. <u>ADDITIONAL REQUIREMENTS:</u> <ol style="list-style-type: none"> <li>A. Utilize trench and working salvage (Detail 54) on slopes less than 5% where shown on Alignment Sheets or as directed by Keystone.</li> <li>B. Where grading is necessary, salvage topsoil from entire area to be graded (Detail 53).</li> <li>C. Salvage topsoil horizon at depths as shown on Alignment Sheets or as directed by Keystone.</li> </ol>	
<b>TRENCHING:</b>	As specified in the CMR Plan. <u>ADDITIONAL REQUIREMENTS:</u> None unless otherwise directed by Keystone.	
<b>BACKFILL, DECOMPACTION AND REGRADING:</b>	As specified in the CMR Plan to avoid slumping over the trench, relieve compaction, and match adjacent topography. <u>ADDITIONAL REQUIREMENTS:</u> <ol style="list-style-type: none"> <li>A. Do not decompact areas where topsoil was not salvaged and sagebrush root structures remain in place unless directed by Keystone.</li> <li>B. Avoid scalping undisturbed sod layer on the spoil side when backfilling spoil and redistributing stockpiled topsoil.</li> </ol>	
<b>TEMPORARY EROSION CONTROL:</b>	As specified in the CMR Plan and authorized by Keystone to limit dust, prevent off-site sedimentation or erosion, and accelerated erosion on the ROW.	

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**RECLAMATION**

**SEEDBED  
PREPARATION:**

As specified in the CMR Plan.

ADDITIONAL REQUIREMENTS:

- A. Dirt clods should typically be smaller than 2-3 inches diameter.
- B. Cultipack or roll ROW to firm topsoil prior to reseeding as authorized by Keystone.
- C. The seedbed should be firm enough so that the boot heel of an average adult penetrates the soil to a depth of approximately one-half inch.

**SEEDING METHOD,  
SEED MIX AND RATE:**

As specified in the CMR Plan. See Detail 70 for a description of seeding procedures and approved equipment.

ADDITIONAL REQUIREMENTS:

- A. Seed will be provided by Keystone and managed by the Contractor. The Contractor will store seed a dry, secure location.
- B. The Contractor will store any unused seed in a dry, secure location and notify Keystone as to the seed's disposition. Keystone may elect to change the storage location.
- C. The seed mix will be broadcast-seeded in one application. Seeded areas will be dragged with a chain to lightly cover seed.
- D. Cover crop: If permanent seeding is delayed to the following growing season, QuickGuard or another annual cover crop may be seeded per Keystone direction.

**Sagebrush-1 Seed Mixture SAGE-1  
(Spread 1)**

SCIENTIFIC NAME	COMMON NAME	VARIETY <sup>2</sup>	BROADCAST SEEDING RATE <sup>1</sup>	
			Pounds PLS/ Acre	PLS/ sq.ft.
<b>GRASSES:</b>				
<i>Agropyron smithii</i> *	Western wheatgrass	Rosana	5.00	- 12
<i>Agropyron trachycaulum</i>	Slender wheatgrass	Pryor	1.50	- 5
<i>Koeleria cristata</i> *	Prairie junegrass	VNS	0.10	- 5
<i>Poa sandbergii</i> *	Sandberg bluegrass	VNS, High Plains	0.40	- 8
<i>Stipa comata</i>	Needle-and-thread	VNS	2.50	- 6
	<b>Subtotal</b>		<b>9.50</b>	<b>- 36</b>
<b>FORBS:</b>				
<i>Achillea millefolium</i> *	Yarrow	VNS, Great Northern	0.05	- 3
<i>Dalea candida</i>	White prairie clover	Antelope	0.25	- 2
<i>Dalea purpurea</i>	Purple prairie clover	Kaneb, Bismarck	0.25	- 1
	<b>Subtotal</b>		<b>0.55</b>	<b>- 6</b>
<b>SHRUBS:</b>				
<i>Artemisia cana</i> <sup>3</sup>	Silver sagebrush	VNS	5.00	- 98
<i>Ceratoides lanata</i> *	Winterfat	Open Range	0.50	- 1
	<b>Subtotal</b>		<b>5.50</b>	<b>- 99</b>
	<b>TOTAL</b>		<b>15.55</b>	<b>- 141</b>

VNS: Variety not specified

<sup>1</sup>Based on a broadcast seeding rate of 141 Pure Live Seed (PLS) per square foot.

