Revegetation Plan
for
Taelor Solar Energy Project

Weld County

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January 2024

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Introduction

The Taelor Solar Energy Project (the Project) proposes to generate up to 650-megawatt (MW) alternating current (AC) solar photovoltaic (PV) renewable energy, enough to annually power approximately 187,000 homes in Colorado. The Project intends to interconnect to Xcel Energy's planned Colorado Power Pathway 345 kilovolt (kV) transmission line, which will cross the Project boundary. The Project will also include the following components:

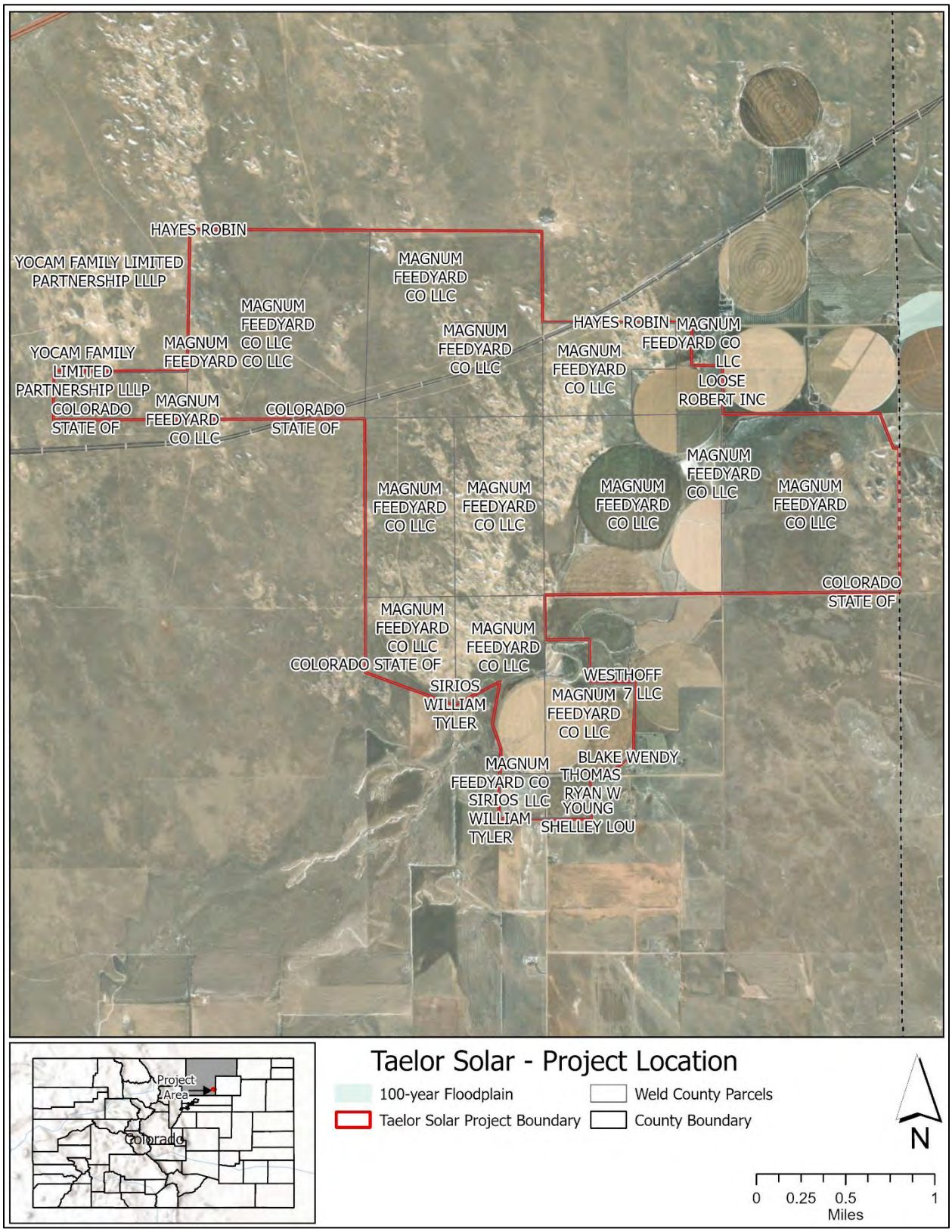
- On-site substation
- Operations and Maintenance area and building
- Communications facilities
- One or more meteorological stations
- Site security and fencing
- Battery Energy Storage System

