

# Appendix K-2

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Reclamation Plan

# **TWO RIVERS WIND PROJECT**

## **RECLAMATION PLAN**

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## Acronyms and Abbreviations

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BLM	Bureau of Land Management
BMPs	best management practices
CWA	Clean Water Act
dS/m	deciSiemens per meter
ESDs	ecological site descriptions
ISC	Industrial Siting Council
kV	kilovolt
LANDFIRE	Landscape Fire and Resource Management Planning Tool
LRP	Limited Reclamation Potential
MLRA	Major Land Resource Region
MW	megawatts
POD	Plan of Development
ROD	Record of Decision
SAR	Sodium absorption ratio
SHWD	Solid and Hazardous Waste Division
the Project	Two Rivers Wind Energy Project
Two Rivers Wind	Two Rivers Wind, LLC
USACE	U.S. Army Corps of Engineers
WTGs	wind turbine generators
WDEQ - WQD	Wyoming Department of Environmental Quality-Water Quality Division
WYPDES	Wyoming Pollutant Discharge Elimination System

# 1.0 Introduction

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Two Rivers Wind, LLC (Two Rivers Wind) is proposing to develop the Two Rivers Wind Project (Project) on approximately 15,657 acres near the Town of Medicine Bow in unincorporated Carbon County, Wyoming. The Project area is comprised of predominately private fee lands with interspersed parcels administered by the State of Wyoming Office of State Lands and Investments and the Bureau of Land Management Rawlins Field Office (BLM RFO). Primary access to the Project site is from US30/US287. See **Figure 1** for a layout of the proposed facilities.

The Project comprises development of a wind powered electric generation facility (Two Rivers I, II, and III). Two Rivers I, II, and III are located in Carbon County north of Highway 30 and the Town of Medicine Bow (**Figure 1**).

The Project collectively holds interconnection queue position number Q719 with an interconnection capacity of 280 megawatts (MW). The number and manufacturer of wind turbine generators has not yet been finalized; however, preliminary plans for the proposed facility include up to 60 wind turbine generators (WTGs) using a 6.1 MW generator to achieve a total nameplate capacity of up to 280 MW.

The proposed facility will also contain step up transformers, a 34.5 kilovolt (kV) electrical collector system, an operations, maintenance and storage building, one substation, access roads, a 230 or 345 kV overhead transmission line, and a 230 or 345 kV overhead Generation-tie transmission line connecting the Project to the Western/Pacific Transmission GRID at PacifiCorp's Freezeout substation (**Figure 1**).

This Reclamation Plan was prepared in accordance with the Wyoming Industrial Siting Council (ISC) requirements and the Wyoming Department of Environmental Quality – Water Quality Division (WDEQ - WQD) stormwater program specifically the Wyoming Pollutant Discharge Elimination System (WYPDES) – Large Construction General Permit. This plan describes how land surface disturbed by the Project would be returned to a stable and productive condition consistent with the reclamation standards established in the ISC rules and regulations (ISC 2018). Since the Project includes areas regulated by the BLM RFO, reclamation plan requirements may be different for those development areas. For purposes of this reclamation plan the above listed standards apply to all non-federal lands.

## 1.1 Definitions, Objectives, and Success Standards

Reclamation is defined as the process of restoring all lands to a use for grazing, agriculture, recreation, wildlife purpose, or any purpose greater or equal value which satisfies the landowner or land management agency (ISC 2018).

Two Rivers will proceed with final reclamation as soon as practicable for areas that will not be re-disturbed during operations and maintenance, and for all other areas following decommissioning. The objective of final reclamation is to return the land to a condition approximating that which existed prior to disturbance with allowances for an improved and/or stable ecological condition where possible. This includes reconstruction of the landform by removing structures, backfilling, grading, contouring, compaction, stabilization, re-vegetation (with a uniform perennial cover), and drainage control (ISC 2018).

Reclamation success and/or final stabilization on non-federal lands would be measured against the standards set out in the ISC requirements (ISC 2018) and WDEQ – WQD rules and regulations (WDEQ – WQD 2016). These reclamation success standards address soil handling, drainage and erosion control, revegetation, invasive plants and noxious weeds, and landscape reconstruction. Two Rivers would reclaim impacted wetlands consistent with the requirements of the Clean Water Act (CWA) and a Section 404 permit from the U.S. Army Corps of Engineers (USACE).

## **2.0 Pre-Disturbance and Site Characterization**

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Pre-disturbance site characterization is critical for reclamation monitoring purposes to describe the surrounding landscape, determine ecological community types, and assess biophysical parameters. To complete pre-disturbance site characterization for the Project, Two Rivers completed a desktop analysis to assess soil, vegetation, climate, and other applicable information related to reclamation. Vegetation and soil surveys were then conducted to ensure that each site was appropriately classified.

The baseline information collected for pre-disturbance site characterization would include topographic, hydrologic, vegetation, and soil parameters when available. Methods for the pre-disturbance characterization and reclamation success monitoring on non-federal lands would be consistent with the methods found in the WDEQ rules and regulations.

Methods for the pre-disturbance characterization and reclamation success monitoring on BLM RFO administered lands would be consistent with the methods found in the Monitoring Manual for Grasslands, Shrubs, and Savanna Ecosystems. Second Edition. Volume 1: Core Methods (Herrick et al 2017).

### **2.1 Extent of Project Area Covered by Reclamation Plan**

This Reclamation Plan covers the approximate 15,657 acres of non-federal lands in the Project Area within Carbon County. The impact area is limited to the areas of temporary and permanent disturbance within the Project Area on non-federal lands. See Table 6 Disturbance Acreage by Landowner for the breakdown of disturbance acres by surface owner. Reclamation activities occurring on BLM RFO administered lands will follow their specified reclamation plan submitted in a separate document.

### **2.2 Ecological Sites Identified**

An ecological site is defined as a distinctive kind of land with specific soil and physical characteristics that differs from other kinds of lands in its ability to produce and support a distinctive type and amount of vegetation, and in its ability to respond similarly to management actions and natural disturbances (Natural Resources Conservation Service [NRCS] 2019). NRCS-approved ecological site descriptions (ESDs) provide guidelines for which vegetation species should occur in plant communities in different rainfall zones and soil types (Strom et al. 2010).



Existing information identified 16 ecological sites within the Project Area (Table 1) (NRCS 2019), with the majority of the Project Area (76.0 percent) not having ecological site information defined. The identified ecological sites are based on approved and/or provisional ESDs published as spatial data from the NRCS for the Project Area (NRCS 2019). All ecological sites within the Project area are found in the Major Land Resource Region (MLRA) 34A – Cool Central Desertic Basins and Plateaus. Ecological sites within the Project area are considered High Plains Southeast precipitation zone, Zone 9, with an average annual rainfall of 10-14 inches, Green River – Great Divide Basins precipitation zone, Zone 4, average annual rainfall of 7-9 inches, and Foothills and Basins West precipitation zone, Zone 7, average annual rainfall of 10-14 inches. Table 2 describes the position, slope, and estimated vegetation composition of the ecological site. Table 4 describes the ecological sites and temporary and permanent impacts along with untouched topsoil. See **Figure 2** for the mapped and existing ecological sites within the Project Area and ROWs.

Field surveys were carried out July 24 through July 30, 2018, to help determine ecological sites that occur within the Project Area. All areas surveyed during this time were within the undefined area on BLM-administered lands with no existing ecological site information. Field surveys were not carried out on non-federal lands during this time. Based on the field surveys the following ecological sites were found within the Project Area on BLM-administered land: loamy, loamy overflow, clayey, shallow clayey, impervious clay, sandy, rocky hills, saline loamy, saline lowland, saline subirrigated, and saline upland.

