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TECHNICAL MEMORANDUM

Date: December 15, 2020

To: Brandon Pollpeter and Luke Papez, Magic Valley Energy, LLC

From: Kurt Flaig and Melanie McCormack, Western EcoSystems Technology, Inc.

Subject: Lava Ridge Wind Project – Vegetation Assessment Memo

INTRODUCTION

Magic Valley Energy, LLC (MVE), contracted Western EcoSystems Technology, Inc. (WEST) to conduct baseline biological studies for the proposed Lava Ridge Wind Project (Project). The Project is located on approximately 150,000 acres (60,703 hectares) in Jerome, Minidoka, and Lincoln counties, Idaho, approximately 18 miles (29 kilometers) northeast of Twin Falls (Figure 1). The biological study plan for the Project includes a desktop assessment and field survey to assess vegetation and plant communities within the Project. The objective of the vegetation assessment is to provide data which can be used to evaluate the potential for occurrence of plant species listed as sensitive species by the Bureau of Land Management (BLM) Shoshone Field Office. This memorandum describes the methods and results of the desktop assessment and field survey.

PROJECT AREA

The Project is located within the Snake River Basin Level III Ecoregion (US Environmental Protection Agency 2017a, 2017b). The Snake River Basin is part of the xeric intermontane west, and is characterized by shallow stony soils, though barren lava fields may also occur in the region. Typical natural vegetation is mostly composed of sagebrush steppe, including several species of sagebrush (*Artemisia spp.*), rabbitbrush (*Chrysothamnus spp.*), and numerous perennial bunchgrasses and forbs. However, a number of wildfires have occurred within and adjacent to the Project between 1980 and 2016, which, combined with livestock grazing, have resulted in alterations to natural vegetation with the introduction of non-native forbs (BLM 2019). Topography within the Project area is relatively flat with elevations ranging from approximately 1,219 meters (m; 4,000 feet [ft]) to 1,524 m (5,000 ft). The primary land use within the Project area is open range livestock grazing. The Project area is mainly bordered by relatively large tracts of land used for center pivot-irrigated agriculture.

METHODS

The Project layout was not available at the time of survey; therefore, the Study Area was defined as the entire Project area (Figure 1). The vegetation assessment included agency coordination, a desktop assessment, and field survey. Details are provided below.

Agency Coordination

WEST reviewed public data records, including data from the Idaho Fish and Wildlife Information System (IFWIS), and consulted with a botanist at the BLM Shoshone Field Office (S. Seabrook-Sturgis) to identify plants listed as BLM sensitive plant species with the potential to occur in the Study Area. Based on these resources, 11 BLM-listed sensitive plant species were identified for evaluation (Table 1).

Five of the 11 sensitive species occur in wetlands; these species were not evaluated during the field surveys as they will be evaluated in 2021 concurrently with the aquatic resources inventory for the Project. In order to evaluate the presence of potential suitable habitat for the six upland species, WEST proposed to sample vegetation within 50 by 50-m (164 by 164-ft) plots placed in representative vegetation communities throughout the Study Area. The intent of this systematic sampling design was to provide a rapid assessment of the vegetation condition and composition within the Study Area to aid in evaluating potential habitat for sensitive plant species.

Desktop Assessment

To aid in determining potential locations for the sample plots within the Study Area, WEST downloaded soil mapping unit data from the US Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) Soil Survey Geographic Database (USDA NRCS 2020; Figure 2) and vegetation cover class types from the US Geological Survey (USGS) LANDFIRE database (USGS LANDFIRE 2016; Figure 3). These data were converted to Google Earth Keyhole Markup language Zipped files so the data could be overlaid on aerial imagery in Google Earth (imagery date June 3, 2016). A WEST plant ecologist reviewed the soil and vegetation layers with respect to observable signatures on the aerial imagery to determine potential habitat types within which sample plots could be located. Habitat signatures in Google Earth imagery were somewhat confounded by the mosaic of historic and relatively large wildfire scars throughout the Study Area; thus, greater emphasis was placed on the NRCS soil and LANDFIRE vegetation data for sample plot locations. Sample plot locations were selected based on a delineation of the vegetation communities across the Study Area. Locations for sample plots were subjectively sited (i.e., not randomly selected) to gain a representational dataset for each habitat type. The intent of this survey was not to identify individual occurrences of the sensitive plant species, but rather to inform habitat conditions in areas these species may occupy. Sample plots were located exclusively in upland communities, as wetland communities will be sampled during the 2021 growing season as part of wetland delineation efforts for the Project.

Field Survey

Based on review of the soils and vegetation data and Google Earth imagery, 20 sample plots were located within the Study Area that provided representation of the different vegetation cover

class and soil types (Figure 4 and Appendix A). Sample plots were visited by an experienced botanist who walked throughout the 50 by 50-m sample plot to identify species and collect data. Data collected within each plot included ocular estimation of percent cover of dominant plant species, plant species composition, presence of disturbance, and representative photographs. Percent cover was recorded for dominant species, defined as species with a minimum of 10% cover in a given sample plot, all other species were recorded as “present” (i.e., no percent cover value was provided).

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Table 1. BLM-sensitive plant species with potential to occur within the Lava Ridge Wind Study Area.