The purpose of the Dust and Weed Management Plan for the Project is to provide sustainable, Best Management Practices (BMPs) and specifications as they relate to fugitive dust during surface disturbing activities, as well the control of noxious and undesirable species throughout the life of the Project. The following details existing site conditions and management as they pertain to minimizing fugitive dust and controlling weed populations.

Site Description

The Project is located along the eastern edge of Weld County, Colorado, on approximately 4,400 acres of private land. The Project area is currently zoned for agriculture. Weld County is within the Front Range region of Colorado where the annual average temperature is 48.2 degrees Fahrenheit (ranges between -29 to 104 degrees Fahrenheit), annual rainfall received is 14.6 inches, and average snowfall is 34.5 inches (Northern Water Station NW106). The Project area also receives sustained daily average winds of 6 miles per hour (MPH), with daily average gusts of 23 MPH (Northern Water Station NW106). Dust generated by agricultural and construction activities is a common concern in this area. The following dust mitigation strategies address this through the use of preventative and active measures prior to and throughout the construction process.

Figure 1. Project location in Weld County, Colorado.



Source: FEMA 2021

Soils

The major soil unit within the Project area is Valent sand, with 3 to 9% slopes (**Table 1**, **Figure 2**). Valent sand covers approximately 69% of the Project area and is predominately found on dunes and plains (NRCS 2022). Dune features within the Project area can be observed via aerial imagery and may indicate a current loss of topsoil, making revegetation efforts harder to implement. Due to concerns of additional fugitive dust, susceptibility to wind erosion was evaluated using Wind Erodibility Groups (WEG). WEGs consist of soils that have similar properties influencing their susceptibility to erosion by wind in cultivated areas (NRCS 2022). Approximately 78% of the Project area is highly susceptible to wind erosion, falling within WEGs 1-3 (**Table 1**).

