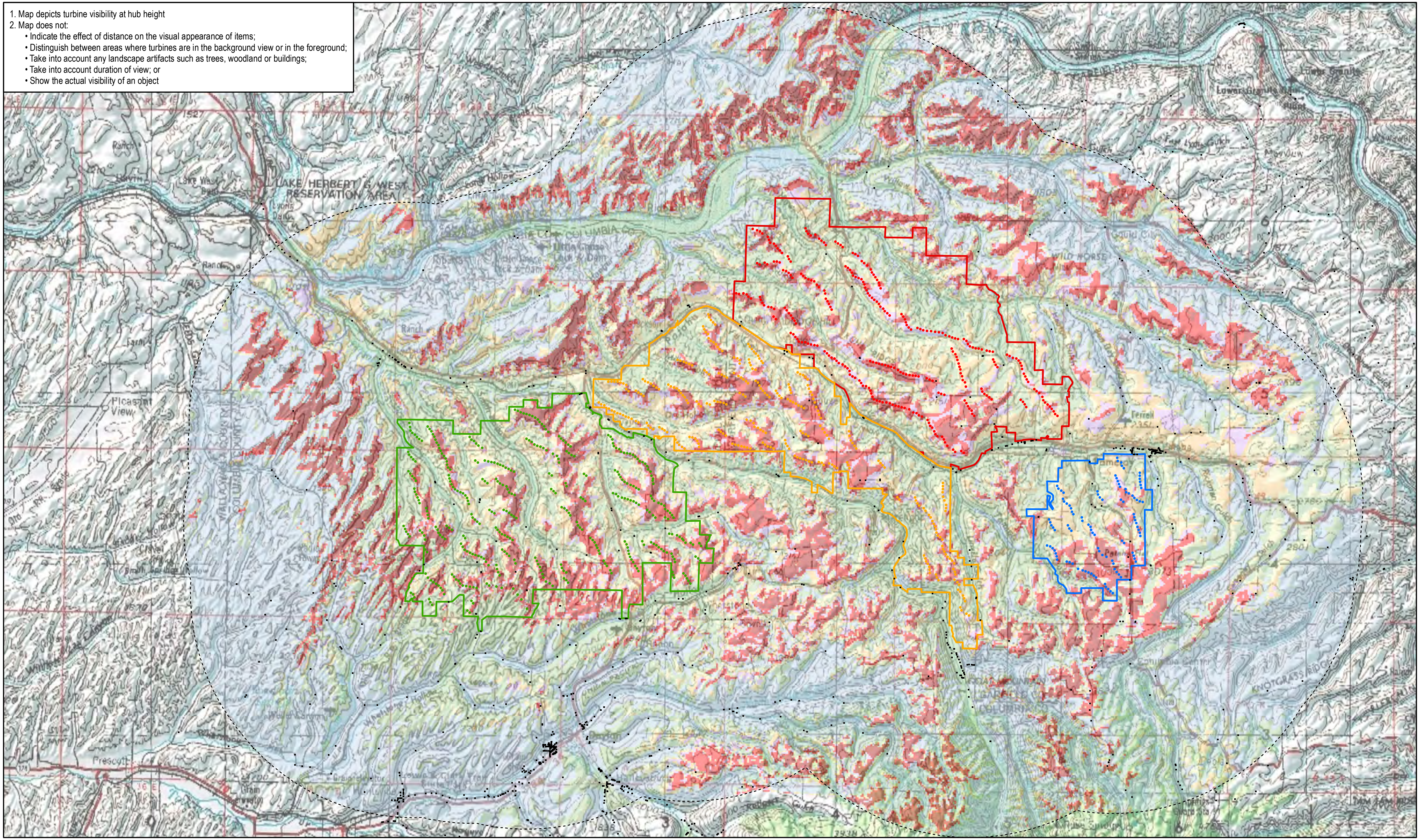
E Visual Simulations

© Ecology & Environment, Inc. GIS Department Project #
M:\Seattle\Res_AmericasWind\Maps\MXDs\ZVI\WTGS_ZVI_Apr202009_SeptWTGmapped.mxd 10/01/2009

1. Map depicts turbine visibility at hub height
2. Map does not:
   - Indicate the effect of distance on the visual appearance of items;
   - Distinguish between areas where turbines are in the background view or in the foreground;
   - Take into account any landscape artifacts such as trees, woodland or buildings;
   - Take into account duration of view; or
   - Show the actual visibility of an object



Residential Unit
All WTGs 8-mile buffer
Tucannon WTG Location
Tucannon WRA Boundary
Oliphant WTG Location
Oliphant WRA Boundary
Kuhl Ridge WTG Location
Kuhl Ridge WRA Boundary
Dutch Flat WTG Location
Dutch Flat WRA Boundary

0
1 to 50
51 to 100
101 to 200
201 to 300
301 to 500
501 and greater

N

0 1.25 2.5 3.75 5 Miles

Figure F2-21
Zone of Visual Influence Within 8 Miles
Garfield and Columbia Counties

J

SWCA's Lower Snake River Wind Energy Project Rare Plant Survey Report Garfield and Columbia Counties, Washington

Lower Snake River Wind Energy Project
Rare Plant Survey Report
Garfield and Columbia Counties, Washington

Prepared for

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September 2009

SWCA Project 14530

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1. Introduction

1.1. Project Description

The Applicant is proposing to build a commercial wind energy generation facility with a maximum of 795 turbines and a maximum installed capacity of 1,432 megawatts. Wind turbines will be located along ridge tops to use winds that typically come from the southwest. Supporting infrastructure includes access roads, underground and overhead electric collector lines, substations, meteorological towers, operations and maintenance centers, and temporary construction access and staging areas.