<sup>2</sup>This may not be a complete list; other named varieties listed by USDA-NRCS in Montana and South Dakota are acceptable.

<sup>3</sup>Optional based on landowner preference.

NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

\*Identified as species associated with sage-grouse habitat in Bird and Schenk (2005).

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Sagebrush-2 Seed Mixture SAGE-2 (Spreads 2, 3)			BROADCAST SEEDING RATE <sup>1</sup>	
SCIENTIFIC NAME	COMMON NAME	VARIETY <sup>2</sup>	Pounds PLS/ Acre	PLS/ sq.ft.
<b>GRASSES:</b>				
<i>Agropyron smithii</i> *	Western wheatgrass	Rosana, Rodan	3.00	- 8
<i>Agropyron spicatum</i>	Bluebunch wheatgrass	Goldar	1.50	- 5
<i>Agropyron trachycaulum</i>	Slender wheatgrass	Pryor	1.00	- 3
<i>Calamovilfa longifolia</i>	Prairie sandreed	Goshen, Bowman	0.75	- 5
<i>Koeleria cristata</i> *	Prairie junegrass	VNS	0.10	- 5
<i>Poa sandbergii</i> *	Sandberg bluegrass	VNS, High Plains	0.25	- 5
<i>Schizachyrium scoparium</i>	Little bluestem	Badlands, Itasca	0.50	- 3
<i>Stipa comata</i>	Needle-and-thread	VNS	2.00	- 5
<b>Subtotal</b>			<b>9.10</b>	<b>- 39</b>
<b>FORBS:</b>				
<i>Achillea millefolium</i> *	Yarrow	VNS, Great Northern	0.05	- 3
<i>Dalea candida</i>	White prairie clover	Antelope	0.25	- 2
<i>Dalea purpurea</i>	Purple prairie clover	Kaneb, Bismarck	0.25	- 1
<b>Subtotal</b>			<b>0.55</b>	<b>- 6</b>
<b>SHRUBS:</b>				
<i>Artemisia cana</i> * <sup>3</sup>	Silver sagebrush	VNS	2.00	- 39
<i>Artemisia tridentata</i> var. <i>wyomingensis</i> * <sup>3</sup>	Wyoming big sagebrush	VNS	1.00	- 57
<i>Ceratoides lanata</i> *	Winterfat	Open Range	0.50	- 1
<b>Subtotal</b>			<b>3.50</b>	<b>- 7</b>
<b>TOTAL</b>			<b>13.15</b>	<b>- 142</b>

VNS: Variety not specified

<sup>1</sup>Based on a broadcast seeding rate of 142 Pure Live Seed (PLS) per square foot.

<sup>2</sup>This may not be a complete list; other named varieties listed by USDA-NRCS in Montana and South Dakota are acceptable.

<sup>3</sup>Optional based on landowner preference.

NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

\*Identified as species associated with sage-grouse habitat in Bird and Schenk (2005).