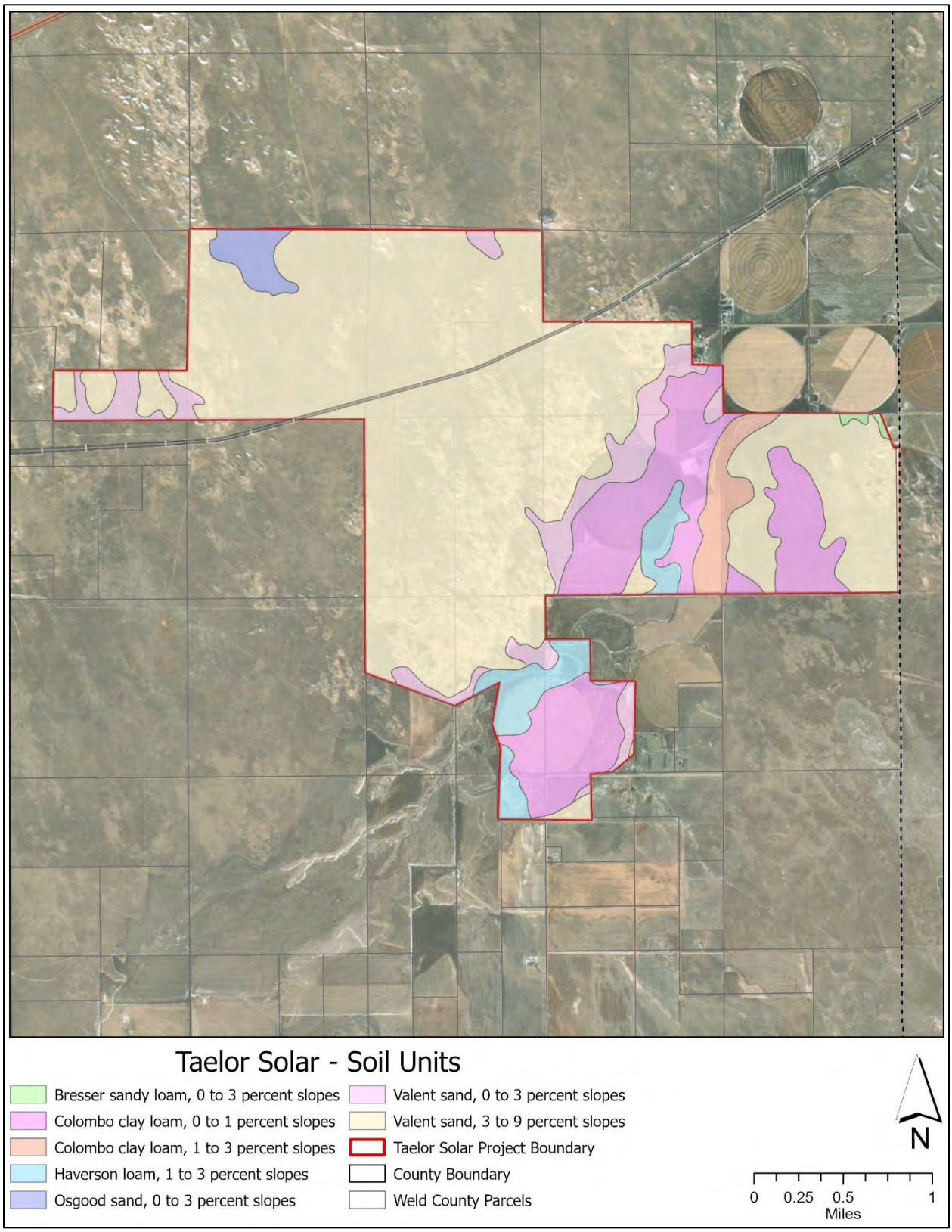
Table 1. Characteristics of soil units within the Project boundary.

Soil Unit	Area (acres)	% of Project Area	WEG*
Valent sand, 3 to 9 percent slopes	3,020	69%	1
Colombo clay loam, 0 to 1 percent slopes	720	16%	4L
Valent sand, 0 to 3 percent slopes	289	7%	1
Haverson loam, 1 to 3 percent slopes	183	4%	6
Colombo clay loam, 1 to 3 percent slopes	114	3%	4L
Osgood sand, 0 to 3 percent slopes	69	2%	1
Bresser sandy loam, 0 to 3 percent slopes	8	0%	1
Totals:	4,402	100%	

Source: NRCS 2022

*Wind Erodibility Groups. Soils in group 1 are most susceptible to wind erosion and those in group 8 are least susceptible.

Figure 2. Soil units within the Project boundary.



Source: NRCS 2022.

Revegetation Specifications and Best Management Practices

The goal of revegetation is to maintain a desired vegetation community that maximizes ecosystem services while minimizing erosion and the risk of wildland fire. A desired seed mix will be agreed upon with the landowners and County to revegetate areas disturbed by construction. This plan will establish a vegetation management approach that maintains a buffer around access points and electrical equipment that will remain void of vegetation (i.e., defensible spaces).

For locations that may be disturbed again during the construction phase (including soil stockpiles), a temporary seed mix, erosion control, and weed monitoring should occur until more permanent revegetation efforts can be applied.

All revegetation and erosion control efforts should be implemented immediately after disturbance of a site has concluded and prior to the typical spring rainy season. This reduces the risks for soil loss and establishment of noxious weeds, as well as maximize revegetation efforts. If satisfactory revegetation is challenging, Balanced Rock Power would coordinate with the landowner and Weld County to improve success.