The proposed Project encompasses over 120,000 acres of leased lands within Columbia and Garfield counties (Figure 1). The Project in Garfield County comprises lands south of Pomeroy, north of the Pataha River, and between the Pataha and the Tucannon Rivers. The Columbia County lands consist of property that is generally 5 miles north of the city limits of Dayton and bordered on the north and west by State Route 12 and bordered on the south by Tucannon Road. Prominent geographic features in the project vicinity include the Blue Mountains to the south and the Snake River to the north. The project site is primarily located along the tops of ridges; however, there are several areas along lower-lying streams and access roads that are included in the study area. Site elevations range from 1,000 feet (305 meters) above sea level along Tucannon Creek in the eastern portion of the project site to 3,100 feet (945 meters) above sea level in the southern portion of the project.

1.2. Study Area

Areas that may be impacted by the project are included within the environmental permitting corridors (study area). The study area generally consists of rolling ridge tops with ephemeral streams occurring in valleys with steep hillsides that flow to broader valleys with more permanent waters. The primary land uses include dryland wheat farming, Conservation Reserve Program (CRP) areas, and open livestock range land. Native vegetation communities include eastside steppe grasslands and riparian habitat. A few residences and farm buildings exist within and in the vicinity of the project site. Several gravel and dirt farm access roads cross through the site. State Route 12 crosses through the central portion of the study area and is the largest transportation corridor in the vicinity.

2. Methods

2.1. Vegetation Habitat Mapping

SWCA used a combination of aerial photographic interpretation and on-the-ground verification to map vegetation within environmental permitting corridors. A reconnaissance-level survey was conducted in which representative habitats were visited and verified on ortho-rectified aerial photographs (scale 1 inch = 1,000 feet). Based on different aerial signatures of land cover types and the results of the field survey, native grasslands and other cover types, where possible, were delineated on aerial photographs and then digitized using ArcGIS software. Other cover types, such as agriculture and CRP, were also derived from existing National Land Cover Database 2001 (U.S. Geological Survey) data. Cover type categories were identified in accordance with the Washington Department of Fish and Wildlife Wind Power Guidelines (WDFW 2009) and include dryland agriculture, CRP, steppe, and riparian communities. Due to mapping constraints, finer-scale cover type mixtures were categorized by the dominant type present. Habitat boundaries are approximate and based on high resolution aerial photographs; they were not surveyed. Photographs were taken to provide a visual reference for site features and cover types (Appendix A).

2.2. Rare Plant Database and Literature Review

Prior to the beginning of field surveys, SWCA reviewed the Washington Natural Heritage Program rare plant database and compiled a list of rare plant taxa with the potential for occurrence in the project area including all federally listed Threatened, Endangered, and Candidate species known to occur in eastern Washington (Washington Natural Heritage Program Rare Plants GIS Spatial Data Set; WNHP 2009).

There are five listed plant species on the USFWS Eastern Washington ESA plant species list (Table 1); one of these species has been documented in Columbia and Garfield counties: Ute Ladies'-tresses (*Spiranthes diluvialis*) (Threatened). An additional four species are listed as potentially occurring in eastern Washington: water howellia (*Howellia aquatilis*) (Threatened), Spalding's silene (*Silene spaldingii*) (Threatened), showy stickseed (*Hackelia venusta*) (Endangered), and Wenatchee Mt. checkermallow (*Sidalcea oregana* ssp. *oregana* var. *calva*) (Endangered). It is unlikely that most of these listed species occur on the project site due to the lack of appropriate habitat and/or the extent of their historical range; however, Spalding's silene inhabits native grassland habitat and could potentially occur in the non-plowed native grassland areas even though it has never been observed in Columbia or Garfield counties.

Table 1. Eastern Washington Listed Species

Species	Habitat	Associated Species	Elevation (Feet)	Bloom Period	Occurrence Potential
water howellia *Howellia aquatilis*	in E. WA, forested edge n. Columbia Basin and scabland	aspen	10–2,300	July	No
Spalding's silene *Silene spaldingii*	mesic native grassland	Idaho fescue, rough fescue, bluebunch wheatgrass	1,200–5,300	mid–late July	Yes
Ute lady's tresses *Spiranthes diluvialis*	seasonally wet alkaline flat in shrub-steppe adj. to coniferous forest	big sagebrush, rabbit-brush, bitterbrush, green sedge, witchgrass, spike-rush	720–1,500	mid July–Aug	No
lesser showy stickseed *Hackelia venusta*	dry granitic sand	open sparse vegetation	1,500–2,500	May	No
Wenatchee Mt. checkermallow *Sidalcea oregana* ssp. *oregano* var. *calva*	moist meadows	aspen, black hawthorn, snowberry, sticky purple geranium, false hellebore	1,900–3,200	mid–late July	No

Spalding's silene, the only special-status plant with the potential to occur within the study area, was listed as a threatened species under the Endangered Species Act on October 10, 2001 (USFWS 2001). This species is an herbaceous perennial plant in the pink family (Caryophyllaceae) that occurs predominantly in bunchgrass grasslands and sagebrush-steppe, and occasionally in open pine communities, in eastern Washington, northeastern Oregon, west-central Idaho, western Montana, and barely extending into British Columbia, Canada. This species inhabits open, mesic (moist) grassland communities or sagebrush-steppe communities. Spalding's silene is most often associated with Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Agropyron spicatum*), and rough fescue (*F. scabrella*). It occurs at elevations ranging from 1,200 to 5,300 feet (365 to 1,615 meters) in deep, productive loess soils. Plants are generally found in swales or on northwest-to-northeast-facing slopes where soil moisture is relatively higher. Threats to this species include habitat loss and fragmentation due to human development, habitat degradation associated with adverse grazing and trampling by domestic livestock and wildlife, and invasions of aggressive nonnative plants (USFWS 2007).