**Table 1. Ecological Sites within Project Area**

<b>Ecological Site ID</b>	<b>Ecological Site</b>	<b>BLM Land Acres</b>	<b>Non-BLM Acres</b>	<b>Total Acres</b>
<b>Existing ESD Mapping (SSURGO mapping data)</b>				
R034AY350WY	Sandy (High Plains Southeast)	97.9	0.5	98.4
R034XY312WY	Gravelly (10-14SE)		3.0	3.0
R034XY322WY	Loamy (10-14SE)	37.7	1,973.4	2,011.1
R034XY336WY	Saline Loamy (10-14SE)		468.2	468.2
R034XY338WY	Saline Lowland (10-14SE)		3.1	3.1
R034XY350WY	Sandy (10-14SE)		588.6	588.6
R034XY358WY	Shallow Clayey (10-14SE)		14.0	14.0
R034XY362WY	Shallow Loamy (10-14 SE)		616.5	616.5
R034XY366WY	Shallow Sandy (10-14SE)		104.7	104.7
R049XY108WY	Coarse Upland (15-19SE)		625.9	625.9
<b>Total<sup>1</sup></b>		<b>135.5</b>	<b>4,397.9</b>	<b>4,533.5</b>
<b>ICF Mapped ESD</b>				
R034AB126WY	Loamy, Calcareous (Green River Basin)	473.9	1,830.4	2,304.3
R034AY304WY	Clayey (High Plains Southeast)	247.5	147.2	394.7
R034AY350WY	Sandy (High Plains Southeast)	83		
		.3	159.1	242.4
R034XY318WY	Impervious Clay (10-14SE)	465.0	2,578.7	3,043.6
R034XY322WY	Loamy (10-14SE)	1,550.3	2,241.1	3,791.3
R034XY334WY	Rocky Hills (10-14SE)	558.4	1,183.0	1,741.4
R034XY336WY	Saline Loamy (10-14SE)	34.8	197.1	231.9
R034XY338WY	Saline Lowland (10-14SE)		451.2	451.2
R034XY342WY	Saline Subirrigated (10-14SE)	26.7	423.1	449.8
R034XY344WY	Saline Upland (10-14SE)	0.1	107.7	107.8
R034XY358WY	Shallow Clayey (10-14SE)	925.0	1,610.5	2,535.5
<b>Total</b>		<b>4,365.1</b>	<b>10,929.1</b>	<b>15,294.2</b>
<b>SSURGO/ICF Mapping Not Complete</b>		4.1	232.9	237.0
<b>Water</b>		0	92.9	92.9
<b>Grand Total</b>		<b>4,504.7</b>	<b>15,653.0</b>	<b>20,157.6</b>

<sup>1</sup>Total does not include the undefined acres. Source: NRCS 2019

**Table 2. Ecological Sites and Associated Position, Slope, and Estimated Vegetation Composition**

<b>Ecological Site</b>	<b>Position/Slope</b>	<b>Estimated Vegetation Composition</b>
Gravelly	Terrace breaks, all exposures, slopes mostly 5 to 30%	80% grasses/grass-like 10% forbs 10% woody plants
Coarse Upland	Upland position on gentle slopes, but may occur on all slopes and positions	60% grasses/grass-like 15% forbs 25% woody plants
Rocky Hills	Upland positions but may occur on all slopes and positions.	45% grasses/grass-like 10% forbs 45% woody plants
Shale	Upland positions, slopes vary from 1 to 70% but are mostly 5 to 25%	70% grasses/grass-like 10% forbs 20% wood plants
Sandy	Upland, flat to moderately sloping, typically ranging from 1 to 15%	75% grasses/grass-like 10% forbs 15% woody plants
Loamy	Upland, relatively flat to moderately sloping land on all exposures	80% grasses 10% forbs 10% woody plants
Loamy Overflow	Gently sloping to moderately sloping flood plains, canyons, and small valley bottoms along intermittent streams, found on all exposures.	70% grasses/grass-like 10% forbs 20% woody plants
Loamy Calcareous	Intermontane basin landscapes, flat to moderately sloping, up to 15%	70% grasses/grass-like 10% forbs 20% woody plants
Very Shallow	Upland positions with a wide variety of slopes, prevalent on wind swept ridges, most common slopes range from 25 to 50%	70% grasses/grass-like 15% forbs 15% wood plants
Shallow Loamy	Upland, south and west facing slopes, but may occur in all positions and slopes	70% grasses 10% forbs 20% woody plants
Saline Lowland	Gently sloping land along perennial and intermittent streams. Slopes 0 to 5%	70% grasses 10% forbs 20% woody plants
Saline Subirrigated	Nearly level land along perennial or intermittent streams, near seeps, sloughs, our springs. Found on broad, low lake terraces, lake plains, alluvial bottoms, and poorly drained bottom lands adjacent to stream channels. Slopes mostly less than 3%.	80% grasses/grass-like 10% forbs 10% wood plants

<b>Ecological Site</b>	<b>Position/Slope</b>	<b>Estimated Vegetation Composition</b>
Shallow Sandy	Upland, south and west facing slopes, but may occur in all positions and slopes	75% grasses 10% forbs 15% woody plants
Saline Loamy	Lowland, flat to gently sloping, but can occur in all positions	60% grasses 10% forbs 30% woody plants
Clayey	Valley bottoms and gently sloping to steep mountain slopes, found on all exposures toward north and east slopes on lower elevations.	80% grasses/grass-like 10% forbs 10% woody plants
Shallow Clayey	Upland, south and west facing slopes, but may occur in all positions and slopes	70% grasses 10% forbs 20% woody plants
Impervious Clay	Lowland, flat to gently sloping, but can occur in all positions	50% grasses 5% forbs 45% woody plants
Saline Upland	Lowland, slopes 1 to 25%, typically 1 to 10% but can occur in all positions and slope	50% grasses 5% forbs 45% woody plants

## 2.3 Reference Sites

Reference sites document the site characteristics necessary to evaluate reclamation success standards and serve as a reference to the surrounding landscape and ecological community types within the disturbance area. Multiple reference sites for each ecological site account for local variability in vegetation, soil, and climatic conditions and provide a range of vegetation and soil baseline standards to assess reclamation success. In addition to reference sites, characterizations have been completed within the disturbance area to further verify that the disturbance area is similar in character to the selected reference site(s). The amount of reference sites will be identified at the time of interim reclamation monitoring and in coordination with the regulating agency.

## 2.4 Drainages, Waterways, Wetlands, and Riparian Areas

Drainages and waterways will be protected by standards described in the general WYPDES permit WYR10-0000 (WDEQ – WDQ 2016). Perennial streams located on private land will be spanned by the transmission line and access to the line would be obtained from either side of the stream; no access road crossing of perennial streams on private land are planned. Access road crossings of intermittent streams will be constructed as low water ford-type crossings on non-federal land.

Proper erosion control techniques, such as water dips and water bars, wing ditches and rip-rap would be used along access routes as appropriate.

The USACE regulates the discharge of dredged or fill material into waters of the United States, including jurisdictional wetlands, under Section 404 of the CWA. Two Rivers has not identified any construction activities that would require permitting under Section 404 of the CWA at this time. If impacts to waters of the United States, including jurisdictional wetlands, are identified during final design, Two Rivers will initiate consultation with the USACE to review the Project.

## 2.5 Vegetation and Weeds

The Landscape Fire and Resource Management Planning Tool (LANDFIRE) was used to determine current existing vegetation communities that occur within the Project Area. The Project Area includes several vegetation types characterized by areas of sagebrush steppe, sagebrush shrubland, grassland, and woodland. Wetland, floodplain, riparian, depressional, and developed communities are also present in the Project Area and ROWs. Table 3 identifies the vegetation communities that occur in the Project Area. See **Figure 3** for the Landcover class information within the Project Area and ROWs.

**Table 3. Vegetation Communities within the Project Area**

Landcover Group	Landcover Class	Total Acres
Grassland/Herbaceous	Western Cool Temperate Pasture and Hayland	51.7
	Introduced Upland Vegetation-Annual and Biennial Forbland	20.5
	Introduced Upland Vegetation-Annual Grassland	0.6
	Western Cool Temperate Developed Ruderal Grassland	110.2
	Western Cool Temperate Urban Herbaceous	36.1
	Western Great Plains Depressional Wetland Systems	15.5
	Inter-Mountain Basins Semi-Desert Grassland	195.5
	Northern Rocky Mountain Lower Montane-Foothill-Valley Grassland	103.5
	Introduced Upland Vegetation-Perennial Grassland and Forbland	16.4
	Northwestern Great Plains Mixedgrass Prairie	0.7
	Rocky Mountain Wetland-Herbaceous	13.5
	Western Great Plains Floodplain Herbaceous	6.8
	Artemisia tridentata ssp. vaseyana Shrubland Alliance	818.3
	Inter-Mountain Basins Big Sagebrush Steppe	5,631.3
	Inter-Mountain Basins Montane Sagebrush Steppe	93.8
	Inter-Mountain Basins Semi-Desert Shrub-Steppe	762.8
	<b>7,877.2</b>	
Shrub/Scrub	Wyoming Basins Dwarf Sagebrush Shrubland and Steppe	334.8
	Inter-Mountain Basins Mat Saltbrush Shrubland	718.0
	Inter-Mountain Basins Big Sagebrush Shrubland	10,392.6
	Inter-Mountain Basins Greasewood Flat	51.1
	Inter-Mountain Basins Mixed Salt Desert Scrub	5.3