Reference Communities

Defining a reference community that represents pre-disturbance conditions for the Project area informs revegetation strategies. Reference communities appropriate for the Project area were determined using ecological sites identified by the Ecosystem Dynamics Interpretive Tool (EDIT), which details past, present, and future ecological states based on land use, soils, and climate (NRCS, JER, and NMSU 2021).

The Project area falls within Major Land Resource Area (MLRA) 067B – Central High Plains, Southern Part. MLRA 067B is characterized by shallow to deep, loamy or clayey soils with a mesic soil temperature regime and arid soil moisture regime (NRCS, JER, and NMSU 2021). Much of this area supports species characteristic of shortgrass prairies. Most of the land within this MLRA is in agricultural use (NRCS 2006).

As a result of proposed solar arrays, in combination with revegetation strategies, soil health should improve over the lifetime of the project, as the lack of continued disturbance will increase soil carbon, water retention and infiltration, and reduce surface run-off (Nordberg et al. 2021). Within the Project area, four ecological sites occur: clayey plains, deep sand, loamy plains, and sandy plains (**Table 2**, **Figure 3**).

Table 2 describes the characteristics of the ecological sites within the Project that will be used to inform seed mixes and revegetation strategies. Deep sand is the dominant ecological site, covering 57.7% of the Project area, followed by Sandy plains covering 32.7% (**Table 2**).

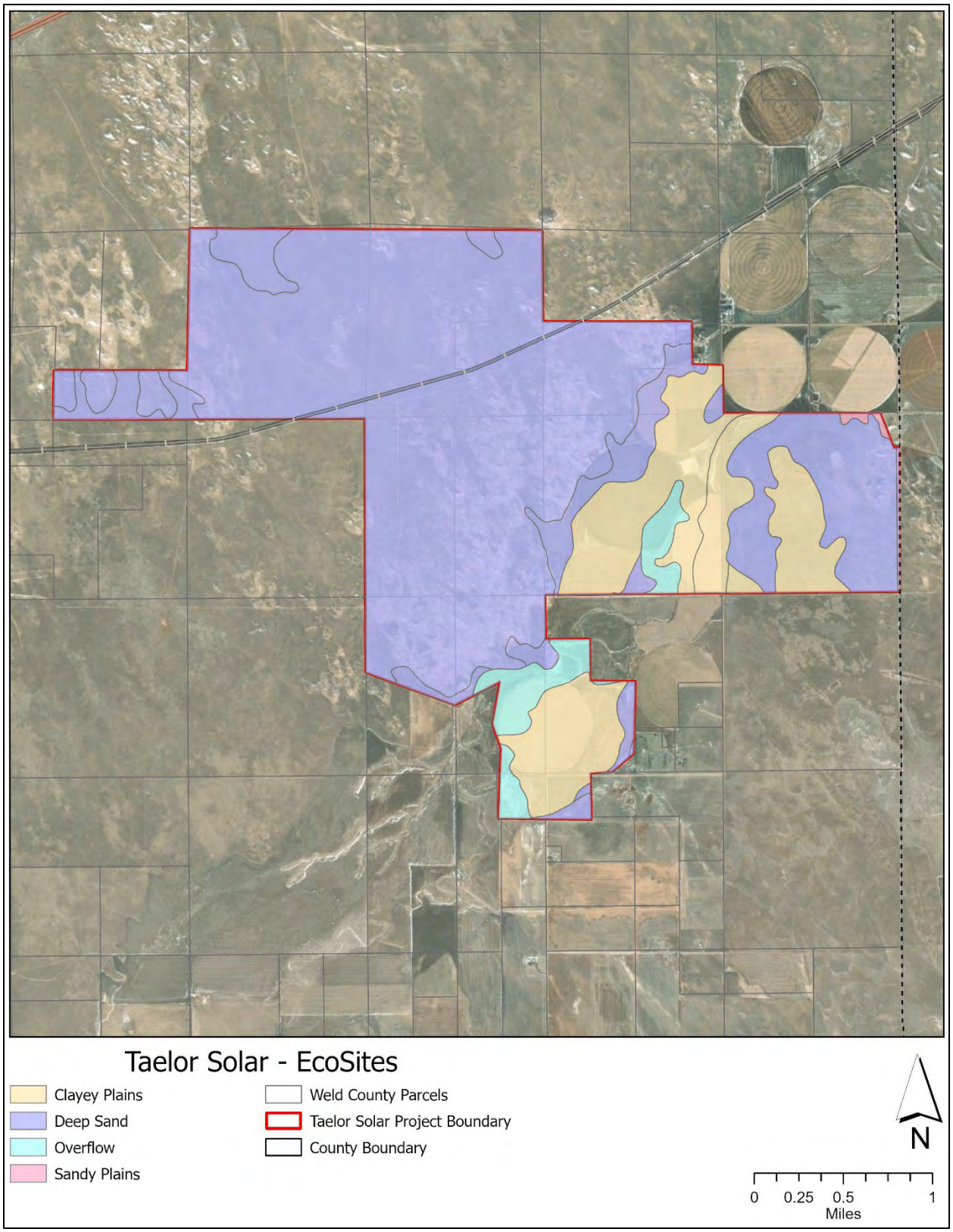
Table 2. Ecological Sites within the Project area used to inform seed mixes and revegetation strategies.