2.3. Special-Status Plant Species Survey

Based on the SWCA habitat map, all suitable native grasslands within the environmental permitting corridors were systematically surveyed using standard rare plant survey methodology (WDNR 2009). Surveys were conducted during the optimum time for viewing Spalding's silene and were performed by SWCA qualified biologists over a period of 14 days between July 27 and August 13, 2009. Staff biologists walked in a grid pattern to ensure complete visual coverage. Narrow grassland fragments were often evaluated by one person and broader grassland communities were evaluated by two or three people walking abreast; the distance between surveyors was determined by specific site conditions in order to optimize plant visibility relative to the terrain and the height of herbaceous vegetation. A vascular plant species list was compiled for all species observed during the surveys (Appendix B). Scientific nomenclature followed Hitchcock and Cronquist (1973) or the PLANTS database (USDA-NRCS 2009) as appropriate.

Survey specifications of fieldwork (Table 2) are provided below:

Table 2. Field Survey

Dates	Survey	Field Crew	Areas Surveyed
June 18, 2009	Habitat Mapping	P. Chitwood, T. Cummins	Entire site
June 19, 20, and 29, 2009	Habitat Mapping	P. Chitwood	Entire site
July 27, 2009	Rare Plant Survey	P. Chitwood	1–11
July 28, 2009	Rare Plant Survey	P. Chitwood, D. Grimm, M. Vesh	12–19
July 30 and 31, 2009	Rare Plant Survey	P. Chitwood	20–42
August 2–7, 2009	Rare Plant Survey	P. Chitwood, J. Feldmann	43–79
August 10, 2009	Rare Plant Survey	P. Chitwood	80–81
August 11–13, 2009	Rare Plant Survey	P. Chitwood, T. Cummins, C. Galen	82–106
September 17, 2009	Habitat Mapping	T.Cummins	Entire site

3. Results

3.1. Habitat Types

The project area is located in the Columbia Plateau ecoregion, which includes the area in eastern Washington and eastern Oregon bounded by the Cascade, Okanogan, Blue, and Rocky mountains (WDNR 2007, Franklin and Dyrness 1988). It lies in the Cascade Mountains rain shadow and is the driest ecoregion in Washington. As a result of these climatic conditions, steppe (native grassland) is the primary plant community that evolved in the region.

The study area includes four cover types: dryland agriculture, CRP, eastside steppe (native grassland), and riparian vegetation. Each cover type is described below and is mapped in Figure 2 and Figure 3.

3.1.1. Dryland Agriculture

Dryland agriculture (cropland) within the project area is typically planted in wheat (*Triticum aestivum*) and other grain crops. Fallow fields within the project area are characterized by invasive annual grasses and forbs such as cheatgrass (*Bromus tectorum*), yellow starthistle (*Centaurea solstitialis*), Russian thistle (*Salsola kali*), and a variety of other invasive species. Since these areas no longer support a native plant community, they are not expected to support sensitive plant species. A total of 21,461.4 acres of this habitat occur within the study area.

3.1.2. Conservation Reserve Program

The U.S. Department of Agriculture Conservation Reserve Program provides technical and financial assistance to eligible farmers and ranchers to protect soils by converting highly erodible cropland to perennial grasslands. Vegetation on lands managed under the CRP within the study area is dominated by perennial nonnative bunchgrasses, such as intermediate wheatgrass (*Agropyron intermedium*) and crested wheatgrass (*Agropyron cristatum*). CRP lands are distributed throughout the project area. Due to past land use disturbances and the nonnative condition of these areas, CRP lands are not expected to support sensitive plant species. A total of 1,614.3 acres of this habitat occurs within the study area.

3.1.3. Eastside Steppe (Native Grassland)

Eastside steppe habitat is a Washington State Priority 2 Habitat (WDFW 2008) because the vast majority of native grassland habitat in the region has been eliminated or highly modified by a variety of human activities, including conversion to croplands, nonsustainable livestock management practices, habitat fragmentation, and invasion by nonnative plants (Johnson and O'Neil 2001). It is also the only cover type in the study area that could potentially support rare plants.

Eastside steppe habitat mapped in the study area consists of unplowed lands with a native bunchgrass component. Common vegetation includes native perennial bunchgrasses such as bluebunch wheatgrass, Sandberg's bluegrass (*Poa sandbergii*), rough fescue, and Idaho fescue; native forbs such as common yarrow (*Achillea millefolium*), serrate balsamroot (*Balsamorhiza serrata*), large-fruited biscuitroot (*Lomatium macrocarpum*), and milkvetches (*Astragalus* spp.); and exotic annuals such as cheatgrass, yellow starthistle, barren fescue (*Vulpia bromoides*), and bulbous bluegrass (*Poa bulbosa*). This community also includes sparsely distributed green rabbitbrush (*Chrysothamnus viscidiflorus*) and blue rabbitbrush (*C. nauseosus*) shrubs on drier south-facing slopes and pockets of Douglas hawthorn (*Crataegus douglasii*), wild rose (*Rosa* sp.), chokecherry (*Prunus virginiana*), creeping barberry (*Mahonia repens*), and snowberry (*Symphoricarpos albus*) on wetter, north-facing slopes.

