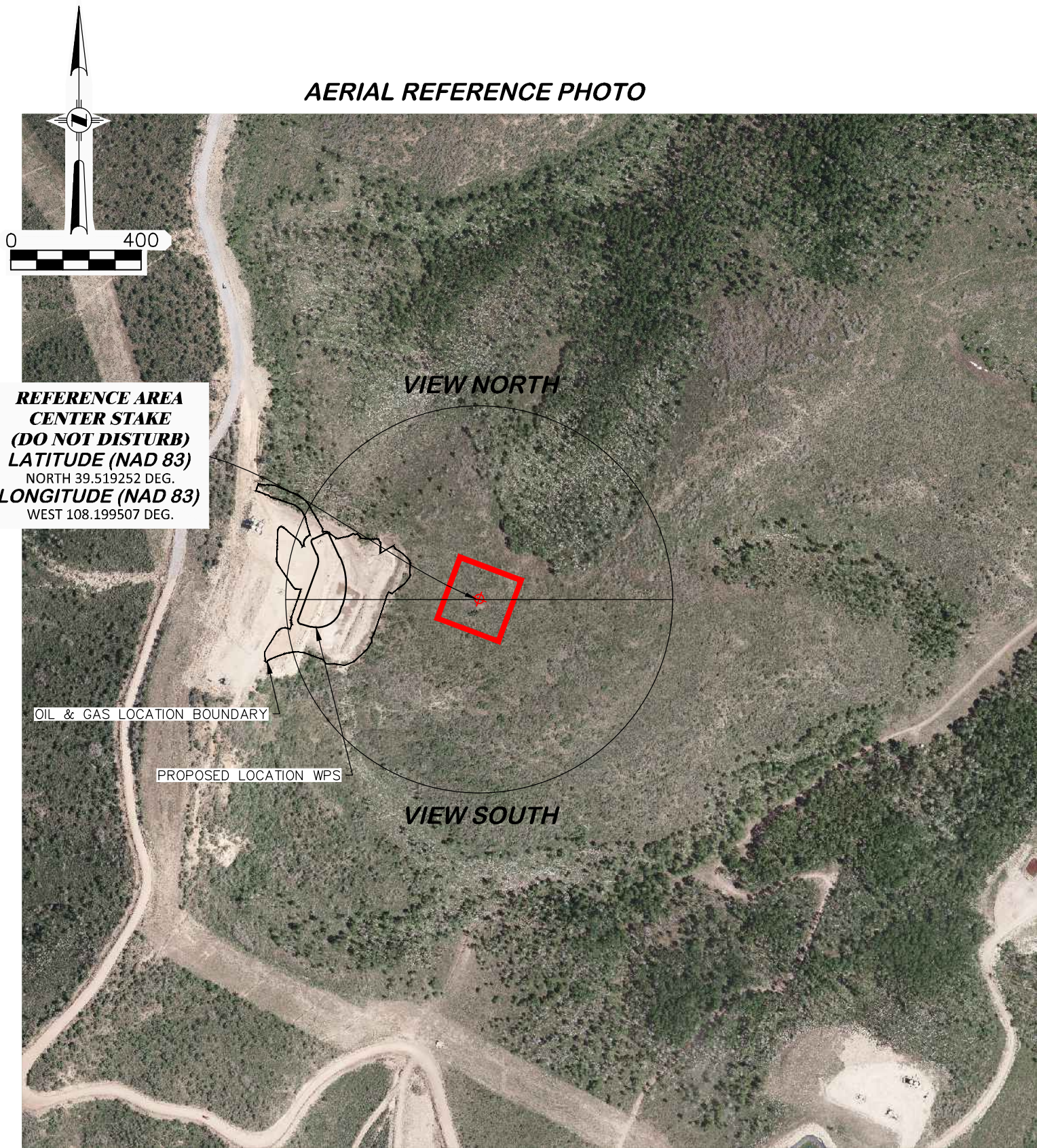


AERIAL REFERENCE PHOTO



AERIAL PHOTO SOURCE
 AERIAL PHOTOGRAMMETRY
 TAKEN 6/8/2011

REFERENCE AREA PHOTOS
 9/27/2021



W N E

REFERENCE AREA LOOKING NORTH



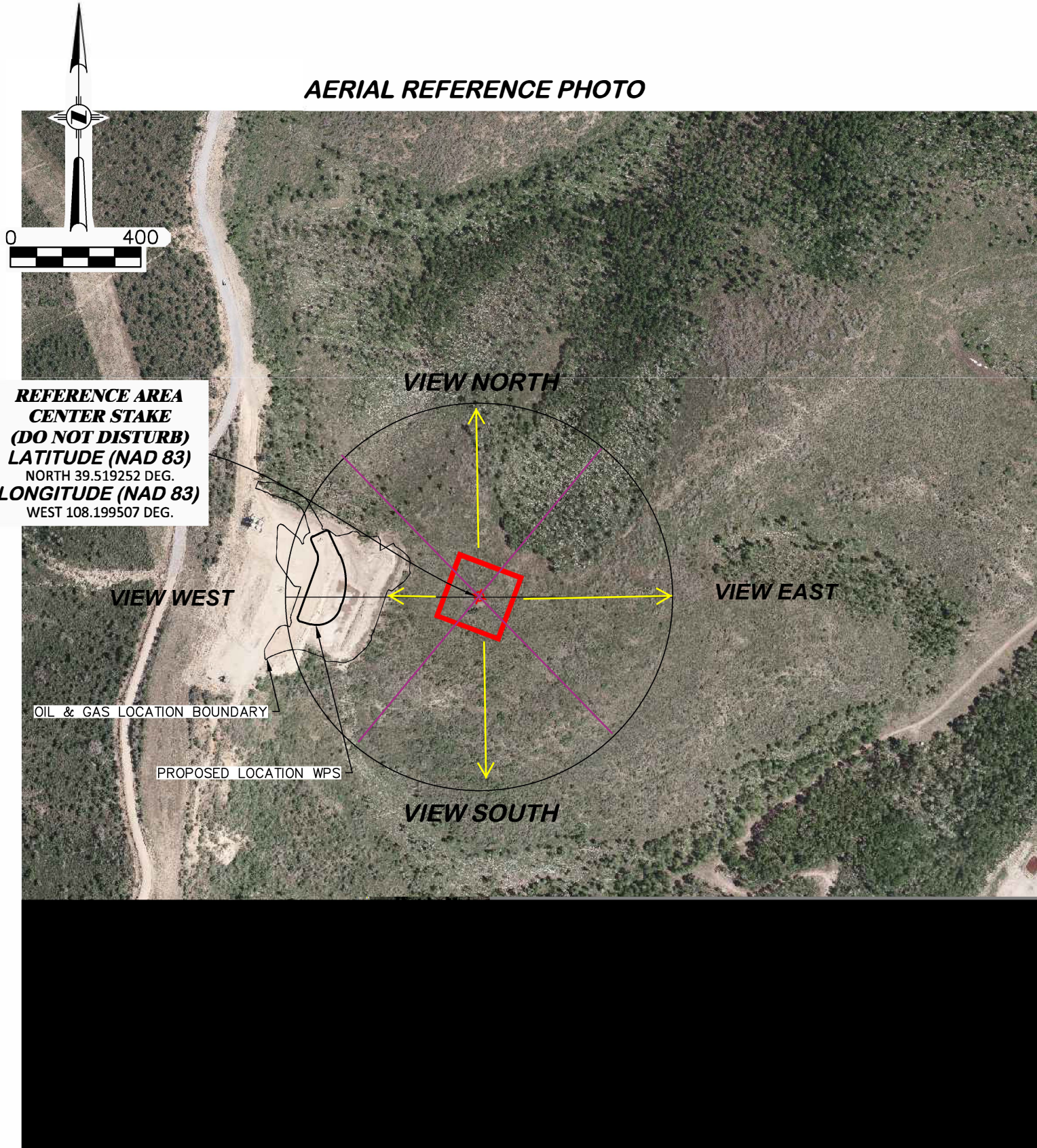
E S W

REFERENCE AREA LOOKING SOUTH

CC 697-15-54 ANNEX

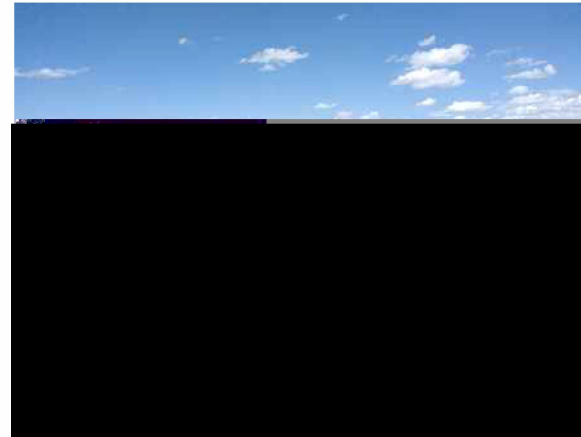
<p>DRG RIFFIN & ASSOCIATES, INC. (307) 362-5028 1414 ELK ST., ROCK SPRINGS, WY 82901</p>		REFERENCE AREA PHOTOS	
		<p>LARAMIE ENERGY, LLC. CC 697-15-54 ANNEX SESE, SECTION 15, T. 6 S., R. 97 W., 6th P.M., GARFIELD COUNTY, COLORADO</p>	
DRAWN: 10/29/2021 - DEH	SCALE: NONE		
REVISED: 11/11/2021 - DEH	DRG JOB No. 21379		
ADDED OG LOC BNDY	304B(9)BII REF PHOTO		

AERIAL REFERENCE PHOTO



**REFERENCE AREA
CENTER STAKE
(DO NOT DISTURB)**
LATITUDE (NAD 83)
NORTH 39.519252 DEG.
LONGITUDE (NAD 83)
WEST 108.199507 DEG.

REFERENCE AREA PHOTOS



**REFERENCE AREA LOOKING NORTH
5/20/2021**



**REFERENCE AREA LOOKING SOUTH
5/20/2021**



**REFERENCE AREA LOOKING EAST
5/20/2021**



**REFERENCE AREA LOOKING WEST
5/20/2021**

AERIAL PHOTO SOURCE