Scientific Name	Common Name	Habitat[1]	Flowering/Fruiting Period[1]
Astragalus atratus v. *inseptus*	camas milkvetch	Sagebrush steppe communities on flats and hillsides, often clayey, stony soil over basalt; bare ground within sagebrush	early May – mid June
Astragalus oniciformis	Picabo milkvetch	Basins, bowls, flats with rolling topography having deep, stable, well-drained, sandy or sandy loam soils	early May – mid June
Astragalus purshii v. *ophiogenes*	Snake River milkvetch	Often on barren sites growing in loosely aggregated, frequently moving sand and gravel deposits on bluffs, talus, dunes, and volcanic ash beds	mid-to-late April (flwr)
Downingia bacigalupi	Bach's calicoflower	Vernal pools, grassy meadows	July
Eremothera boothii ssp. *boothii*	Booth's evening-primrose	Sandy flats; deep, loose slopes	April – September
Juncus bryoides	moss rush	Wet places, washes, meadows, seeps	July
Juncus hemiendytus v. abjectus	Herman's dwarf rush	Damp, open areas; especially vernally wet	July
Mentzelia congesta	clustered blazing star	Sagebrush scrub	May - July
Phacelia thermalis	heat phacelia	Bare ground/openings in sagebrush; open clay flats	May - June
Potamogeton diversifolius	waterthread pondweed	Ponds, lakes, ditches, slow-moving water	July
Psilocarphus tenellus	slender woollyheads	Dried beds of vernal pools, and other open, moist or vernally moist places	July

[1]Habitat and phenology information was obtained from various sources, including: Idaho Natural Heritage Program (IDNHP), Bureau of Land Management, *Flora of the Pacific Northwest* (Hitchcock and Cronquist 1973), and *The Jepson Manual* (Baldwin et al. 2012).

RESULTS

The field survey was conducted from July 21 – 23 by WEST botanist Klarissa Lawrence. Species composition and percent cover data for each plot are provided in Appendix A. Representative photographs of the vegetation sample plots surveyed within the Study area are provided in Appendix B.

No BLM-listed sensitive plant species were observed in the 20 sample plots. Two non-native grasses, cheatgrass (*Bromus tectorum*) and crested wheatgrass (*Agropyron cristatum*), were the most common dominant species encountered within the 20 sample plots. Cheatgrass occurred as a dominant species in 16 of 20 sample plots (Appendix A). Crested wheatgrass was recorded as a dominant species in eight of 20 sample plots. The plant species with the next highest level of occurrence were big sagebrush (*A. tridentata*) and Sandberg bluegrass (*Poa secunda*); both were recorded as dominant plant species in five of the 20 sample plots (Appendix A).

Although noxious weeds were not the target of the survey, a number of noxious weed species listed by the Idaho State Department of Agriculture (2020) were observed incidentally throughout the Study Area during the field survey. Noxious weed colonies varied in size and the majority were composed of Scotch thistle (*Onopordum acanthium*). Infestations of Russian knapweed (*Acroptilon repens*), rush skeletonweed (*Chondrilla juncea*), perennial pepperweed (*Lepidium perfoliatum*), and Canada thistle (*Cirsium arvense*) were also observed.

DISCUSSION AND CONCLUSION

None of the 11 BLM-listed sensitive plant species were identified during the field survey. Although the WEST botanist conducting the field survey was looking for the targeted sensitive plant species within the vegetation sample plots, the field survey was not intended to serve as a presence/absence survey given the timing of the survey. IFWIS data contained records of one BLM-listed sensitive plant species, Picabo milkvetch, within the Study Area (IFWIS 2020). This species is primarily found in sagebrush (*Artemesia tridentata*) habitat, and may also occur within grassy or recently burned areas (Moseley 1995). Due to the timing of the survey, these records were not verified during the field survey but will be incorporated into future survey efforts.

Five of the BLM-listed sensitive plant species occur in wetland habitats (Table 1). Wetland habitats were not included within the sample plots, but numerous small, wetland depressions are identified in the US Fish and Wildlife Service National Wetlands Inventory (2020) database, several of which were observed by the surveying botanist while traversing the Study Area (Appendix B21, B22). These mesic to wet depressions and other wetland habitats will be investigated for the presence of sensitive species during wetland delineations in 2021.

Overall, vegetation communities present within the Study Area have been altered by domestic livestock grazing and the introduction of non-native species, such as cheatgrass. Cheatgrass composed more than 50% cover in 8 of the 20 sample plots. Cheatgrass invasion has contributed to a more frequent and often more intense fire cycle, which has further facilitated its spread throughout the intermountain west region (Balsch et al. 2012). Based on BLM data (2019), review of aerial imagery, and observations made during the field survey, numerous wildfires have occurred over the last 35 years, including within the last several years. In addition to cheatgrass and other non-native invasive species proliferating in burned areas, many of the burned areas appear to have been predominantly seeded with crested wheatgrass, likely in an effort to quell the spread of cheatgrass and help stabilize soils.

The results of the field survey suggest the overall vegetation composition and condition within much of the Study Area is predominantly disturbed and composed of non-native grasses. WEST recognizes the timing of the field survey may have resulted in fewer native forbs being detected and plant diversity may be higher than was recorded during the survey. However, it should also be recognized that some of the native plants that occurred historically in the Study Area may have been displaced over time (i.e., outcompeted) by invasion/establishment of non-native species. While some sensitive plant species can tolerate various levels of disturbance, they often occupy niche (i.e., micro) habitats within disturbed areas. The degraded vegetation communities encountered throughout the Study Area may be unsuitable for many of the above sensitive species; however, there is potential for some of the above species, particularly the *Astralagus* species, to occur in microhabitats within degraded areas in the Project. MVE anticipates pre-construction clearance surveys may be an effective minimization measure to micro-site Project infrastructure around niche occurrences of the sensitive species listed above, should they be identified.