Sagebrush-3 Seed Mixture SAGE-3 (Spreads 4, 5)			BROADCAST SEEDING RATE <sup>1</sup>	
SCIENTIFIC NAME	COMMON NAME	VARIETY <sup>2</sup>	Pounds PLS/ Acre	PLS/ sq.ft.
<b>GRASSES:</b>				
<i>Agropyron smithii</i> *	Western wheatgrass	Rosana, Rodan, Walsh	2.50	- 6
<i>Agropyron trachycaulum</i>	Slender wheatgrass	Pryor	1.00	- 3
<i>Buchloe dactyloides</i> *	Buffalograss	Tatanka, Bismarck	3.00	- 4
<i>Calamovilfa longifolia</i>	Prairie sandreed	Goshen, Pronghorn	0.50	- 3
<i>Distichlis spicata</i>	Inland saltgrass	VNS	0.25	- 3
<i>Koeleria cristata</i> *	Prairie junegrass	VNS	0.10	- 5
<i>Poa sandbergii</i> *	Sandberg bluegrass	VNS	0.20	- 4
<i>Schizachyrium scoparium</i>	Little bluestem	Badlands, Itasca	0.50	- 3
<i>Stipa comata</i>	Needle-and-thread	VNS	2.00	- 5
<i>Stipa viridula</i>	Green needlegrass	Lodorm, AC Mallard Escovar	0.75	- 3
<b>Subtotal</b>			<b>10.80</b>	<b>- 39</b>
<b>FORBS:</b>				
<i>Achillea millefolium</i> *	Yarrow	VNS, Great Northern	0.05	- 3
<i>Dalea candida</i>	White prairie clover	Antelope	0.25	- 2
<i>Dalea purpurea</i>	Purple prairie clover	Kaneb, Bismarck	0.25	- 1
<b>Subtotal</b>			<b>0.55</b>	<b>- 6</b>
<b>SHRUBS<sup>3</sup>:</b>				
<i>Artemisia cana</i> *	Silver sagebrush	VNS	2.00	- 39
<i>Artemisia tridentata</i> var. <i>wyomingensis</i> *	Wyoming big sagebrush	VNS	1.00	- 57
<b>Subtotal</b>			<b>3.00</b>	<b>- 96</b>
<b>TOTAL</b>			<b>14.35</b>	<b>- 141</b>

VNS: Variety not specified

<sup>1</sup>Based on a broadcast seeding rate of 141 Pure Live Seed (PLS) per square foot.

<sup>2</sup>This may not be a complete list; other named varieties listed by USDA-NRCS in Montana and South Dakota are acceptable.

<sup>3</sup>Optional based on landowner preference.

NOTE: Species or rates may be revised based on commercial availability or site-specific conditions.

\*Identified as species associated with Sage-grouse habitat in Bird and Schenk (2005).

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<b>NRCS RECOMMENDED SEEDING DATES:</b>	September 15 to May 15, depending on climatic conditions. These dates may be altered at Keystone direction. Seeding outside these dates may be allowed with Keystone approval.
<b>MULCHING AND MATTING:</b>	All sagebrush will be mulched regardless of slope. Refer to Detail 52 for straw mulch. <b>ADDITIONAL REQUIREMENTS:</b> None unless otherwise directed by Keystone.
<b>SLOPE AND TRENCH BREAKERS:</b>	As specified in the CMR Plan at locations shown on Alignment Sheets or as directed by Keystone. Refer to Detail 3 for slope breakers and Detail 7 for trench breakers. <b>ADDITIONAL REQUIREMENTS:</b> None unless otherwise directed by Keystone.

**MANAGEMENT PRACTICES**

1. Provide for livestock and wildlife access across the trench at locations convenient to livestock and the landowner as practicable per the CMR Plan.
2. Construction and reclamation practices may be modified from those presented to suit site conditions or permit requirements with KXL approval.
3. Monitor revegetation and soil stability post construction. Areas of failed reclamation will be repaired. Sagebrush establishment in this Con/Rec Unit will be monitored on lands administered by the Bureau of Land Management (BLM).
4. Monitor and control noxious weeds as specified in the Montana and South Dakota Noxious Weed Management Plans.

## APPENDIX B. REVEGETATION SUCCESS MONITORING PLAN FOR SAGE-GROUSE HABITAT ALONG THE KEYSTONE XL PIPELINE PROJECT IN SOUTH DAKOTA.

### 1.0 INTRODUCTION

Post-construction reclamation monitoring in sagebrush habitat is required on the Keystone XL Pipeline Project (Project) as part of the Draft Environmental Impact Statement (DEIS). Specific monitoring requirements are intended to document successful reclamation of sage-grouse habitat through the following criteria:

1. “Monitor establishment of sagebrush on reclaimed areas annually for at least 4 years to ensure that sagebrush plants become established at densities similar to densities in adjacent sagebrush communities and implement additional seeding or plantings of sagebrush if necessary”; and
2. “Monitor densities of native forbs and perennial grasses on reclaimed areas and reseed with native forbs and grasses where densities are not comparable to adjacent communities” (DOS 2010).