Landcover Group	Landcover Class	Total Acres
	Rocky Mountain Gambel Oak-Mixed Montane Shrubland	0.7
	Rocky Mountain Lower Montane-Foothill Shrubland	83.0
	Western Cool Temperate Developed Ruderal Shrubland	54.4
	Western Cool Temperate Urban Shrubland	24.6
	Rocky Mountain Subalpine/Upper Montane Riparian Shrubland	109.6
	Western Great Plains Floodplain Shrubland	0.2
		<b>11,774.2</b>
Deciduous Forest	Rocky Mountain Aspen Forest and Woodland	11.0
	Western Cool Temperate Urban Deciduous Forest	0.2
	Western Great Plains Floodplain Forest and Woodland	164.5
		<b>175.8</b>
Evergreen Forest	Rocky Mountain Foothill Limber Pine-Juniper Woodland	91.3
	Colorado Plateau Pinyon-Juniper Woodland	7.6
	Southern Rocky Mountain Ponderosa Pine Woodland	2.2
	Inter-Mountain Basins Juniper Savanna	0.4
		<b>101.5</b>
Mixed Forest	Inter-Mountain Basins Curl-leaf Mountain Mahogany Woodland	1.8
	Rocky Mountain Montane Riparian Forest and Woodland	198.4
		<b>200.2</b>
Developed	Developed-High Intensity	0.7
	Developed-Low Intensity	8.9
	Developed-Medium Intensity	6.0
	Developed-Roads	103.8
		<b>119.4</b>
Non-vegetated	Barren	74.5
	Open Water	34.5
		<b>109.0</b>
Sparsely vegetated	Inter-Mountain Basins Sparsely Vegetated Systems	46.9
	Rocky Mountain Alpine/Montane Sparsely Vegetated Systems	3.1
		<b>50.0</b>
<b>Project Area Total</b>		<b>20,407.3</b>

Source: LANDFIRE data.

## 2.5.1 Inter-Mountain Basins Big Sagebrush Shrubland (50.9 percent of Project Area)

This system occurs throughout much of the western U.S., usually in broad basins between mountain ranges, plains, and foothills between 1,500 and 2,300 meters in elevation. Soils are typically deep, well-drained and non-saline. These shrublands are dominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and/or Wyoming big sagebrush (*Artemisia*

*tridentata* ssp. *wyomingensis*). Scattered juniper (*Juniperus* spp.), greasewood (*Sarcobatus vermiculatus*), and saltbush (*Atriplex* spp.) may be present in some stands. Rabbitbush (*Ericameria* spp.), rabbitbrush (*Chrysothamnus* spp.), or mountain snowberry (*Symphoricarpos oreophilus*) may codominate disturbed stands. Common graminoid species include Indian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis*), thickspike wheatgrass (*Elymus lanceolatus*), needle and thread (*Hesperostipa comata*), basin wildrye (*Leymus cinereus*), western wheatgrass (*Pascopyrum smithii*), and Sandberg bluegrass (*Poa secunda*).

## 2.5.2 Inter-Mountain Basins Big Sagebrush Steppe (27.6 percent of Project Area)

This widespread system occurs throughout much of the Columbia Plateau and northern Great Basin. Soils are typically deep and non-saline, often with a microphytic crust. This shrub-steppe is dominated by perennial grasses and forbs with basin big sagebrush, Wyoming big sagebrush, and/or antelope bitterbrush dominating or co-dominating the open to moderately dense shrub layer. Shadscale saltbush (*Atriplex confertifolia*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush (*Ericameria nauseosa*), greasewood, horsebrush (*Tetradymia* spp.), or prairie sagewort (*Artemisia frigida*) may be common especially in disturbed stands. In Wyoming, stands are more mesic, with more biomass of grass, with less shrub diversity than stands farther west, and 50 to 90% of the occurrences are dominated by Wyoming big sagebrush with western wheatgrass. Cheatgrass may be present and is indicative of disturbance.

## 2.6 Limited Reclamation Potential Areas and Sensitive Soils

Areas of limited reclamation potential (LRP) or sensitive soils may be found within the Two Rivers Project Area. For purposes of this section the BLM definition from the Wyoming Reclamation Policy (BLM 2012) will be used to describe these areas. The following criteria to identify potential LRP areas:

- Slopes greater than 25% on south or southwest facing aspects;
- Rock outcrops;
- Marine shale and seleniferous geological substrates;
- Vegetation communities dominated by salt-loving (halophytic) plant species or other sensitive plant communities;
- Noxious and invasive weed species; or
- Annual precipitation less than nine inches.

Sensitive soil conditions can be identified from the site-specific soils and vegetation data incorporated into the ecological site mapping. The BLM defines sensitive soils as containing one or more the following characteristics (BLM 2012):

- Topsoil depth: no topsoil available or very shallow – less than 3 inches.
- pH: greater than 8.4.

- Electrical conductivity: greater than 8 deciSiemens per meter (dS/m), indicating strongly saline soils.
- Sodium absorption ratio (SAR): greater than 13 (laboratory test), indicating sodic soils.
- Texture: sand, sandy clay, silty clay, clay, or silt.
- Parent materials: marine shale, clay/siltstone, seleniferous geological substrates.
- Halophytes: e.g., Gardner’s saltbush.
- Alkali halophytes: e.g., black greasewood.
- Selenium accumulator plants: e.g., two-grooved milkvetch, prince’s plume, and wood aster.
- Very shallow, saline, lowland, sands, clayey, or badland ecological sites.

Where avoidance is not practicable, best management practices (BMPs) and other strategies designed to address site-specific conditions will be implemented to increase reclamation success. LRP sites and areas of sensitive soil conditions will be identified and reported to the regulating agency prior to additional surface-disturbing activities. In the event site-specific LRP areas or sensitive soils are identified, additional LRP/sensitive soil BMPs and protective measures will be implemented in coordination with the regulating agency. Two Rivers will implement additional site-specific BMPs and protective measures (e.g., topsoil amendments, soil remediation, weed control, etc.) as needed and in coordination with the regulating agency following the implementation of reclamation and monitoring, if reclamation standards are not being met in LRP areas and/or sensitive soils.

Areas of LRP can be found throughout the Project area and ROWs as identified in **Figure 1** relating to 25% slopes or greater. It may be likely that these slopes are also associated with rock outcrops. Sensitive soil conditions can be found within greasewood dominated vegetation communities and locations determined to be within a clayey ecological site. Ecological site mapping within the Project area and ROWs identified as very shallow, saline, lowland, sands, clayey or badlands would also be considered sensitive soil conditions.

### 3.0 Surface-Disturbing Activities

The Preliminary Plan of Development (POD) for the Project includes details of the Project design and a description of surface-disturbing activities. Two Rivers would begin reclamation immediately following construction with initial stabilization followed by interim and final reclamation, as appropriate. Table 4 describes disturbance by landowner. Disturbance acreages include access roads within the Project Area and outside the Project area, structure sites, turbine sites, collector lines between turbine locations, and electric transmission lines between Project Areas and to the Freezeout substation.

**Table 4. Disturbance Acreages by Landowner**

Disturbance Type	Land Ownership			Total (acres)
	BLM (acres)	Private (acres)	State (acres)	
Temporary <sup>1</sup>	242.8	275.7	38.7	557.1



Untouched Topsoil <sup>2</sup>	4.6	8.9	0.9	<b>14.4</b>
Permanent <sup>3</sup>	61.7	54.6	6.3	<b>122.7</b>

<sup>1</sup> Temporary disturbance areas will have the topsoil cleared and used throughout the construction period before being reclaimed. Topsoil will be segregated from subsoil and marked accordingly.

<sup>2</sup> Untouched topsoil areas are for the crane paths and will have vehicles driven on rig mats used to protect the underlying vegetation. Area use is very temporary (typically a few days) and no topsoil or ground clearing occurs.

<sup>3</sup> Permanent disturbance areas will be used throughout the entire project lifetime before final reclamation.

### 3.1 Access Roads

Within the site, access roads will lead to the maintenance and storage facilities, the concrete batch and mixing plant, substations, individual WTGs, and transmission structures. Periodic maintenance will be conducted to ensure safe access to project components. Project access will require a combination of new access roads, improvements to existing roads, and use of existing roads as is. Wherever available and practicable, existing roads, including two-tracks, will be used with upgrades.

New access roads or improvements to existing access roads will be constructed using a bulldozer or grader, followed by a roller compact and smooth the ground. All access roads will be temporarily constructed to a width of 50 feet, to include the travel surface and drainage, and then reduced to a smaller permanent width after completion of construction. The permanent width for arterial roads is 28 feet; the width for turbine facility roads leading to the turbines, substations, batch plants, laydown yards, and buildings and facilities will be 20 feet; and the width for structure roads to met towers will be 12 feet. The temporary width of transmission line roads will be 20 feet and then reduced to an 8-ft two-track road after completion of construction. For crane paths, an 80-ft-wide rig mat is temporarily laid down to accommodate crane tracks that are typically 50-ft-wide.