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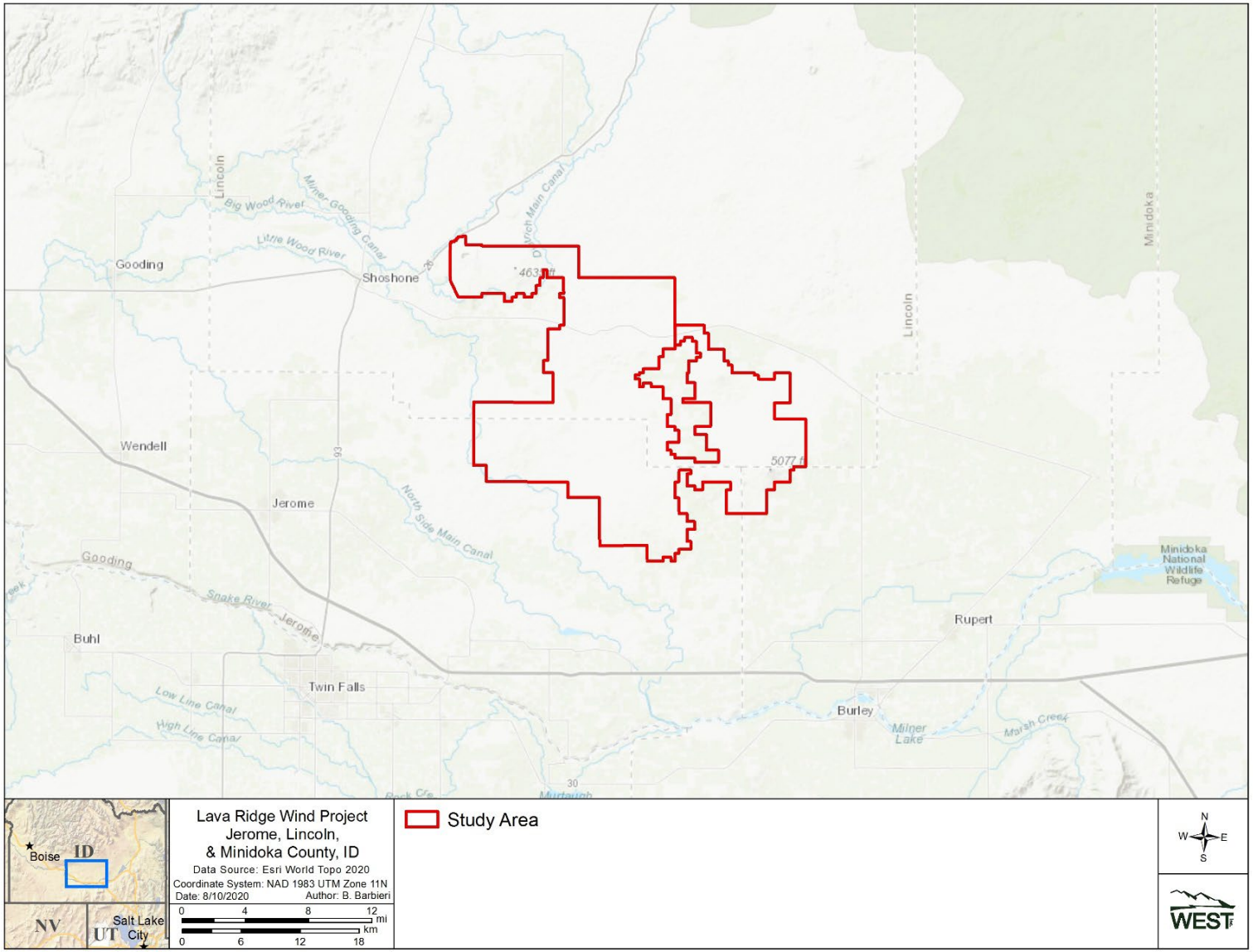

Figure 1. Location of the Lava Ridge Wind Project Study Area.