Throughout the study area native grassland occurs in small remnant patches across the landscape. These grasslands have been grazed by domestic livestock, primarily cattle, and have been invaded by nonnative species as a result of surrounding land uses and habitat fragmentation. The degree of grazing disturbance is evidenced by the relative dominance of native or exotic species. Mounds of loose, wind-deposited soil (approximately 20 feet in diameter and 5 feet tall) were identified in several grassland areas throughout the survey area and were typically dominated by invasive species. High quality grasslands are dominated by native bunchgrass species with a high diversity of forbs and minimal (<20% cover) weed invasion. They occur primarily in rocky soils on steeper slopes that are less susceptible to cattle trampling during grazing activities. Most of the higher quality grasslands also contain cryptobiotic soils, which have a crust of lichens and mosses that help prevent some weeds from becoming established. Medium quality grasslands included a patchwork of high and low quality grasslands where the high quality component was less than 40% cover and more than 10% of the total vegetation cover or the area was uniformly degraded by grazing or weed infestations. A total of 2,030.0 acres of this habitat occur within the study area.

3.1.4. Nonnative Grassland

Nonnative grassland habitats consisted of less than 10% native grass cover and lacked a native forb component. Vegetation was dominated by nonnative species including cheatgrass, ripgut brome (*Bromus rigidus*), jointed goatgrass (*Aegilops cylindrica*), volunteer rye (*Secale cereale*), yellow starthistle, Russian thistle, prickly lettuce (*Lactuca serriola*), tumble mustard (*Sisymbrium altissimum*), redstem stork's bill (*Erodium cicutarium*), hairy vetch (*Vicia villosa*), and bristly fiddleneck (*Amsinckia tessellata*). Several of these areas were field verified or visually observed through binoculars from a distance; others were mapped based on aerial imagery signatures.

Nonnative grassland areas typically occurred in deeper soils. They most likely have been heavily grazed, and lack native species richness and cryptobiotic soils. Impacts to this cover type do not require mitigation (WDFW 2009). A total of 3,154.2 acres of this habitat occur within the study area.

3.1.5. Riparian

Riparian habitats included forested streams and their floodplains. Dominant vegetation included Pacific willow (*Salix lasiandra*), Douglas hawthorn, and black locust (*Robinia pseudoacacia*) in the canopy, and reed canarygrass (*Phalaris arundinacea*) and stinging nettle (*Urtica dioica*) in the understory. Riparian habitat was identified along intermittent and perennial creeks throughout the project area, especially along Pataha Creek and Tucannon River floodplains. A total of 17.0 acres of this habitat occur within the study area.

3.2. Special-Status Plant Species

The potential for occurrence of special-status plant species was based upon vegetation community types, vegetation structure, and the degree of habitat disturbance. All grassland habitats with the potential to contain Spalding's silene were surveyed between July 27, and August 13, 2009 during the optimum time of its visibility. No silene was observed during the field survey. A list of all vascular plant species observed during the rare plant surveys is included in Appendix B; field observations of each surveyed grassland location are presented in Appendix C.

No rare plant species were identified within the study area, and rare plants are not expected to occur due to land disturbances and cattle grazing. The proposed project is not expected to impact individuals or populations of rare plants, including Spalding's silene.

4. Impact Analysis

4.1. Special Status Plant Species

No Threatened, Endangered, or sensitive plants were identified during the survey. As a result of the highly disturbed condition and fragmented distribution of native vegetation communities within the environmental permitting corridors, impacts to special status plants are not expected to occur.

4.2. Habitat Types

Approximately 2,030 acres of functioning eastside steppe vegetation occur within the study area. This habitat is considered to be a Class III habitat by WDFW (2009) and a Priority 2 habitat by WDFW (2008). WDFW encourages the siting of wind power projects on disturbed lands and discourages the degradation of high-value habitat areas. Impacts to steppe habitat within the environmental permitting corridors will likely require restoration or the acquisition or designation of replacement habitat. A mitigation package should be negotiated in consultation with WDFW and the permitting authority. Temporary impacts to this habitat must be mitigated at a 0.1:1 mitigation/restoration ratio. For permanent impacts, a 1:1 acquisition ratio is required for mitigation. Additionally, 1,614 acres of CRP lands are also considered to be a Class III habitat by WDFW (WDFW 2009) and should conform to the same mitigation requirements as eastside steppe vegetation.

Approximately 17 acres of riparian vegetation, also considered to be a Priority 2 habitat by WDFW, occur within the study area. Management recommendations for riparian habitat are developed to meet the goal of maintaining or enhancing the structural and functional integrity of riparian habitat and associated aquatic systems needed to support fish and wildlife populations. Once impacts are determined, mitigation should be consistent with Knutson and Naef (2007) and state and federal wetland permitting requirements.