### 3.2 Structures Sites and Right-of-Way

At each structure site, grading and leveling for equipment set up will be needed to facilitate the safe operation of equipment. A temporary construction ROW will be requested to accommodate tower assembly and construction, installation of transmission structures, and pulling and tensioning sites. In locations where guys and anchors would be required (i.e., locations of angles along the route) a setback radius around the structure site is required to accommodate the structural supports. The clearing of some natural vegetation will be required within the ROW; however, selective clearing will be performed only when necessary to provide for surveying, electrical clearance, line reliability, and construction and maintenance operations. A 150-foot permanent right of way for operation and maintenance of the transmission line for 50 years is requested.

### 3.3 Foundation Installation

Once the site preparation and road construction is complete, the WTG foundations will be excavated. Foundations are expected to have a diameter of approximately 55 feet. Following the construction of the wind turbine foundation the site will be cleared and graded for wind turbine installation. The site will be compacted as needed using compaction rollers and water trucks. If

required for stabilization based on soil conditions, an aggregate surface will be placed across the site using belly-dump trailers, bulldozers, and motor graders.

Excavations for poles are made with power equipment. Where the soil permits, a vehicle-mounted power auger or backhoe is to be used. In rocky areas, the foundation holes may be excavated by drilling and blasting, or special rock anchors may be installed. Blasting will require drilling holes in the area to be excavated. Conventional or plastic explosives will be used. Safeguards such as blasting mats may be used as necessary to protect adjacent property. After the hole is augured, poles will be set, backfilled, and tamped using existing spoils. Remaining spoils material will be spread on the ground.

### **3.4 Construction Yards (or Staging Areas)**

Construction of the transmission system begins with establishment of staging areas or laydown yards. The staging area is about 5 acres and will be located on state or private land. Staging areas serve as field offices, reporting locations, parking areas for vehicles and equipment, material storage, fabrication assembly, and equipment maintenance stations. In some areas, the staging area may need to be scraped by a bulldozer and a temporary layer of gravel may be spread to provide an all-weather surface. Unless directed otherwise by the landowner, the gravel will be removed upon completion of construction and the area will be restored according to the Master Reclamation Plan.

## **4.0 Site Preparation and Seeding**

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The goal of site preparation and seeding is to 1) prepare the Project Area for successful revegetation, and 2) establish a desired uniform native plant community. Components of site/seedbed preparation and seeding include soil management, landscape reconstruction and erosion control, and revegetation as described below.

### **4.1 Soil Management**

The purpose of soil management is to maintain physical, chemical, and biological properties of soils while achieving a site balance of the soil resource. Salvaged soil will be removed as cut, used as fill, or stockpiled for interim reclamation. Components of soil management include soil handling, landscape reconstruction, and erosion control. Soil will be managed in accordance with the WYPDES Permit WYR10-0000 (WDEQ – WQD 2016), as further detailed below.

#### **4.1.1 Soil Handling**

Soil for the Project will be managed in accordance with the WYPDES Permit WYR10-0000 (WDEQ – WQD 2016) including provisions for segregating and marking stockpiles, and protecting stockpiled material from erosion, contamination and degradation. Two Rivers will apply BMPs, as described in the Preliminary POD or the WYPDES Permit WYR10-0000, during surface-disturbing activities, as appropriate.

#### **4.1.1.1 Vegetation Clearing**

Vegetation clearing would be required during leveling for equipment set up at structure sites, for access roads, for temporary construction laydown areas, at temporary construction yard areas, and for long-term operation and maintenance of the wind farm. If vegetation clearing is required, Two Rivers would conduct vegetation clearing based upon vegetation characteristics and design requirements, including the following:

- In areas with no significant amount of woody shrubs (less than 5 percent), Two Rivers will strip topsoil in areas that contain relatively low and sparse native grasses without performing vegetation clearing so that the native vegetation is mixed directly into the stripped topsoil, increasing organic matter and maintaining the native soil biota and seedbank.
- The height of the vegetation will first be reduced by mowing the area, typically with a tractor pulled brush hog, in areas where the amount of native grasses would hinder topsoil stripping. The clippings would remain with the topsoil during the stripping process.
- Areas with higher concentrations of woody brush will be cleared first by cutting and mulching the vegetation prior to stripping the topsoil. Cutting and mulching is commonly performed with a skid steer equipped with a clearing and mulching attachment. The mulch will remain with the topsoil during the stripping process.
- Two Rivers may push vegetation to the limits of disturbance using bulldozers or similar equipment prior to stripping topsoil for areas with very dense vegetation including wooded areas. Two Rivers will chip and mulch the vegetation and place it on top of the topsoil storage piles for purposes of stabilization once the topsoil storage piles are established.

#### **4.1.1.2 Topsoil Stripping and Stockpiling**

If topsoil stripping is required, Two Rivers will salvage the top 3 inches of topsoil or will salvage to a restrictive layer within the top 6 inches, with an average depth less than 6 inches. When the topsoil depth is greater than 6 inches, Two Rivers will generally not salvage to the soil horizon depth to minimize mixing topsoil with subsoils, and to reduce overall stockpile footprints. Soil horizons below the top horizon may be biologically active in the upper portion of the soil profile and maintain suitable rooting material for plants and may be considered as suitable topsoil, unless a restrictive layer is present. Two Rivers may elect to remove some additional topsoil for use in interim and final reclamation, with approval from the regulating agency. Topsoil will not be salvaged from saline ecological sites; soil from all depths will be handled as subsoil to minimize movement and mixing of strongly saline soils.

When performing topsoil stripping, Two Rivers will set the stripping equipment (typically motor grader or similar) to strip topsoil to the depth discussed above. Such equipment typically has a tolerance of plus or minus 2 to 3 inches due to terrain effects. Topsoil will be stripped and stockpiled at the edge of temporary disturbance areas. Topsoil stockpiles will be designed to minimize surface area and maintain geomorphic stability. Soil stabilization will be implemented as soon as practicable on topsoil stockpiles. All stockpiles will be protected from erosion, degradation, and contamination and placed in areas that will not affect existing drainages.

The stockpiled topsoil will be re-spread on disturbed areas. Stockpiled topsoil from specific ecological sites will be used within the same ecological site. If topsoil is needed for additional reclamation activities and requires movement across ecological site boundaries, the ecological site will be noted and ecological site compatibility will be considered prior to redistribution of topsoil,

in coordination with the regulating agency. Compatible ecological sites may include sites that share the similar predominant soil texture but are located in different precipitation zones (e.g., Sandy 7-9 Inch ecological sites and Sandy 10-14 Inch ecological sites). Topsoil that is not used to reclaim temporary disturbance will remain stockpiled for reclamation following decommissioning. Topsoil stockpiles will be seeded with desired vegetation if they remain longer than one growing season. Stockpiles left for more than two years will be no deeper than two feet, including the native topsoil underneath. Additional information will be included concerning topsoil boundaries and topsoil depths as information is compiled before construction.

#### **4.1.1.3 Subsoil Excavation and Stockpiling**

Subsoil excavation for the Project would be limited to excavation for the WTG foundations, the foundation holes for the transmission structures, and trenching for the underground sections of the electrical system. Excavated subsoils would be used to backfill trenches and foundation holes, and stockpiling of subsoils would not be required.

#### **4.1.1.4 Backfill and Grading**

Once topsoil has been removed and any necessary components have been installed, the construction area will be brought to final elevation by backfilling (if necessary) and grading. Backfilling will primarily involve moving soil locally with bulldozers over short distances. Following backfilling, construction areas will be graded to their final elevation and slope.

#### **4.1.1.5 Unsuitable and Contaminated Soil**

Contaminated soil is soil that is subject to a foreign substance during construction or operation that modifies the chemical properties of the soils to the extent that vegetation re-establishment is not achievable within a reasonable amount of time. Two Rivers will manage waste materials to minimize the occurrence of contaminated soils. In compliance with the WDEQ – Solid and Hazardous Waste Division (SHWD) all hazardous, non-hazardous, special, and general wastes, including contaminated soils, will be segregated and will be disposed of off-site at authorized disposal facilities. No waste will be buried on-site. Hazardous material will be managed and disposed of in accordance with all applicable laws, ordinances, and regulations, and standards governing the use, transport, and disposal of hazardous materials.

#### **4.1.1.6 Soil Handling Best Management Practices**

Two Rivers will apply soil handling BMPs to the surface-disturbing activities associated with the Project. Soil handling BMPs are designed and implemented to improve the likelihood of reclamation success. If necessary, the WDEQ – WQD will provide input on remedial actions to further facilitate reclamation success. Administrative BMPs may include soil stabilization measures, contamination remediation, and soil amendments, and will be determined in coordination with the regulating agency.