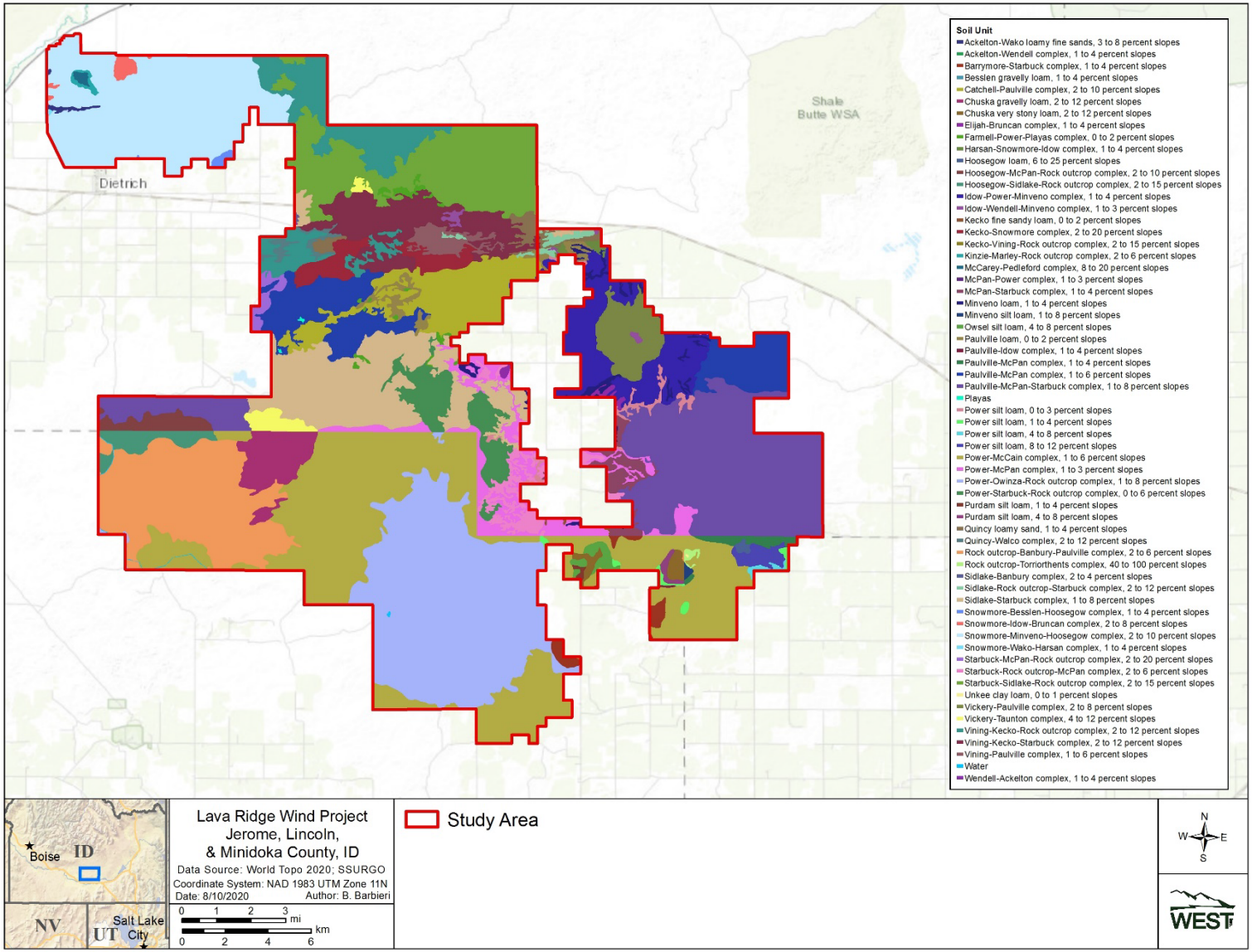

Figure 2. US Department of Agriculture Natural Resources Conservation Service soil mapping units for the Lava Ridge Wind Project Study Area.

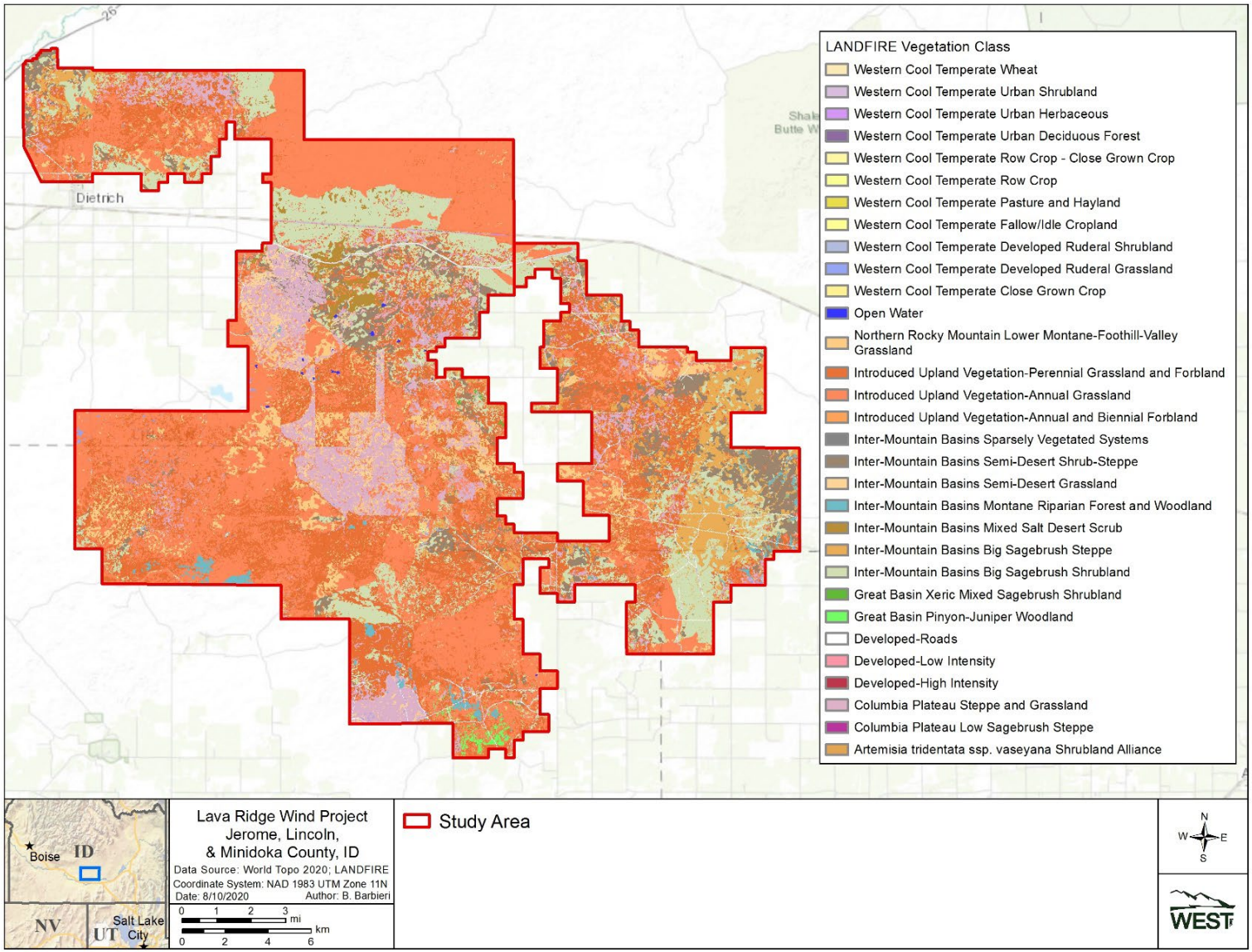

Figure 3. US Geological Survey LANDFIRE vegetation classes for the Lava Ridge Wind Project Study Area.