AERIAL PHOTOGRAMMETRY
TAKEN 6/8/2011

CC 697-15-54 ANNEX

<p>DRG RIFFIN & ASSOCIATES, INC. 1414 ELK ST., ROCK SPRINGS, WY 82901 (307) 362-5028</p>		REFERENCE AREA PHOTOS	
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DRAWN: 10/29/2021 - DEH	SCALE: NONE		
REVISED: 11/11/2021 - DEH	DRG JOB No. 21379		
ADDED OG LOC BNDY	304B(9)BII REF PHOTO (2)		

**LARAMIE ENERGY
ANNEX CUTTINGS FACILITY
VEGETATION ASSESSMENT**



Cover Photo: Reference vegetation transect.

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Prepared by:
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October 2021

INTRODUCTION

Laramie Energy, LLC. requested that WestWater Engineering (WestWater) conduct a vegetation assessment for the Cascade Creek 0697-15-08 well pad location. The project would be located on private surface in Garfield County, Colorado in Section 15, Township 6 South, Range 97 West, Sixth Principal Meridian.

PROJECT AREA DESCRIPTION

The proposed Cascade Creek Annex Cuttings Facility would be located on gently rolling hills of the Roan Plateau between Cascade Creek to the west and McKay Gulch to the east. Elevation in the project area is approximately 8,500 feet. The current primary uses of the land are natural gas development, rangeland, and wildlife habitat. The historical and current land use description at the site is Rangeland.

There are three main vegetation community types present surrounding the project area: mountain shrublands, sagebrush shrublands, and aspen woodlands. The mountain shrublands are composed primarily of Utah serviceberry (*Amelanchier utahensis*) intermixed with mountain snowberry (*Symphoricarpos oreophilus*), Gambel oak (*Quercus gambelii*), and mountain big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Sagebrush shrublands are composed primarily of mountain sagebrush and mountain snowberry with an understory of native perennial grasses and forbs. North-facing slopes in the surrounding area support patchy aspen woodlands composed of quaking aspen (*Populus tremuloides*), mountain snowberry, and chokecherry (*Prunus virginiana*). Common plants observed throughout the survey area are described in Table 1.