## **4.2 Landscape Reconstruction and Erosion Control**

Two Rivers will control surface runoff and erosion in areas exposed to surface-disturbing activities by reconstructing the landscape to maintain soil stability. The landscape in disturbed area will be reconstructed to achieve a desired topography, slope stability, and surface stability in accordance

with the WYPDES Permit WYR10-0000 and will follow original topographic contours. Reconstruction will maximize geomorphic stability and topographic diversity of the reclaimed topography. Two Rivers will eliminate highwalls, cut slopes, and/or topographic depressions on site, unless otherwise approved by the regulating agency. Two Rivers will propose alternative landscape designs in coordination with the regulating agency prior to reconstruction activities in the event that the original topography and landscape cannot be reconstructed.

Two Rivers will reconstruct water courses and drainage features where feasible to approximate the natural features and hydrologic characteristics of pre-disturbance conditions by maintaining the drainage pattern, profile, and dimension. Slope stability will be controlled by implementing erosion control measures and BMPs to minimize sheet and rill erosion. Two Rivers will stabilize the surface by maintaining soil physical properties and treating compacted surfaces using BMPs.

Two Rivers will re-establish the complementary visual composition to ensure that the reclaimed landscape features blend into the adjacent areas and conform to the land use plan decisions.

The Project design maintains subsurface integrity and prevents surface and ground water contamination as required by the WYPDES Permit WYR10-000 (WDEQ – WQD 2016).

## 4.3 Site Preparation

Two Rivers will implement soil conditioning, decompaction, and topsoil protection measures to reestablish topsoil properties and to protect the seeding surface. Seedbed preparation maximizes seeding efficiency and improves reclamation success and includes topsoil replacement, discing, mulching, hydro-seeding, furrow placement, fencing, targeted fertilization, geotextiles, watering, and other surface roughening techniques as appropriate. Preparation techniques will be closely monitored and evaluated based on revegetation success and may include compaction and moisture content testing. Soil conditioning and amendments may be necessary to ameliorate poor topsoil and subsoil quality.

Two Rivers will implement the following BMPs to redistribute topsoil and protect the seeding surface, as appropriate and necessary:

- Suspend construction activities when soils are too wet to support construction equipment without significant rutting. In general, activities that cause in excess of four inches of rutting will be halted, unless such rutting occurs in subsoils that will be cut or filled beyond the extent of the rutting;
- To the extent practicable, do not mix topsoil and subsoil during site preparation;
- Perform primary tillage of the subsoil prior to the replacement of topsoil to improve drainage;
- Perform secondary tillage of topsoil to break up clods; secondary tillage will be no deeper than the depth of the replaced topsoil;
- Till across slope or perpendicular to the prevailing wind to reduce erosion;
- Prior to seeding, perform a final tillage to break up any remaining clods and produce a firm seed bed;
- Inspect the soil surface for ponding or gullyng;

- After seeding, create furrows or pits to roughen the soil surface, increase moisture infiltration, capture blowing snow, and slow the surface velocity of wind and water to reduce erosion and sedimentation; and
- Minimize sheet and rill erosion on or adjacent to the reclaimed area ensuring there is no evidence of mass wasting, head cutting, large rills or gullies, down cutting in drainages, or overall slope instability on or adjacent to the reclaimed area.

## 4.4 Revegetation

The primary objective of revegetation is to establish a desired, self-perpetuating native plant community and total ground cover. Proper seed mixtures will be used to reclaim disturbed areas on non-federal lands with native vegetation. The seed mixes will be further refined according to the present ecological sites and associated conditions.

Initial seeding will be used to achieve temporary vegetation coverage or stabilization of soil stockpiles or until interim or final reclamation measures can be implemented. Longer term reclamation measures would include seeding following the redistribution of soils to the original vertical profiles, compaction evaluations, mulching and amendment additions, and soil roughening. Compaction will be reduced to an appropriate depth (below the root zone, 18 – 24 inches) per the conditions of approval prior to re-distribution of topsoil, to accommodate desired plant species.

### 4.4.1 Seed Mixture Design

Seed mixes will be tailored to establish species composition, diversity, structure, and total ground cover appropriate for the desired plant community which reflects the baseline conditions in each ecological site in the Project Area. The seed mixture selection process will consider commercial availability and cost, growth form, seasonal variety, and prevailing dominant and locally adapted species. Only approved, certified weed-free seeds will be used. Two Rivers, in coordination with the regulating agency, will develop a specific seed mixture for each reclamation prescription on non-federal lands. Locally adapted native plant materials based on the site characteristics and ecological setting (i.e., the pre-disturbance site characterization) will be selected where possible to increase the likelihood of successful reclamation.

**Table 5. Example Seed Mixes per Ecological Site**

Ecological Site	Species
Gravelly	Green rabbitbrush ( <i>Chrysothamnus viscidiflorus</i> )
	Skunkbush sumac ( <i>Rhus trilobata</i> )
	Bluebunch wheatgrass ( <i>Pseudoroegneria spicata</i> )
	Indian ricegrass ( <i>Achnatherum hymenoides</i> )
	Needle and thread ( <i>Hesperostipa comate</i> )
	Thickspike wheatgrass ( <i>Elymus lanceolatus ssp. lanceolatus</i> )
	Hood’s phlox ( <i>Phlox hoodii</i> )
Coarse Upland/Very Shallow	Violet ( <i>Viola spp.</i> )
	Big sagebrush ( <i>Artemisia tridentata ssp. Wyomingensis</i> )
	Black sagebrush ( <i>Artemisia nova</i> )
	Bluebunch wheatgrass ( <i>Pseudoroegneria spicata</i> )
	Western wheatgrass ( <i>Pascopyrum smithii</i> )

Ecological Site	Species
Rocky Hills	Indian ricegrass ( <i>Achnatherum hymenoides</i> )
	Fringed sagewort ( <i>Artemisia frigida</i> )
	Hood's phlox ( <i>Phlox hoodii</i> )
	Buckwheat ( <i>Eriogonum spp.</i> )
	Yarrow ( <i>Achillea millefolium</i> )
	Alderleaf mountain mahogany ( <i>Cercocarpus montanus</i> )
	Green rabbitbrush ( <i>Chrysothamnus viscidiflorus</i> )
	Big sagebrush ( <i>Artemisia tridentata ssp. Wyomingensis</i> )
	Black sagebrush ( <i>Artemisia nova</i> )
	Bluebunch wheatgrass ( <i>Pseudoroegneria spicata</i> )
	Western wheatgrass ( <i>Pascopyrum smithii</i> )
	Indian ricegrass ( <i>Achnatherum hymenoides</i> )
	Needle and thread ( <i>Hesperostipa comate</i> )
Sandy/Shallow Sandy	Hood's phlox ( <i>Phlox hoodii</i> )
	Buckwheat ( <i>Eriogonum spp.</i> )
	Fringed sagewort ( <i>Artemisia frigida</i> )
	Big sagebrush ( <i>Artemisia tridentata ssp. Wyomingensis</i> )
	Silver sagebrush ( <i>Artemisia cana</i> )
	Indian ricegrass ( <i>Achnatherum hymenoides</i> )
	Needle and thread ( <i>Hesperostipa comate</i> )
	Bottlebrush squirreltail ( <i>Elymus elymoides</i> )
	Sandberg bluegrass ( <i>Poa secunda ssp. Sandbergii</i> )
	Thickspike wheatgrass ( <i>Elymus lanceolatus ssp. lanceolatus</i> )
	Green rabbitbrush ( <i>Chrysothamnus viscidiflorus</i> )
	Scarlet globemallow ( <i>Sphaeralcea coccinea</i> )
	Scurfpea ( <i>Psoraleidium lanceolatum</i> )
Loamy/Shallow Loamy	Buckwheat ( <i>Eriogonum spp.</i> )
	Fringed sagewort ( <i>Artemisia frigida</i> )
	Big sagebrush ( <i>Artemisia tridentata ssp. Wyomingensis</i> )
	Western wheatgrass ( <i>Pascopyrum smithii</i> )
	Thickspike wheatgrass ( <i>Elymus lanceolatus ssp. lanceolatus</i> )
	Needle and thread ( <i>Hesperostipa comate</i> )
	Prairie junegrass ( <i>Koeleria macrantha</i> )
	Threadleaf sedge ( <i>Carex filifolia</i> )
	Sandberg bluegrass ( <i>Poa secunda ssp. Sandbergii</i> )
	Green rabbitbrush ( <i>Chrysothamnus viscidiflorus</i> )
	Yarrow ( <i>Achillea millefolium</i> )
	Scarlet globemallow ( <i>Sphaeralcea coccinea</i> )
	Loamy Calcareous
Indian ricegrass ( <i>Achnatherum hymenoides</i> )	
Needle and thread ( <i>Hesperostipa comate</i> )	
Bottlebrush squirreltail ( <i>Elymus elymoides</i> )	
Sandberg bluegrass ( <i>Poa secunda ssp. Sandbergii</i> )	
Thickspike wheatgrass ( <i>Elymus lanceolatus ssp. lanceolatus</i> )	
Green rabbitbrush ( <i>Chrysothamnus viscidiflorus</i> )	
Rubber rabbitbrush ( <i>Ericameria nauseosa</i> )	
Scarlet globemallow ( <i>Sphaeralcea coccinea</i> )	
Western wheatgrass ( <i>Pascopyrum smithii</i> )	
Loamy Overflow	Western wheatgrass ( <i>Pascopyrum smithii</i> )