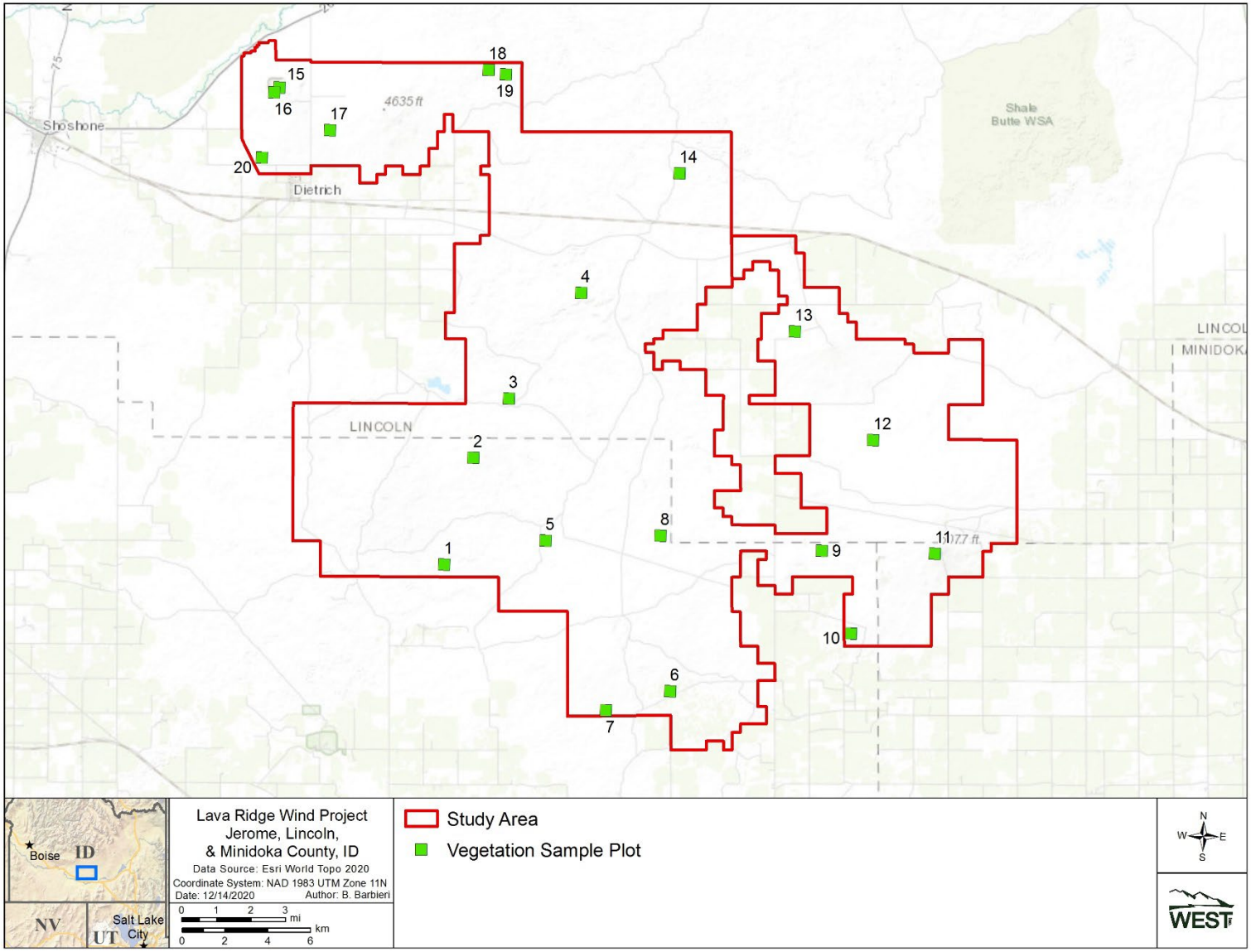

Figure 4. Locations of vegetation sample plots for the Lava Ridge Wind Project Study Area.

Appendix A. Species Composition and Percent Cover Data for Vegetation Sample Plots Surveyed within the Lava Ridge Wind Study Area

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Plot #	Soil Type	LANDFIRE Class	Plant Species[1]	% Cover or Present[2] (P)	Comment
Plot 1	Rock outcrop-Banbury-Paulville complex, 2 to 6 percent slopes	Introduced Upland Vegetation-Annual Grassland	***Bromus tectorum***	**30**	Heavily grazed. Very weedy, many patches of *Onopordum acanthium* adjacent to the plot and throughout surrounding area.
			Pascopyrum smithii	**20**	
			Agropyron cristatum	**15**	
			Poa secunda	**10**	
			Artemisia tridentata	P	
			Chondrilla juncea	P	
			Erigeron spp.	P	
			Gutierrezia sarothrae	P	
			Lactuca serriola	P	
			Sphaeralcea coccinea	P	
			Tragopogon dubius	P	
Plot 2	Chuska gravelly loam, 2 to 12 percent slopes, loamy	Northern Rocky Mountain Lower Montane-Foothill-Valley Grassland	***Agropyron cristatum***	**60**	Recently grazed. Burned ~ 5 years ago. Area reseeded with *Agropyron cristatum*. Least diverse sample plot.
			Chondrilla juncea	P	
			Tragopogon dubius	P	
Plot 3	Sidlake-Starbuck complex, 1 to 8 percent slopes, fine-loamy	Introduced Upland Vegetation-Perennial Grassland and Forbland	***Pseudoroegneria spicata***	**30**	Burned ~ 5 years ago. Area reseeded with *Agropyron cristatum*, *Pseudoroegneria spicata*, and *Thinopyrum ponticum*.
			Agropyron cristatum	**20**	
			Bromus tectorum	**20**	
			Thinopyrum ponticum	**20**	
			Chondrilla juncea	P	
			Sisymbrium altissimum	P	
			Tragopogon dubius	P	
Plot 4	Paulville loam, 0 to 2 percent slopes, fine-loamy	Inter-Mountain Basins Mixed Salt Desert Scrub	***Bromus tectorum***	**30**	Taller sagebrush; old sage grouse pellets scattered but infrequent.
			Agropyron cristatum	**20**	
			Artemisia tridentata	**20**	
			Chrysothamnus viscidiflorus	P	
			Vulpia bromoides	P	
Plot 5	Power-McCain complex, 1 to 6 percent slopes, fine-silty	Introduced Upland Vegetation-Perennial Grassland and Forbland	***Pseudoroegneria spicata***	**30**	Burned ~ 5 years ago. Area reseeded with *Agropyron cristatum*, *Pseudoroegneria spicata*, and *Thinopyrum ponticum*.
			Bromus tectorum	**20**	
			Agropyron cristatum	**20**	
			Thinopyrum ponticum	**15**	