Ecological Site Name	Soil Unit	% of Project Area	Landforms	Dominant Plant Species
Deep Sand	Valent sand, Osgood sand	76.7	Dune Plains	leadplant (*Amorpha canescens*), western sandcherry (*Prunus pumila var. besseyi*), sand bluestem (*Andropogon hallii*), prairie sandreed (*Calamovilfa longifolia*)

Ecological Site Name	Soil Unit	% of Project Area	Landforms	Dominant Plant Species
Clayey Plains	Columbo clay loam	18.9	Terraces, Floodplains	fourwing saltbush (*Atriplex canescens*), winterfat (*Krascheninnikovia lanata*), western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*)
Sandy Plains	Bresser sandy loam	8.0	Drainageways	spreading buckwheat (*Eriogonum effusum*), blue grama (*Bouteloua gracilis*), prairie sandreed (*Calamovilfa longifolia*)
Overflow	Haverson loam	4.2	Terraces, Floodplains	fourwing saltbush (*Atriplex canescens*), winterfat (*Krascheninnikovia lanata*), western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*)

Source: NRCS, JER, and NMSU (2021)

Figure 3. Ecosites with the Project area.



Source: NRCS, JER, and NMSU (2021)

Topsoil Salvage and Storage

Where feasible, stockpiled or salvaged topsoil should be used to restore pre-disturbance contours to the site, with salvaged topsoil restored to the site following construction. In instances when salvaged topsoil and its associated seed bank are not in sufficient supply, an approved seed mix should be used. To determine if associated seed banks are in sufficient supply, a survey of existing plant density and land use history should be conducted prior to topsoil removal. If topsoil in general is not sufficiently available, it may need to be purchased from a nearby source to support revegetation. The seed mix shall be certified weed-free of noxious and undesirable species, obtained from local vendors, and comprised of native cultivars that originate from within 500 feet elevation of the Project site (locally adapted).

BMP's and specifications for topsoil removal and storage are as follows:

- Stockpile locations shall be at least 25 feet from waterways, wetlands, or drainage/sewer systems.
- Sediment control shall be placed around stockpiles (e.g., silt fencing, sediment control logs, straw bales, or sandbags).
- Depending on soil type, topsoil shall be excavated to at least 8 inches.
- Stockpiled soil shall not exceed 10 feet in height.
- Soils intended to be stockpiled for 30-60 days shall be stabilized with surface roughening, erosion control blankets or mulch, or soil binders immediately after forming stockpile.
- Soils intended to be stockpiled for more than 60 days shall be seeded with the temporary seed mix and stabilized with erosion control blankets or mulch immediately after forming stockpile.