Ecological Site	Species
Clayey/Shallow Clayey	Slender wheatgrass ( <i>Elymus trachycaulus</i> )
	Great basin wildrye ( <i>Leymus cinereus</i> )
	Green needlegrass ( <i>Nassella viridula</i> )
	Green rabbitbrush ( <i>Chrysothamnus viscidiflorus</i> )
	Rubber rabbitbrush ( <i>Ericameria nauseosa</i> )
	Silver sagebrush ( <i>Artemisia cana</i> )
	Big sagebrush ( <i>Artemisia tridentata</i> )
	Birdsfoot sagebrush ( <i>Artemisia pedatifida</i> )
	Western wheatgrass ( <i>Pascopyrum smithii</i> )
	Slender wheatgrass ( <i>Elymus trachycaulus</i> )
	Green needlegrass ( <i>Nassella viridula</i> )
Impervious Clay	Bottlebrush squirreltail ( <i>Elymus elymoides</i> )
	Sandberg bluegrass ( <i>Poa secunda</i> )
	Woodyaster ( <i>Xylorhiza glabriuscula</i> )
	Birdsfoot sagebrush ( <i>Artemisia pedatifida</i> )
	Western wheatgrass ( <i>Pascopyrum smithii</i> )
	Indian ricegrass ( <i>Achnatherum hymenoides</i> )
	Bottlebrush squirreltail ( <i>Elymus elymoides</i> )
Saline Upland/Saline Lowland/Saline Subirrigated	Sandberg bluegrass ( <i>Poa secunda</i> )
	Desert madwort ( <i>Alyssum desertorum</i> )
	Woodyaster ( <i>Xylorhiza glabriuscula</i> )
	Gardner's saltbush ( <i>Atriplex gardneri</i> )
	Greasewood ( <i>Sarcobatus vermiculatus</i> )
	Alkali sacaton ( <i>Sporobolus airoides</i> )
	Western wheatgrass ( <i>Pascopyrum smithii</i> )
	Indian ricegrass ( <i>Achnatherum hymenoides</i> )
Saline Loamy	Nuttall's alkaligrass ( <i>Puccinellia nuttalliana</i> )
	Sandberg bluegrass ( <i>Poa secunda</i> )
	Milkvetch ( <i>Astragalus spp</i> )
	Woodyaster ( <i>Xylorhiza glabriuscula</i> )
	Gardner's saltbush ( <i>Atriplex gardneri</i> )
	Birdsfoot sagebrush ( <i>Artemisia pedatifida</i> )
	Western wheatgrass ( <i>Pascopyrum smithii</i> )
	Needle and thread ( <i>Hesperostipa comata</i> )
Shale	Bottlebrush squirreltail ( <i>Elymus elymoides</i> )
	Bluebunch wheatgrass ( <i>Pseudoroegneria spicata</i> )
	Hood's phlox ( <i>Phlox hoodia</i> )
	Woodyaster ( <i>Xylorhiza glabriuscula</i> )
	Thickspike wheatgrass ( <i>Elymus lanceolatus ssp. Lanceolatus</i> )
	Bottlebrush squirreltail ( <i>Elymus elymoides</i> )
	Indian ricegrass ( <i>Achnatherum hymenoides</i> )
	Sandberg bluegrass ( <i>Poa secunda</i> )
	Alkali sacaton ( <i>Sporobolus airoides</i> )
Scarlet globemallow ( <i>Sphaeralcea coccinea</i> )	
Woodyaster ( <i>Xylorhiza glabriuscula</i> )	
Gardner's saltbush ( <i>Atriplex gardneri</i> )	
Birdsfoot sagebrush ( <i>Artemisia pedatifida</i> )	



The seed mixture for each ecological site will contain the following elements:

- Species composition and diversity for the desired plant community, ecological setting, and current soil properties based on pre-disturbance vegetation characteristics.
- Native dominant herbaceous species that support or augment the post-disturbance land uses, including species-specific wildlife habitat, rangelands, and other uses.
- Full shrub and/or sub-shrub species when these species will help achieve reclamation objectives while supporting post-disturbance land uses and/or wildlife habitat needs.
- Native forb species or other plant species approved by the regulating agency, as appropriate.
- Seed banking and onsite seed collection will only be considered if native and locally adapted seed sources are not available.

Two Rivers will only select non-native plants as an approved, short-term and non-persistent alternative to native plant materials. Measures will be taken to ensure that non-native species will not hybridize, displace, or offer long-term competition to the endemic, native plants and are designed to aid in the eventual reestablishment of native plant communities.

#### **4.4.2 Seeding Schedule**

Seeding will be implemented during all phases of development depending on initial or long-term reclamation objectives. When possible, seeding will occur prior to precipitation events to increase the likelihood of germination and vegetation establishment. Seeding will be preferable prior to snowfall so that seeds are not blown away or eaten by birds. Seeding schedule and timing will be determined on a site-specific basis and in coordination with the regulating agency, private and state landowners.

Two Rivers will implement the following BMPs and protective measures related to seeding schedules, as necessary and appropriate (WRRRC 2010):

- Follow proper timing for the specific seed mix; and
- Dormant seeding will be done later in the year to prevent germination until the following spring where soil temperatures are less than 40 degrees Fahrenheit at 2 inches depth.

#### **4.4.3 Seeding Rates and Methods**

Seeding rates will vary by application method, reclamation objective, desired plant community, and wildlife and/or range considerations. Broadcast seeding typically requires significantly more seed than drill seeding to achieve similar results. Reclamation areas around specific wildlife habitats or environmentally sensitive areas may also require higher seeding rates to quickly establish vegetation for erosion control and reestablishment of forage base. Seeding rates and methods will be determined on a site-specific basis and in coordination with the regulating agency.

Two Rivers will implement the following BMPs and protective measures, as necessary and appropriate, to reestablish vegetation (WDEQ – WQD 2016; WRRRC 2010):

- Calculate seeding rates using NRCS worksheets;

- Alter seeding rates as needed based on site slope, stability and soil quality (e.g., increasing the rate for critical areas where germination is inhibited by low soil quality);
- Base seeding rates on application method (e.g., increased rate for broadcast seeding);
- In coordination with the regulating agency, reduce seeding rates in areas where a viable seed bank remains in the topsoil;
- Calibrate seed drills or broadcast seeders regularly;
- Select appropriate equipment for the terrain, e.g. drill seeding is currently preferred on flat ground but broadcast seeding will be suitable for steeper slopes;
- Harrow or rake broadcast seed to increase germination;
- Where feasible, hydromulch on steep slopes after seeding;
- Establish proper seeding depths, e.g. 0.25 to 0.5 inch for many grasses and large seeded forbs and less than 0.125 inch for small seeded shrubs and forbs;
- Purchase certified seeds or seeds from a reputable seller;
- Follow proper seed handling guidelines, including storage temperature and humidity;
- Post signs or establish physical barriers where needed to limit public use of the reclaimed surfaces while the vegetation reestablishes; and
- Exclude livestock from reclaimed areas, as practicable, until appropriate levels of site stabilization and revegetation are achieved.

## 5.0 Management of Weeds and Invasive Species

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Weed species observed during field surveys for ESDs was the Plains pricklypear (*Opuntia polyacantha*) and Canada thistle (*Cirsium arvense*). Two Rivers will control noxious and invasive weeds in the Project Area in accordance with the approved Weed Management Plan. Weed management will be a cooperative effort between the surface landowners and Two Rivers. Disturbed soils, roadsides, drainages, and agricultural improvements are most susceptible to noxious and invasive weed infestations or occurrences.

Two Rivers will implement the following BMPs and protective measures for the control of noxious and invasive plant species at the Project Area as described in the Weed Management Plan and as appropriate (WRRRC 2010):

- Only approved, certified weed-free seeds will be used;
- The Project Area will be monitored for noxious and invasive weed species;
- Weeds will be controlled and treated;
- Construction equipment will be washed;
- Weed occurrences will be marked during construction;
- Employees will be trained on noxious and invasive plant species awareness and measures to prevent the spread of weeds; and

- Coordination with landowners and agencies to conduct weed management.

See Two River's Weed Management Plan (TR 2019) for additional information.