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Plot #	Soil Type	LANDFIRE Class	Plant Species[1]	% Cover or Present[2] (P)	Comment
			Chondrilla juncea	P	
			Lactuca serriola	P	
Plot 6	Power-Owinza-Rock outcrop complex, 1 to 8 percent slopes, fine-silty	Introduced Upland Vegetation-Perennial Grassland and Forbland	***Bromus tectorum***	**80**	Burned 2-3 years ago. Flatter, less rocky areas adjacent to plot reseeded with *Agropyron cristatum*.
			Sisymbrium altissimum	**20**	
			Elymus repens	P	
			Lactuca serriola	P	
			Lupinus argenteus	P	
			Tragopogon dubius	P	
Plot 7	Power-McCain complex, 1 to 6 percent slopes, fine-silty	Columbia Plateau Steppe and Grassland	***Bromus tectorum***	**80**	Burned 2-3 years ago. Flatter, less rocky areas adjacent to plot reseeded with *Agropyron cristatum*.
			Sisymbrium altissimum	**20**	
			Lactuca serriola	P	
Plot 8	Power-Owinza-Rock outcrop complex, 1 to 8 percent slopes, fine-silty	Inter-Mountain Basins Semi-Desert Shrub-Steppe	***Bromus tectorum***	**30**	Burned ~ 5 years ago. Area is relatively diverse compared to other areas, but still rather weedy.
			Pascopyrum smithii	**30**	
			Poa bulbosa	**20**	
			Artemisia tridentata	P	
			Chondrilla juncea	P	
			Chrysothamnus viscidiflorus	P	
			Gutierrezia sarothrae	P	
			Lactuca serriola	P	
			Lupinus argenteus	P	
			Poa secunda	P	
			Sisymbrium altissimum	P	
			Tragopogon dubius	P	
Plot 9	Power-McCain complex, 1 to 6 percent slopes, fine-silty	Inter-Mountain Basins Big Sagebrush Shrubland	***Bromus tectorum***	**80**	Burned 2-3 years ago. Sample plot is near edge of burn.
			Sisymbrium altissimum	**20**	
			Vulpia bromoides	P	
Plot 10	Barrymore-Starbuck complex, 1 to 4 percent slopes, coarse-silty	Columbia Plateau Steppe and Grassland	***Bromus tectorum***	**80**	Burned 2-3 years ago. Flatter, less rocky areas adjacent to plot reseeded with *Agropyron cristatum*.
			Sisymbrium altissimum	**20**	
			Agropyron cristatum	P	
			Lepidium perfoliatum	P	
Plot 11		Inter-Mountain Basins Semi-Desert Shrub-Steppe	***Bromus tectorum***	**70**	Side slope of Kimama Butte.
			Artemisia tridentata	**40**	

Appendix A. Species Composition and Percent Cover Data for Vegetation Sample plots Surveyed within the Lava Ridge Wind Study Area.

Plot #	Soil Type	LANDFIRE Class	Plant Species[1]	% Cover or Present[2] (P)	Comment
	Hoosegow loam, 6 to 25 percent slopes, fine-loamy		*Sisymbrium altissimum*	P	
			Vulpia bromoides	P	
Plot 12	Paulville-McPan-Starbuck complex, 1 to 8 percent slopes, fine-loamy	Inter-Mountain Basins Semi-Desert Shrub-Steppe	***Bromus tectorum***	**70**	Denser sagebrush in area surrounding sample plot.
			Artemisia tridentata	**10**	
			Chondrilla juncea	P	
			Lactuca serriola	P	
			Sisymbrium altissimum	P	
Plot 13	Vickery-Paulville complex, 2 to 8 percent slopes, fine-loamy	Introduced Upland Vegetation-Perennial Grassland and Forbland	***Agropyron cristatum***	**40**	None.
			Artemisia tridentata	**30**	
			Chrysothamnus viscidiflorus	P	
			Phlox hoodii	P	
			Vulpia bromoides	P	
Plot 14	Starbuck-Sidlake-Rock outcrop complex, 2 to 15 percent slopes, loamy	Introduced Upland Vegetation-Annual Grassland	***Poa secunda***	**30**	20% rock cover.
			Bromus tectorum	**20**	
			Agropyron cristatum	**10**	
			Chrysothamnus viscidiflorus	**10**	
			Acroptilon repens	P	
			Chondrilla juncea	P	
			Helianthus annuus	P	
			Lactuca serriola	P	
			Purshia tridentata	P	
			Sphaeralcea coccinea	P	
			Tragopogon dubius	P	