This post-construction reclamation monitoring plan describes monitoring procedures that will be utilized on the Project in sage-grouse habitat to demonstrate achievement of the DEIS sagebrush monitoring requirement.

### 2.0 METHODS

Qualified reclamation specialists will conduct semi-quantitative pedestrian surveys of the right-of-way and other project components in sage-grouse habitat following construction. Reclamation specialists will:

- record canopy cover of by species and morphological class (e.g. native, introduced, perennial, annual, graminoids, shrub, tree) within sage-grouse habitat;
- monitor sagebrush reestablishment and density within sagebrush stands; and
- determine the need for remedial revegetation, repair, or noxious weed treatment at specific sites.

Reclamation in sage-grouse habitat will be assessed within Reclamation Evaluation Areas (REA). Each REA is a section of right-of-way with relatively consistent vegetation, soils, and topography. There may be several REA within any given mile of right-of-way depending on the variety of topography or vegetation that is crossed, although the minimum REA length is typically 0.25 mile. Stratifying the right-of-way into separate REA allows for a continuous comparison of reclamation within the right-of-way to the adjacent rangeland of similar slope and topography, and is consistent with other semi-quantitative monitoring methods that are used to determine rangeland condition (Elzinga 1998; Pellant et al. 2005). Vegetation data will be recorded as a range of values for each REA consistent with plotless methods that are used to evaluate vegetation development and condition (Mueller-Dombois and Ellenberg 1974). Paired monitoring plots will be used if necessary at specific locations. The following specific vegetation parameters will be assessed and were derived from interagency monitoring publications such as Measuring and Monitoring Plant Populations (Elzinga 1998), Interpreting Indicators of Rangeland Health (Pellant et al. 2005), Rangeland Health (NRC 1994), and Monitoring of Greater Sage-Grouse Habitats and Populations (Connelly et al. 2003). These indicators provide a relatively rapid, repeatable system for assessing reclamation relative to the MFSA standard. Representative photos will also be taken.

- **Total Vegetation Cover:** Total plant canopy cover will be ocularly estimated as a range in cover on the ROW and adjacent area within each REA.
- **Vegetation Cover by Morphological Class:** Vegetation cover for each class will be ocularly estimated as a range in cover on the ROW and adjacent area within each REA. Morphological classes will include:

- Native Perennial Grasses
  - Introduced Perennial Grasses
  - Introduced Annual Grasses
  - Native Perennial Forbs
  - Introduced Perennial Forbs
  - Native Annual/Biennial Forbs
  - Introduced Annual/Biennial Forbs
  - Subshrubs/Shrubs
  - Trees
- **Noxious Weeds:** Noxious weeds, if present, will be documented on separate noxious weed inventory forms within areas disturbed by the Project.
  - **Sagebrush Density:** Keystone will implement the DEIS-required sagebrush density mitigation measure by monitoring sagebrush on the right-of-way and within adjacent sagebrush communities in areas that have been identified as a sagebrush Construction/Reclamation Unit. Silver sagebrush (*Artemisia cana*) and big sagebrush (*Artemisia tridentata* spp. *wyomingensis* or spp. *tridentata*) density will be recorded for all plants that are rooted within a 2-meter-wide belt transect. Transects will be established perpendicular to, and across the entire right-of-way, and will extend 55 feet into adjacent sagebrush stands on both side of the right-of-way. All shrubs that are rooted within the belt transect will be recorded by species and age class as follows: seedling (<1dm tall and not flowering), immature (>1 dm and not flowering), mature (flowering sagebrush plant). Transects will be located at representative locations within each sagebrush stand that is affected by the Project. More than one transect will be located in lengthy areas of sagebrush that are traversed by the ROW. A photo will be taken of each transect.

### 3.0 REPORTING

Keystone will submit an annual monitoring report to the SDGFP that details revegetation establishment. Monitoring will be discontinued when conditions within an REA are similar to adjacent, provide sage-grouse habitat, or after five years, whichever occurs first.

### 4.0 LITERATURE CITED

- Connelly, J.W., K.P. Reese, and M.A. Schroeder. 2003. Monitoring of greater sage-grouse habitats and populations. College of Natural Resources Experiment Station Moscow, Idaho. Station Bulletin 80. 47 p.
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