Table 1. Common plant species surrounding the project area.

Common Name	Scientific Name	Abundance*	Habitat Type
Grasses and Grass-like plants			
Intermediate wheatgrass	<i>Thinopyrum intermedium</i>	xxx	Reclaimed/disturbed area
Kentucky bluegrass	<i>Poa pratensis</i>	xx	Mountain shrub, aspen woodland
Muttongrass	<i>Poa fendleriana</i>	xx	Mountain shrub, sagebrush shrubland, aspen woodland
Sandberg bluegrass	<i>Poa secunda</i>	xx	Mountain shrub, sagebrush shrubland, aspen woodland
Slender Wheatgrass	<i>Elymus trachycaulus</i>	xx	Reclaimed/disturbed area
Smooth Brome	<i>Bromus inermis</i>	xxx	Reclaimed/disturbed area
Tall Wheatgrass	<i>Thynopyrum ponticum</i>	xx	Reclaimed/disturbed area

Common Name	Scientific Name	Abundance*	Habitat Type
Forbs			
American vetch	<i>Vicia americana</i>	xxx	Mountain shrub, sagebrush shrubland
Arrowleaf balsamroot	<i>Balsamorhiza sagitta</i>	x	Mountain shrub, sagebrush shrubland, aspen woodland
Badlands mule-ears	<i>Scabrethia scabra</i>	xxx	Mountain shrub, sagebrush shrublands
Bluntseed sweetroot	<i>Osmorhiza depauperata</i>	xxx	Mountain shrub, aspen woodland
Canadian white violet	<i>Viola canadensis</i>	xxx	Aspen woodland
Common dandelion	<i>Taraxacum officinale</i>	xx	Mountain shrub, sagebrush shrublands, aspen woodland
Common yarrow	<i>Achillea millefolium</i>	xxx	Reclaimed/disturbed area, mountain shrub, aspen woodland
Lambstongue ragwort	<i>Senecio integerrimus</i>	xxx	Mountain shrub, sagebrush shrublands
Larkspur	<i>Delphinium sp.</i>	xxx	Mountain shrub, aspen woodland
Silvery lupine	<i>Lupinus argenteus</i>	xxx	Mountain shrub, aspen woodland, sagebrush shrublands
Stinging nettle	<i>Urtica dioica</i>	xx	Mountain shrub, aspen woodland
Western valerian	<i>Valeriana occidentalis</i>	xxx	Mountain shrub
Woods' Rose	<i>Rosa woodsii</i>	xxx	Mountain shrub, aspen woodland
Shrubs/Trees			
Chokecherry	<i>Prunus virginiana</i>	xx	Mountain shrub, aspen woodland
Gambel's oak	<i>Quercus gambelii</i>	xx	Mountain shrub
Mountain mahogany	<i>Cercocarpus montanus</i>	xxx	Mountain shrub
Mountain snowberry	<i>Symphoricarpos oreophilus</i>	xxx	Mountain shrub, sagebrush shrublands

Common Name	Scientific Name	Abundance*	Habitat Type
Quaking aspen	<i>Populus tremuloides</i>	xxx	Mountain shrub, aspen woodland
Rocky mountain maple	<i>Acer glabrum</i>	xx	Mountain shrub, aspen woodland
Rubber rabbitbrush	<i>Ericameria nauseosa</i>	x	Reclaimed/disturbed area, mountain shrub
Utah serviceberry	<i>Amelanchier utahensis</i>	xxx	Mountain shrub
Mountain sagebrush	<i>Artemisa tridentata</i> ssp. <i>vaseyana</i>	x	Mountain shrub, sagebrush shrublands
Yellow rabbitbrush	<i>Chrysothamnus viscidiflorus</i>	x	Mountain shrub, sagebrush shrublands
* x= uncommon in project area. xx= moderate frequency throughout project area. xxx = common frequency throughout project area.			