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Plot #	Soil Type	LANDFIRE Class	Plant Species[1]	% Cover or Present[2] (P)	Comment
Plot 15	McCarey-Pedleford complex, 8 to 20 percent slopes, fine-loamy	Introduced Upland Vegetation-Perennial Grassland and Forbland	***Bromus tectorum***	**60**	Crater bottom, sandy. Heavily grazed and very weedy.
			Chondrilla juncea	**20**	
			Chrysothamnus viscidiflorus	P	
			Lepidium perfoliatum	P	
			Tragopogon dubius	P	
			unknown grass	P	
Plot 16	Kinzie-Marley-Rock outcrop complex, 2 to 6 percent slopes, fine-silty	Inter-Mountain Basins Big Sagebrush Steppe	***Bromus tectorum***	**30**	Sample plot on steep side slope inside crater. Most diverse plot; likely not grazed often due to terrain.
			Poa secunda	**30**	
			Artemisia tridentata	**15**	
			Chrysothamnus viscidiflorus	**10**	
			Achillea millefolium	P	
			Allium spp.	P	
			Elymus cinereus	P	
			Penstemon deustus	P	
			Ribes cereum	P	
Plot 17	Snowmore-Minveno-Hoosegow complex, 2 to 10 percent slopes, fine-loamy	Introduced Upland Vegetation-Annual Grassland	***Bromus tectorum***	**70**	None.
			***Erigeron* spp.**	**20**	
			Chondrilla juncea	P	
			Elymus repens	P	
			Plantago patagonica	P	
			Tragopogon dubius	P	
Plot 18	Vining-Kecko-Rock outcrop complex, 2 to 12 percent slopes, coarse-loamy	Inter-Mountain Basins Big Sagebrush Shrubland	***Bromus tectorum***	**40**	15% rock cover.
			Poa secunda	**20**	
			Chondrilla juncea	P	
			Chrysothamnus viscidiflorus	P	
			Poa bulbosa	P	
			Tragopogon dubius	P	
Plot 19			***Bromus tectorum***	**40**	15% rock cover. Burned 3-4 years ago; plot nearby old fire line.
			Poa secunda	**30**	
			Bromus japonicus	P	

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Plot #	Soil Type	LANDFIRE Class	Plant Species[1]	% Cover or Present[2] (P)	Comment
	Vining-Kecko-Rock outcrop complex, 2 to 12 percent slopes, coarse-loamy	Introduced Upland Vegetation-Annual Grassland	*Chondrilla juncea*	P	
			Chrysothamnus viscidiflorus	P	
			Erigeron spp.	P	
			Lupinus argenteus	P	
			Taeniatherum caput-medusae	P	
			Tragopogon dubius	P	
Plot 20	Snowmore-Minveno-Hoosegow complex, 2 to 10 percent slopes, fine-loamy	Northern Rocky Mountain Lower Montane-Foothill-Valley Grassland	***Bromus tectorum***	**70**	Burned ~ 3 years ago. Area reseeded with *Agropyron cristatum.*
			Agropyron cristatum	**20**	
			Erigeron spp.	P	
			Lactuca serriola	P	
			Sisymbrium altissimum	P	

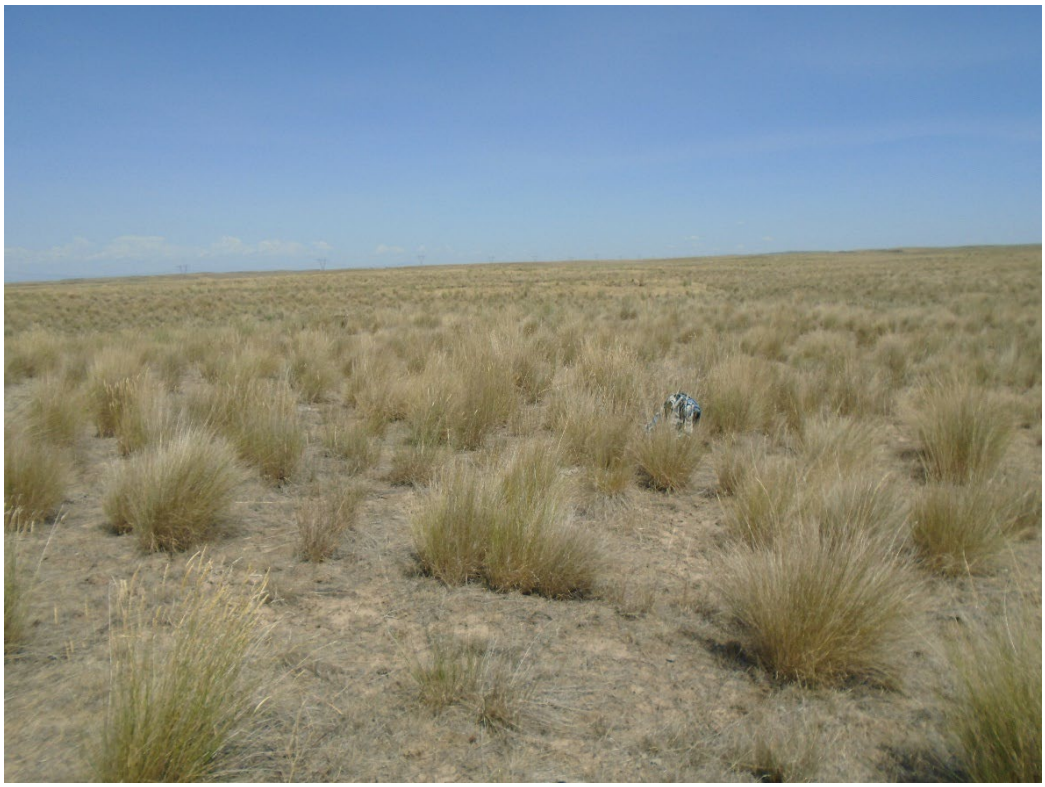
[1]Dominant and co-dominant species in bold.

[2]Present (P) = < 10% cover

Appendix B. Photographs of Vegetation Sample Plots Surveyed within the Lava Ridge Wind Study Area

Appendix B1. Vegetation sample plot 1.

Appendix B2. Vegetation sample plot 2.



Appendix B3. Vegetation sample plot 3.

Appendix B4. Vegetation sample plot 4.

Appendix B5. Vegetation sample plot 5.

Appendix B6. Vegetation sample plot 6.

Appendix B7. Vegetation sample plot 7.

Appendix B8. Vegetation sample plot 8.

Appendix B9. Vegetation sample plot 9.

Appendix B10. Vegetation sample plot 10.

Appendix B11. Vegetation sample plot 11.

Appendix B12. Vegetation sample plot 12.