5. References

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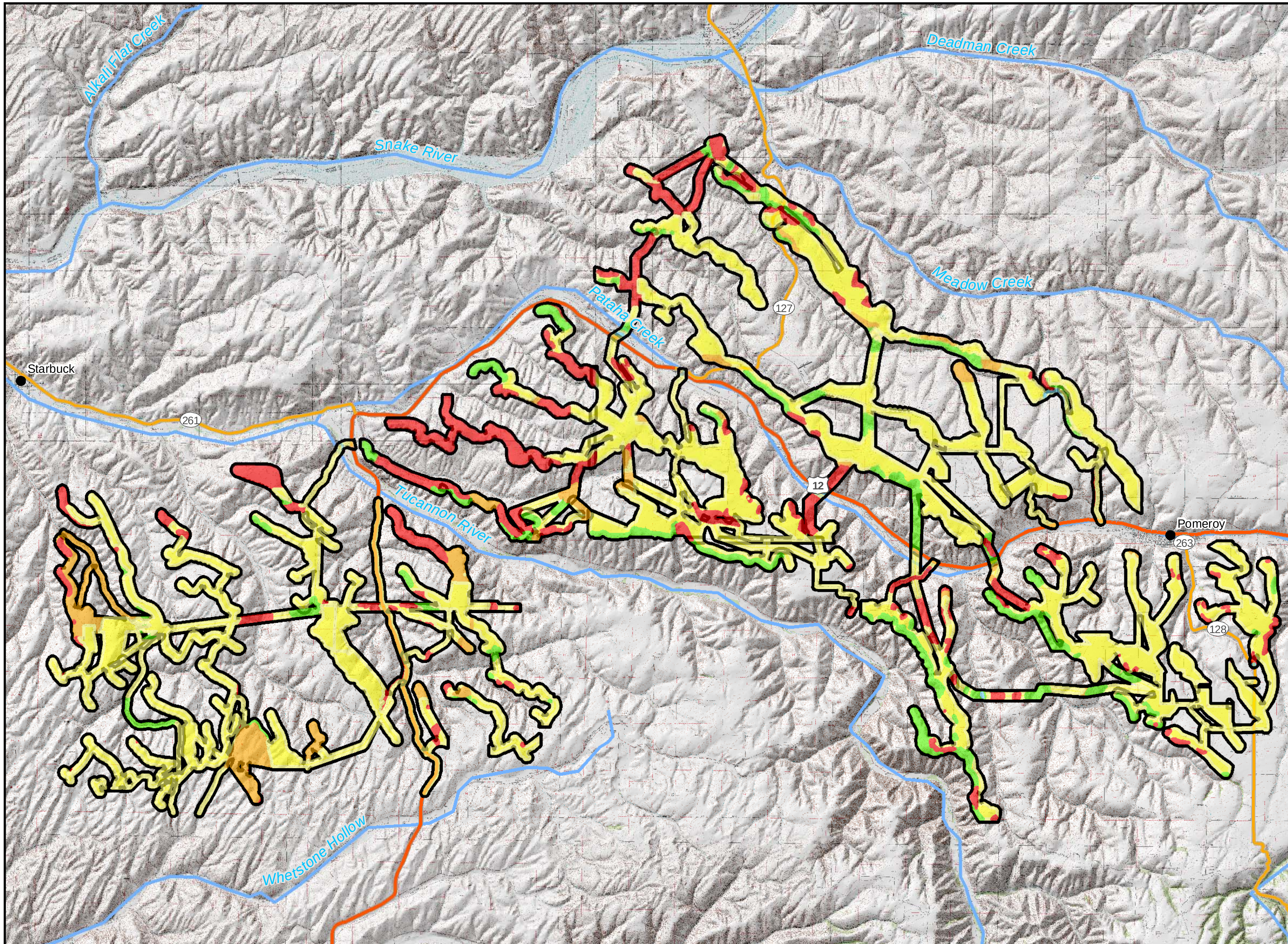
6. List of Preparers

Christie Galen, Senior Ecologist
Taya Katherine Cummins, M.S., Botanist
Peter Chitwood, Ecologist