## 6.0 Reclamation Monitoring

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The ISC (2018) and WYPDES Permit WYR10-0000 (2016) requires that a reclamation monitoring and reporting plan be developed and implemented to conduct compliance and effectiveness monitoring in accordance with WDEQ standards and the Reclamation Plan established for the Project. Reclamation monitoring is required to evaluate reclamation progress to determine reclamation success and if additional measures are required.

The main objectives of the Project's reclamation monitoring plan, including: 1) document the condition of reclaimed areas as compared to adjacent undisturbed reference sites; 2) provide an efficient means for monitoring all reclamation sites to document reclamation progress; 3) standardize monitoring protocols across the Project Area; and 4) establish a monitoring plan to manage for final stabilization.

Reclamation monitoring will occur annually in accordance with WDEQ – WQD guidance. Vegetation will be evaluated against the reference sites established during pre-disturbance characterization. Reclamation success will be evaluated on the current plant community condition class as established by the appropriate reference site conditions and in coordination with the regulating agency. In addition, erosional assessments and photopoints will be completed to support reclamation monitoring efforts. Specific tools used to assess monitoring parameters will be directed by the regulating agency.

The monitoring approach is designed to provide a standardized tool for evaluating reclamation status throughout the Project Area that can be used to make informed decisions on what actions are needed to obtain field-wide reclamation success and to achieve final stabilization. These decisions may range from a high-level action such as revising this Reclamation Plan to a site-specific action such as installing a silt fence. Monitoring will be used to track reclamation progress and initiate appropriate remedial actions.

Two Rivers and the regulating agency will evaluate whether reclamation is progressing towards success and if necessary, Two Rivers will propose additional measures to facilitate reclamation. Two Rivers will implement these measures in coordination with the regulating agency. Additional measures may include reseeding, soil stabilization and amendments, weed control, mulching, fertilizing, fencing, and irrigation.

## 7.0 References

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# Figures

Figure 1a. Preliminary Project Layout

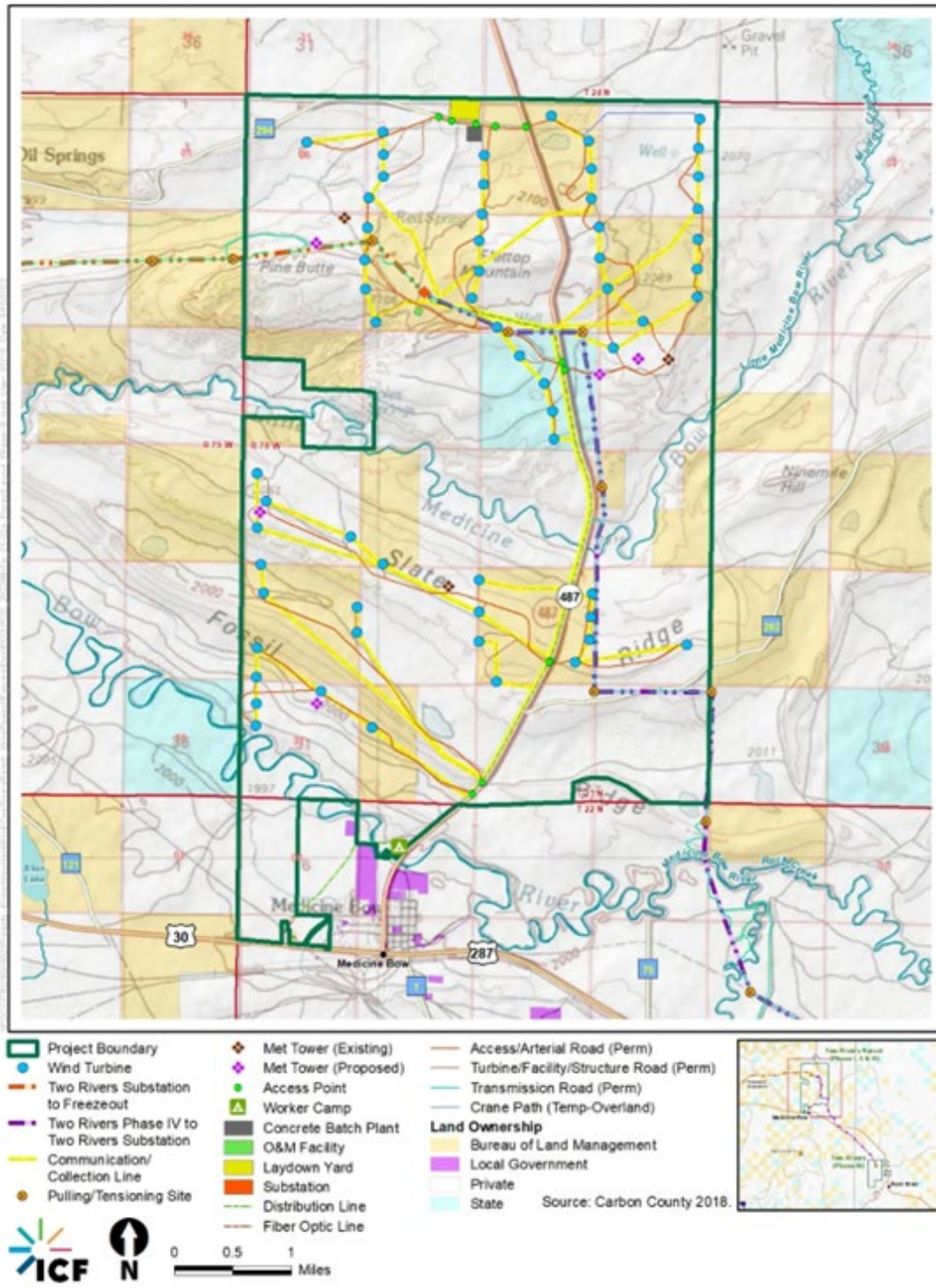
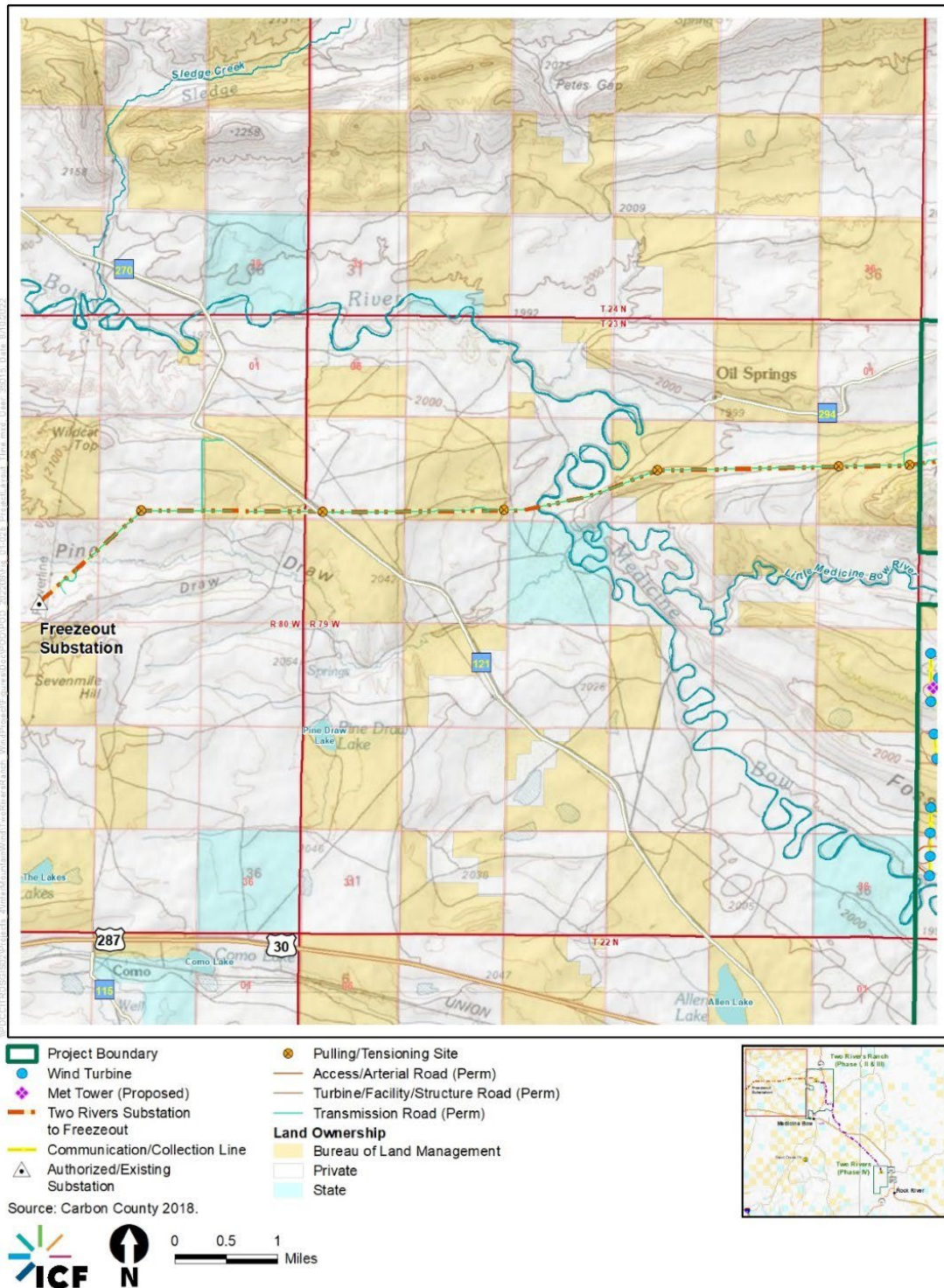