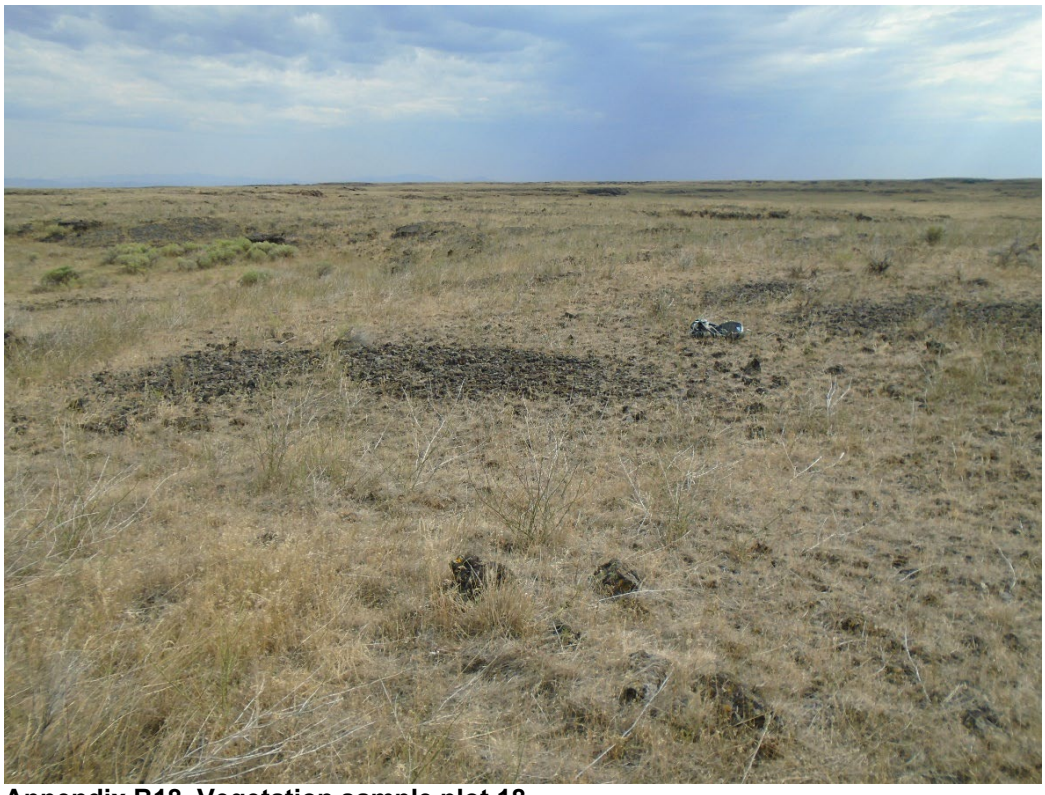
Appendix B13. Vegetation sample plot 13.

Appendix B14. Vegetation sample plot 14.

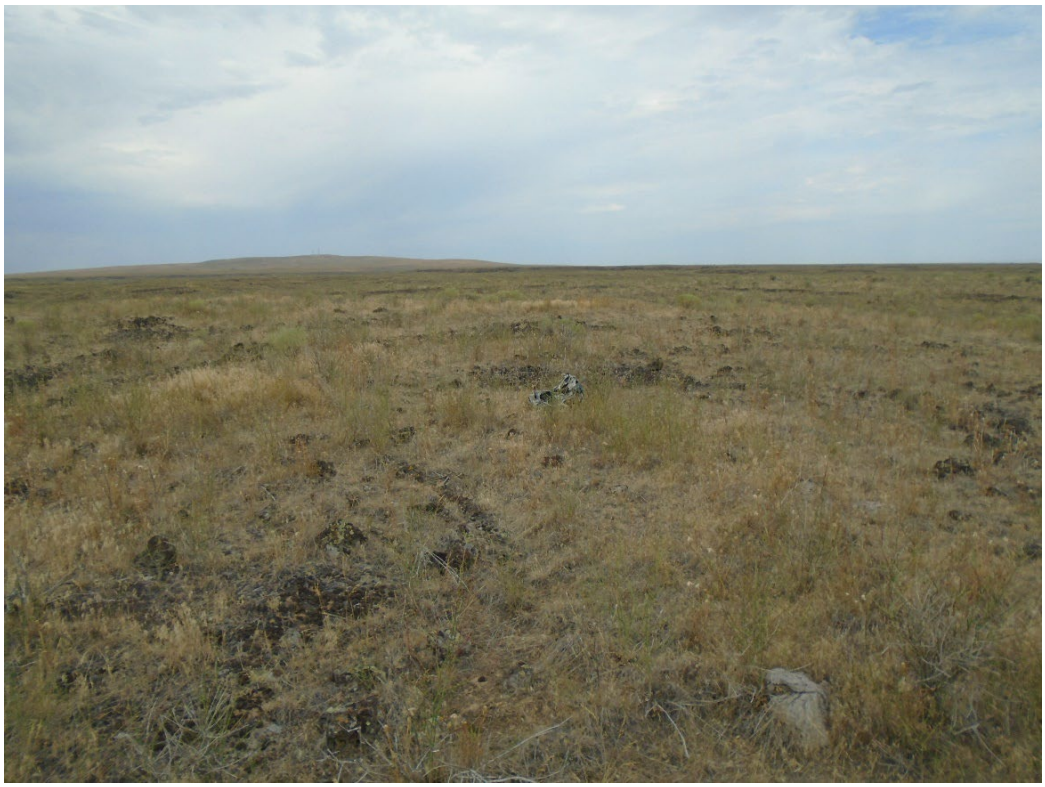
Appendix B15. Vegetation sample plot 15.

Appendix B16. Vegetation sample plot 16.

Appendix B17. Vegetation sample plot 17.



Appendix B18. Vegetation sample plot 18.



Appendix B19. Vegetation sample plot 19.

Appendix B20. Vegetation sample plot 20.

Appendix B21. Wetland depression observed within the Study Area.

Appendix B22. Mesic depression observed within the Study Area.