If topsoil is unsalvageable or unavailable for areas of the site, (i.e., where dunes currently exist), topsoil can be obtained from local suppliers. Topsoil should be sourced from areas with similar vegetation composition and climate, typically from areas with similar or associated ecological sites, and from areas within Colorado. Purchase of commercial topsoil is not recommended. Additional topsoil can be stored at the site in a similar manner as described above to prevent loss from erosion or contamination from weeds and other undesirable vegetation.

Seedbed Preparation

For all disturbed areas that will undergo temporary and/or permanent seeding, to increase the likelihood of successful seed establishment, the following appropriate soil/seedbed preparation specifications and BMPs shall be used.

Decompaction

- All ripping and tilling shall be done in a direction which follows the natural contour of the land.
- Prior to spreading salvaged topsoil and/or seeding, thoroughly till or rip to a depth of 12 inches all areas compacted by access, staging, or construction traffic. Other, non-compacted areas shall be tilled to a depth of 6 inches. Soils shall be worked until no clods greater than 2 inches in diameter remain. Rocks and other objects 3 inches and greater in any dimension shall be removed.
- Areas receiving salvaged topsoil shall be spread to depths required to meet grades and elevations as shown in the 100% construction drawings.
- Prior to seeding, areas to be seeded shall be graded to a smooth, even surface, with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finished grades as depicted in the 100% construction drawings.

Soil Amendments

- A representative soil test shall be sent to a laboratory to determine pH, organic matter content, electrical conductivity, and concentrations of carbon, phosphorus, and nitrogen to determine appropriate soil amendment product for application.
- Soil amendments shall be applied on the surface of the spread topsoil and/or decompacted soils and tilled thoroughly to a depth of 4 inches, prior to seeding.
- Soil amendments, such as Richlawn or Biosol, shall be applied at a rate of 500 lbs per acre.
- If organic compost or humic acid is deemed necessary, the material shall be applied at a rate of 15 cubic yards per acre.
    - Recommended Vendor: A1 Organics, Eaton, Colorado

Seeding

Temporary and permanent seed mixes were developed based on the Project site's elevation, hydrology, adaptation to sandy/course textured soils, occurrence in Weld County, and known vendor availability. Species included in seed mixes are low maintenance (i.e., do not require mechanical treatments) and low water use.

Recommended Temporary Seed Mix

The recommended temporary seed mix (**Table 3**) includes species that are native and/or sterile, establish quickly, and have root structures suitable for erosion control. The temporary seed mix shall be used on soil stockpiles and any area that will not be disturbed for 30 days or more. Contractor shall follow PLS application rates outlined by the seed vendor.

Table 3. Temporary seed mix species.

Scientific Name	Common Name	Season	Growth Habit
	*Regreen – sterile wheat hybrid	NA	Bunchgrass
	*Quickguard – sterile triticale hybrid	NA	Bunchgrass
Buchloe dactyloides	Buffalograss	Warm	Rhizomatous
Distichlis spicata	Saltgrass	Warm	Rhizomatous
Elymus lanceolatus	Thickspike wheatgrass	Cool	Rhizomatous
Elymus trachycaulus	Slender wheatgrass	Cool	Rhizomatous
Panicum virgatum	Switchgrass	Warm	Rhizomatous
Pascopyrum smithii	Western wheatgrass	Cool	Rhizomatous

*Can use either Regreen or Quickguard.