VEGETATION ASSESSMENT

Sampling methods

The vegetation sampling protocol used involves a modified “line point-intercept method” based on the National Park Service Fire Monitoring Handbook (USDI National Park Service 2003) and Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems, Volume 1: Core Methods (Herrick et al 2015). The line point-intercept method uses the contact of a point to measure cover. The theory behind this method is that if an infinite number of points are placed in a two-dimensional area, the exact cover of a plant species can be determined by counting the number of points that intersect that species.

One reference transect was established within the near the well pad in a similar vegetation community. The following techniques were used to collect the sample data:

1. Each sample site was randomly selected within an area representative of the vegetative community being affected by the project.
2. The transect was designated Transect 1 (reference).
3. A metal rebar stake was placed in the ground to anchor a 50-meter measuring tape (0-meters) and the tape extended across the vegetation on the site. A second rebar stake was placed and anchored the 50-meter end of the tape.
4. The beginning and ending point of the transect was recorded using a GPS receiver. Azimuths from the 0-meter to the 50-meter point were recorded.
5. Photographs were taken along the transect that recorded vegetation condition from 0 to 50-meters.
6. Point count data were collected at 1.0-meter intervals along a 50-meter tape measure using a thin, straight metal rod for a total of fifty samples taken along the transect.

7. The first plant species encountered was recorded in the “Top Layer” column. Subsequent species and litter were recorded in the “Lower Canopy Layers” columns. Each species was recorded by 4 letter code (first two letters each of genus and species); unique species were recorded only once per sample point.
8. Ground cover was recorded as a species code (for a basal intercept), rock, bedrock, moss, soil, embedded litter, or duff as defined by the sampling protocol.
9. Other species of vegetation incidentally observed in the sample area were recorded (in addition to those recorded during sampling).

Identification of plant species was aided by using pertinent published field guides (Ackerfield 2015, Whitson et al. 2006, Weber and Wittmann 2012).

Results

Vegetation monitoring was conducted by WestWater scientists on October 6, 2021. Monitoring was conducted at the end of the growing season; however, plants were easily identifiable during the assessment. Percent foliar cover and percent basal cover results from the line-point intercept permanent transect are provided in Table 2, along with UTM locations and magnetic azimuth from 0-meters to 50-meters for each transect.

Table 2. Percent foliar and basal cover for vegetation monitoring transect.

Transect 1 – Reference Transect		
Transect Location (UTM Zone 12, NAD83 datum)		
0-meter terminus: 4378149N, 740737E		
50-meter terminus: 4378129N, 740783E		
Azimuth (true north): 73°		
Group	% Foliar Cover	% Basal Cover
Native Perennial Graminoids	20	0
Introduced Perennial Graminoids	0	0
Native Annual Graminoids	0	0
Introduced Annual Graminoids	0	0
Native Perennial Forbs	4	0
Introduced Perennial Forbs	0	0
Native Annual/Biennial Forbs	0	0
Introduced Annual/Biennial Forbs	0	0
Subshrubs/Shrubs	32	0
Trees	0	0
Total	56	0
Bare ground	38	

The reference transect is located in a mixed mountain shrubland plant community composed primarily of mountain snowberry, mountain big sagebrush, yellow rabbitbrush with an understory of native perennial grass species. A summary of plant species recorded along the transect and their percent foliar cover along is displayed in Table 3.

Table 3. Plant species recorded along reference transect.

Common Name	Scientific Name	Percent Foliar Cover
Columbia needlegrass	<i>Achnatherum nelsonii</i>	6
Geyer's sedge	<i>Carex geyeri</i>	4
Heartleaf arnica	<i>Arnica cordifolia</i>	4
Kentucky bluegrass	<i>Poa pratensis</i>	8
Mountain big sagebrush	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	6
Roundleaf snowberry	<i>Symphoricarpos rotundifolius</i>	16
Western wheatgrass	<i>Pascopyrum smithii</i>	2
Yellow rabbitbrush	<i>Chrysothamnus viscidiflorus</i>	10
	Total	56

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