Lower Snake River Wind Energy Project

Figure 1
Site Location Map

Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

0 1 2 4 Miles

N

1:150,000

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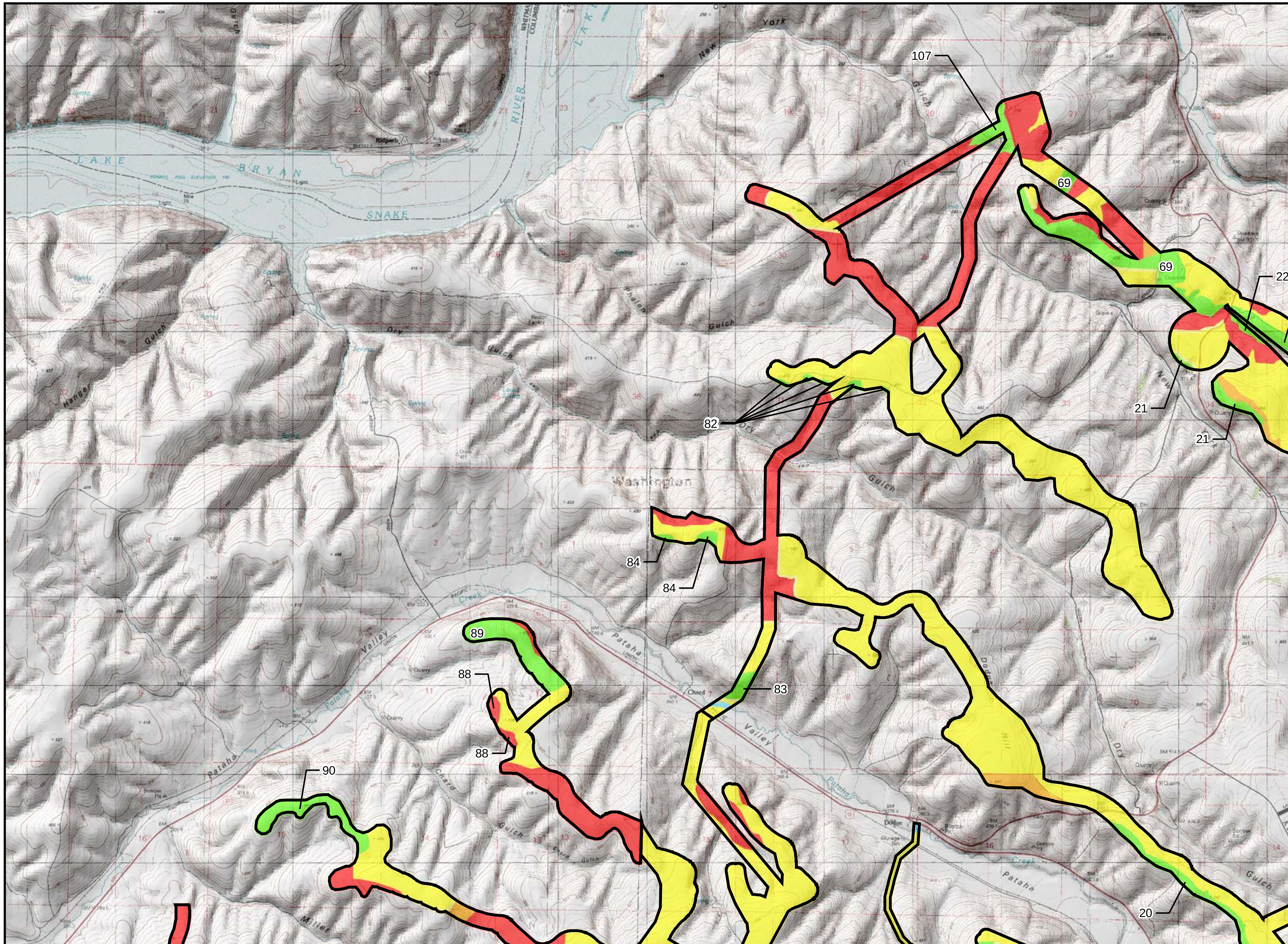


Lower Snake River Wind Energy Project

Figure 2A
Topographic Habitat Map

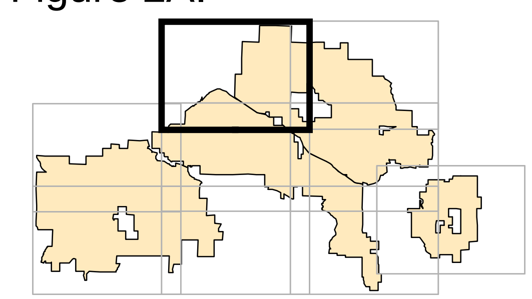
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 2A.



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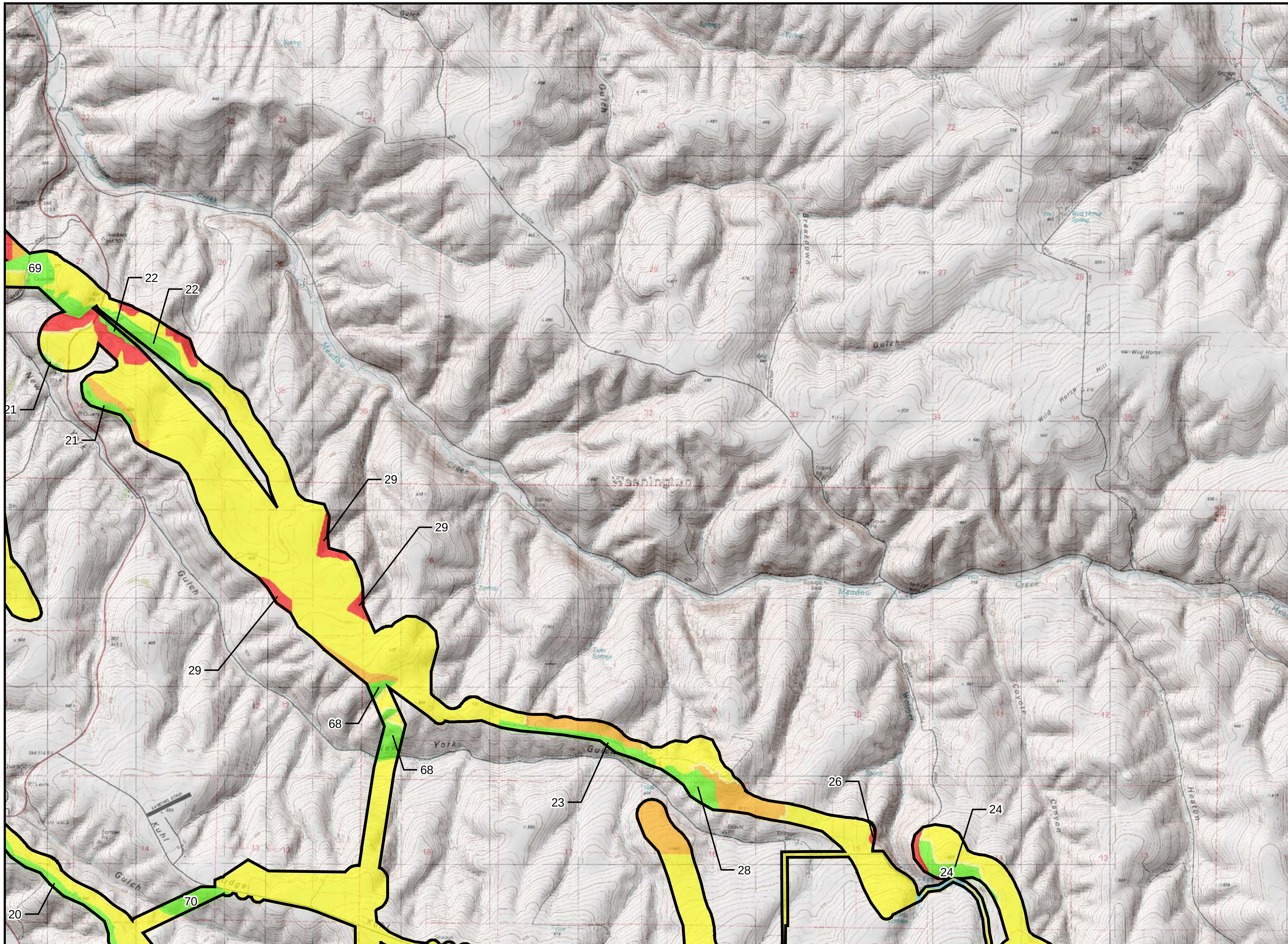