Recommended Permanent Seed Mix

The recommended permanent seed mix (**Table 4**) includes species with multiple life history traits (i.e., perennial vs annual, grass vs forb) to increase biodiversity in the area. The height of plants at maturity was also considered and largely limited to 2 feet to limit interference with solar array infrastructure; however, some taller species were included (primarily forbs) as they have the ability to resprout and still reproduce after cutting (i.e., mowing), especially those adapted to prairie ecosystems. Contractors shall follow pure live seed (PLS) application rates and germination recommendations outlined by the seed vendor.

Table 4. Permanent seed mix species.

Scientific Name	Common Name	Life History	% Mix
Bouteloua gracilis	blue grama	Native Perennial Grass	15
Calamovilfa longifolia	prairie sandreed	Native Perennial Grass	15
Nasella viridula	Green needlegrass	Native Perennial Grass	15
Buchloe dactyloides	buffalograss	Native Perennial Grass	10
Koeleria macrantha	prairie Junegrass	Native Perennial Grass	11
Andropogon hallii	sand bluestem	Native Perennial Grass	5
Hordeum jubatum	foxtail barley	Native Perennial Grass	5
Panicum capillare	panicgrass	Native Annual Grass	5
Panicum virgatum	switchgrass	Native Perennial Grass	5
Artemisia frigida	prairie sagewort	Native Perennial Forb	2
*Amorpha canescens**	leadplant	Native Shrub	1
Argemone polyanthemos	crested pricklypoppy	Native Annual Forb	1
*Atriplex canescens**	fourwing saltbush	Native Shrub	1
Dalea candida	white prairie clover	Native Perennial Forb	1
Dalea purpurea	purple prairie clover	Native Perennial Forb	1
Erigeron divergens	spreading fleabane	Native Biennial Forb	1
Erysimum capitatum	sanddune wallflower	Native Perennial Forb	1
Heterotheca villosa	hairy false goldenaster	Native Perennial Forb	1
*Krascheninnikovia lanata**	winterfat	Native Sub-Shrub	1
*Prunus pumila**	sandcherry	Native Shrub	1
Sphaeralcea coccinea	scarlet globemallow	Native Perennial Forb	1
Vicia americana	American vetch	Native Perennial Forb	1
		Total:	**100%**

*Ensure no stratification is required by seed vendor prior to planting.

Seeding Options

Seeding should follow the PLS guidelines provided by the seed vendor. Drill seeding is recommended where feasible to reduce potential losses from wind erosion or herbivory while plants establish. However, drill seeding is more expensive to implement and may not be feasible in areas with steep slopes or rockier soils. The ideal times to seed are in the fall before the first major freeze of the season or in the spring, between March and June.

Drill Seeding

- All seed is to be drilled ¼ inch to ½ inch into the soil at the specified PLS per acre rate with a mechanical drill with depth bands and an agitator in the seed box.
- Rows shall be spaced not more than 7 inches apart.
- Half of the required PLS per acre shall be drilled in one compass direction, and then the remaining half of the required PLS per acre shall be drilled in a direction 90 degrees to the first half.

Broadcast Seeding

- If areas of the Project are inaccessible to drill seeding, broadcast seeding shall be utilized.

- Seed shall be uniformly broadcast at twice the specified PLS per acre and covered with soil to a depth of ¼ inch to ½ inch by hand raking or harrowing by some other means acceptable.
- Broadcast seeding shall be accomplished using hand-operated "cyclone type" seeders or rotary broadcast equipment attached to construction or revegetation machinery. All machinery shall be equipped with metering devices.
- Broadcasting by hand shall be acceptable on small, isolated sites. Prior to hand broadcast seeding, the seed shall be divided into two halves, with the first half of the seed being applied, followed by the second half of the seed to ensure complete coverage.
- When using hopper type equipment, seed shall be frequently mixed within the hopper to discourage seed settling and uneven planting distribution of species.
- Broadcast seeding shall take place immediately following the completion of final seedbed preparation techniques.
- Broadcast seeding shall not be conducted when wind velocities would prohibit seed to soil contact and/or even seed distribution (wind speeds higher than 8 mph).