Figure 1b. Preliminary Project Layout



Figures 2a. Ecological Site Descriptions

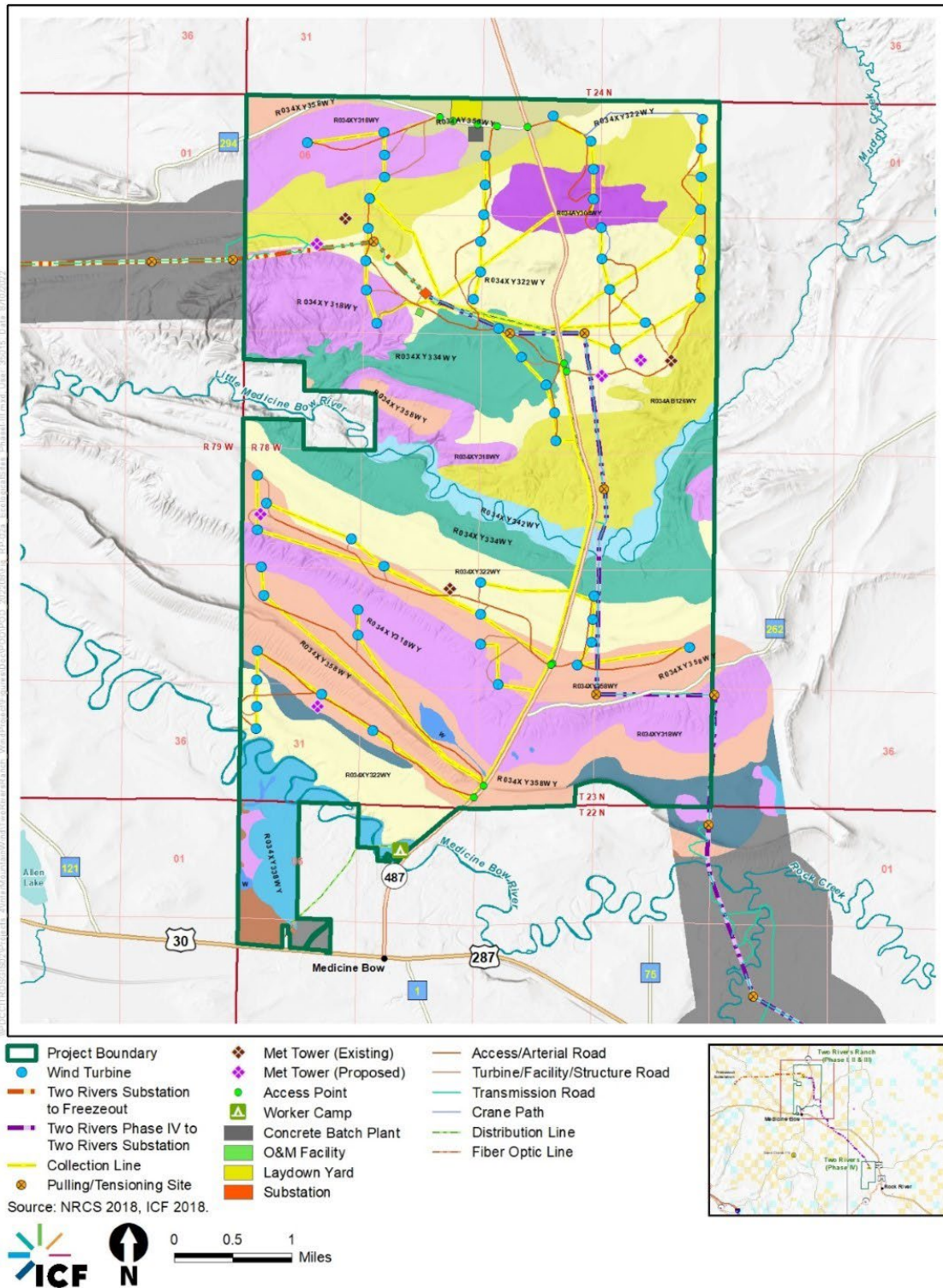
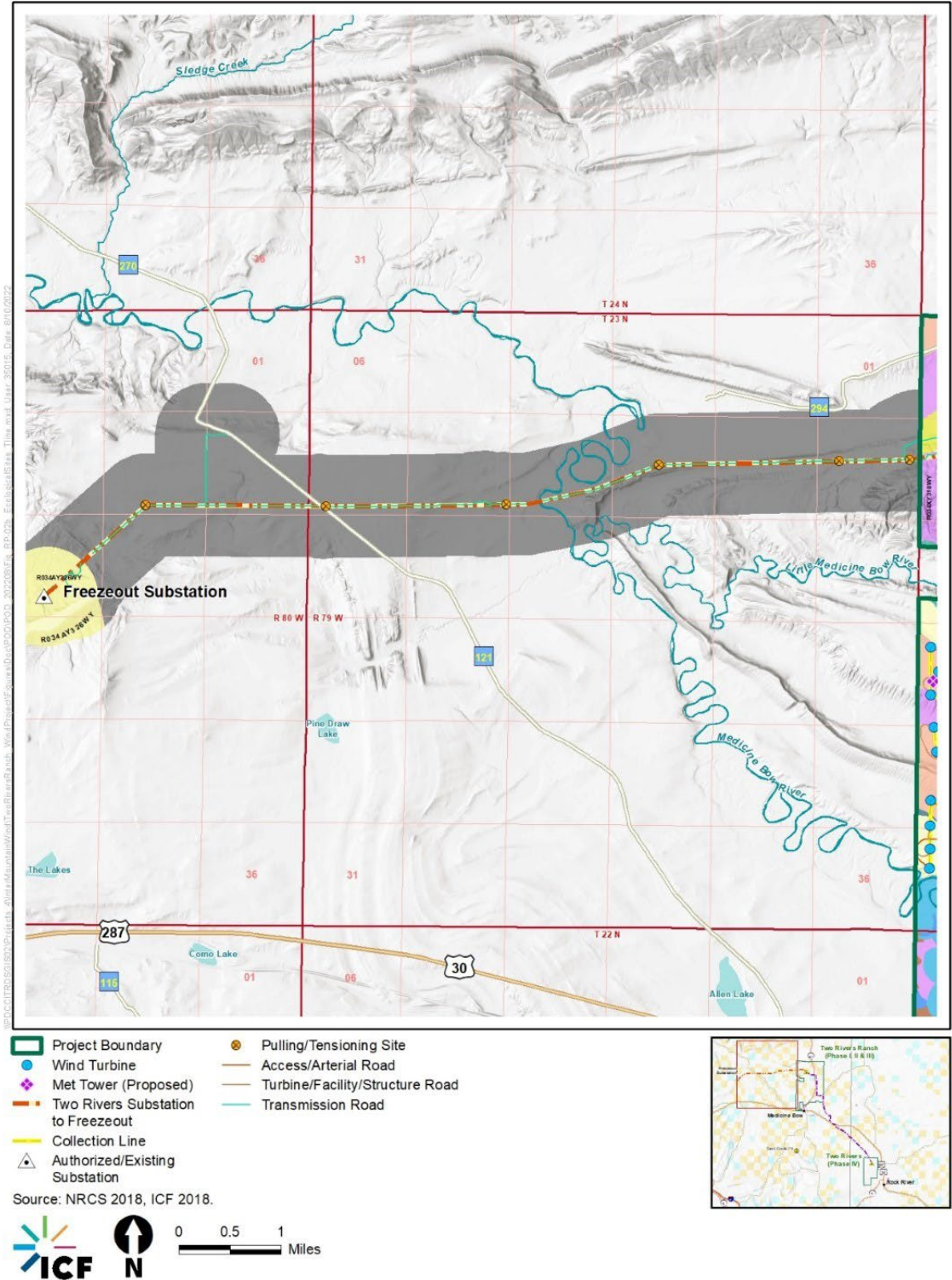


Figure 2b. Ecological Site Descriptions





**Figure 2c. Ecological Site Descriptions**



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Figure 3. Existing Land Cover