Lower Snake River Wind Energy Project

Figure 2B
Topographic Habitat Map

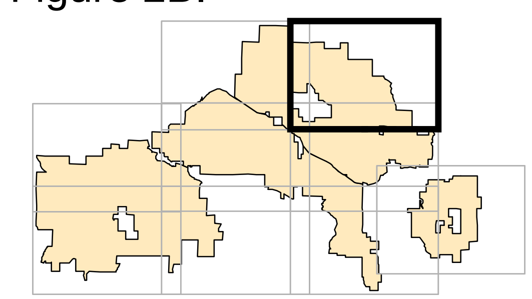
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 2B.



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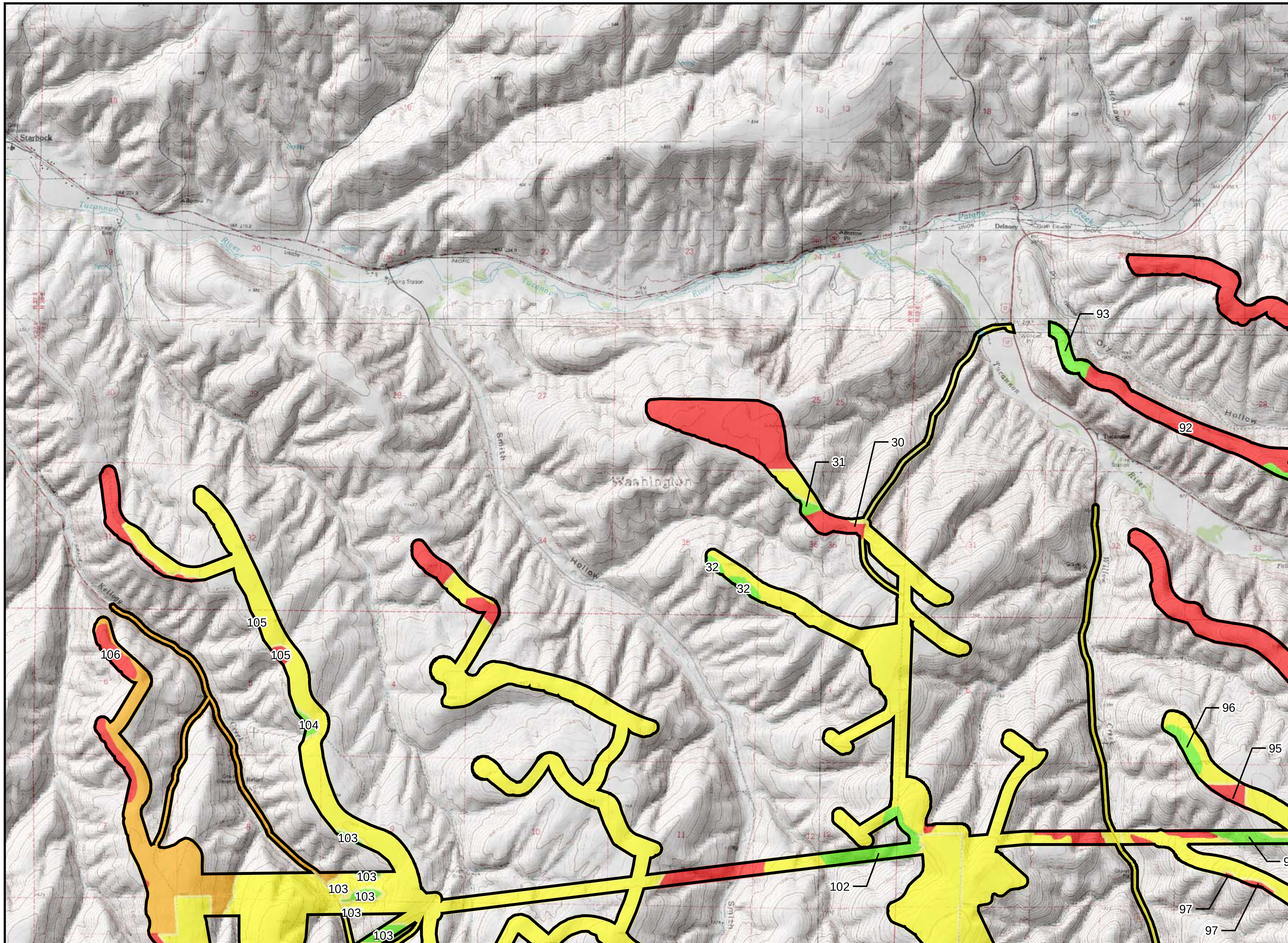