Seed Vendor Requirements

To reduce the likelihood of additional non-native and/or noxious species being introduced to the Project site, seed shall be purchased with the following specifications and BMPs:

- Seed shall be purchased from a local vendor (see recommendations below) and all seed shall be reported in Pure Live Seed per pound.
- Vendors shall provide weed content by species for each seed lot. If any noxious species occur within an individual lot, the species shall be removed from use and % mix shall be adjusted to accommodate the loss.
- Vendor shall provide dormancy and germination information for each lot.
- Vendor shall disclose if any stratification or other seed preparation is required prior to applying seed on site.
- **Recommended Vendors**: Western Native Seed, Coaldale, Colorado. Stevenson Intermountain Seed, Inc. Ephraim, Utah. Granite Seed or Arkansas Valley in Denver, Colorado can be used for Regreen or Quickguard.

Post Seeding Soil Surface Protection and Erosion Control

To reduce the potential for fugitive dust, erosion, and/or loss of applied seed, soil surface protection/erosion control techniques and BMPs shall be implemented after seeding is completed. Three soil surface protection/erosion control methods are recommended: certified weed-free straw, erosion control blanket (ECB), or wood straw.

Certified Weed-Free Straw

- Straw shall be certified weed-free by the vendor to ensure non-native and/or noxious weed species are introduced to the Project site.
- Straw shall be applied immediately after seeding has been completed with a mechanical spreader at a rate not less than 1.5 tons per acre and not more than 2 tons per acre.
- Straw mulch shall be anchored to the soil with a standard commercial crimper, which shall crimp straw 4 inches or more into the soil.
- Straw shall only be utilized on flat areas or slopes less than 3:1.
- **Recommended Vendor**: HayCo, LLC, Monument, Colorado

Erosion Control Blanket (ECB)

- ECB shall be manufactured with fully biodegradable materials, such as jute, hemp, or coconut fibers. Photodegradable ECB shall not be utilized, as the photonetting can trap wildlife.
- Slopes of 3:1 or steeper, concave areas, drainage swales, or areas along the edges of hard surfaces (e.g., trails, roads), and any other areas with the potential to rill, shall have ECB installed.
- All clods and rock shall be removed from the area, and grade shall be smoothed prior to installation of ECB so that blanket to soil contact is maximized and potential for holes/pockets is minimized.
- The edges of the fabric shall be secured by 2-foot wooden stakes, installed 2 feet on center along all edges and seams.
- Seams shall overlap 1 foot and the body of the fabric shall be further secured to the soil surface with 12-inch eco-stakes in a diamond pattern 3 feet on center.
- The top of ECB shall be trenched with 2-foot wedge stakes 2 feet on center.
- **Recommended Vendors**: Grainger Industrial Supply, Fort Collins, Colorado, Ferguson Waterworks, Aurora, Colorado, American Excelsior, Arlington, Texas

Wood Straw

- Wood straw shall be applied at a rate of 276 bales per acre and shall be spread to achieve 70% ground cover.
- No crimping or tackifier is required for wood straw application (unless using aspen straw).
- Wood straw shall only be utilized on flat areas or slopes less than 3:1.
- **Recommended Vendor**: Mountain Pine Manufacturing, Craig, Colorado

Monitoring and Maintenance

Areas receiving temporary and permanent seeding shall be monitored for adequate cover. Adequate cover within the Project area is quantified by bare ground cover of 3% or less, with bare patches ranging from 3 to 5 inches in diameter (NRCS, JER, and NMSU 2021). If seeded areas do not meet these criteria, a qualified Plant Ecologist shall conduct a site visit to recommend whether additional topsoil, soil amendments, seed, or combination is needed.

To enhance revegetation efforts, site maintenance in the form of mowing may need to be restricted to ensure seeded species are able to adequately grow to maturity and reproduce.

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