Lower Snake River Wind Energy Project

Figure 2C
Topographic Habitat Map

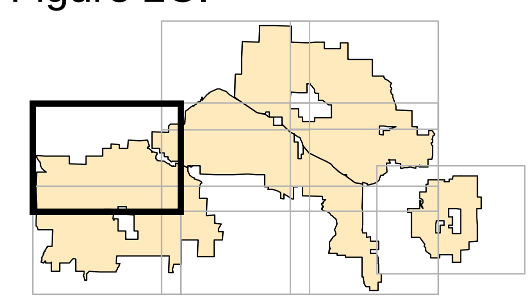
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 2C.



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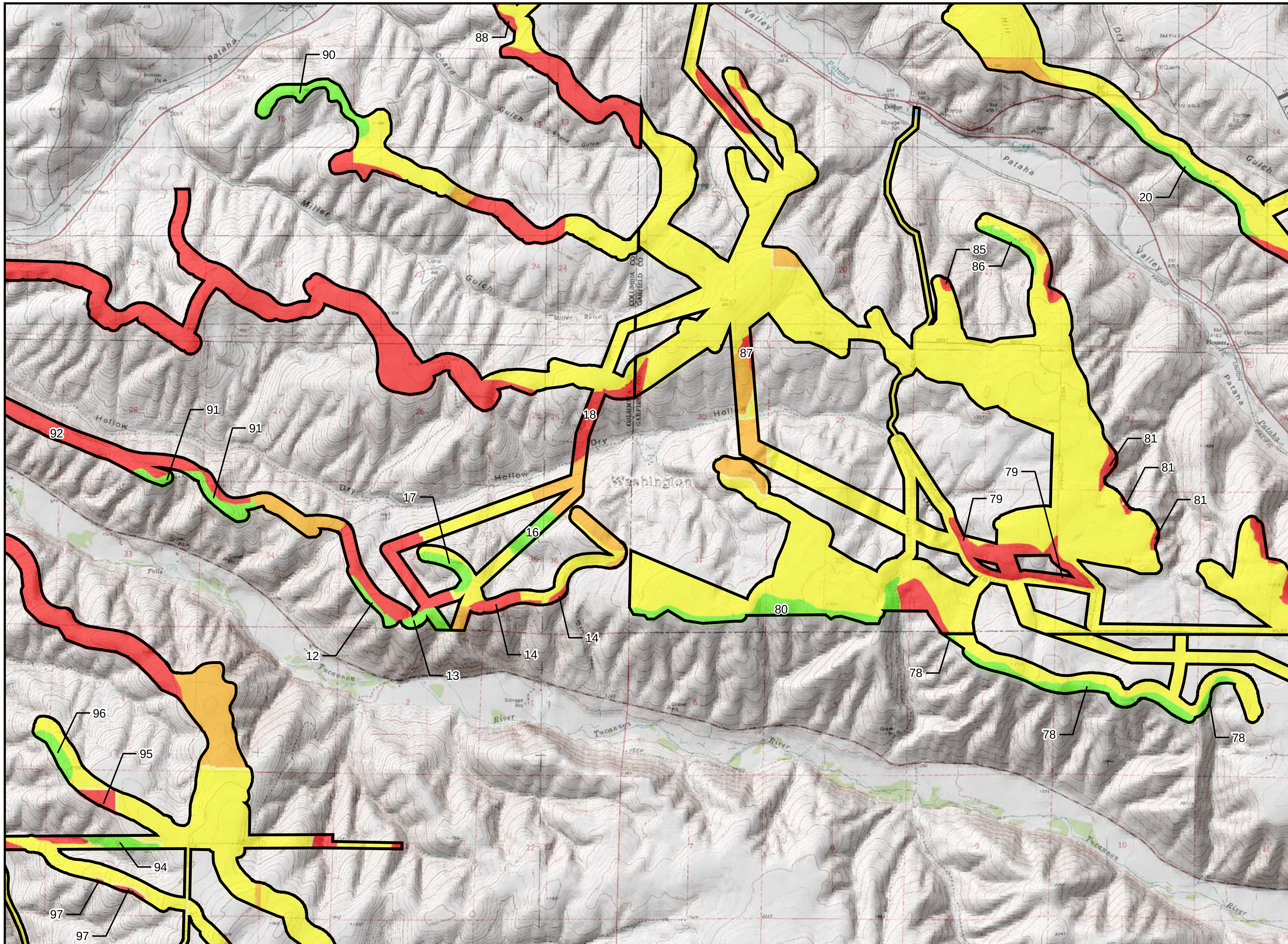


Lower Snake River Wind Energy Project

Figure 2D
Topographic Habitat Map

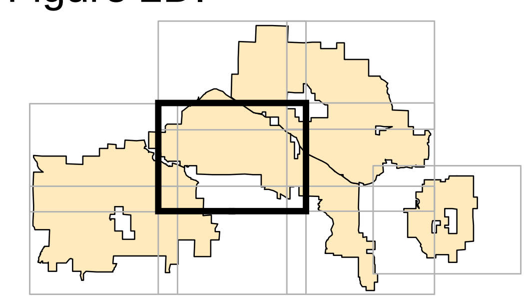
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 2D.



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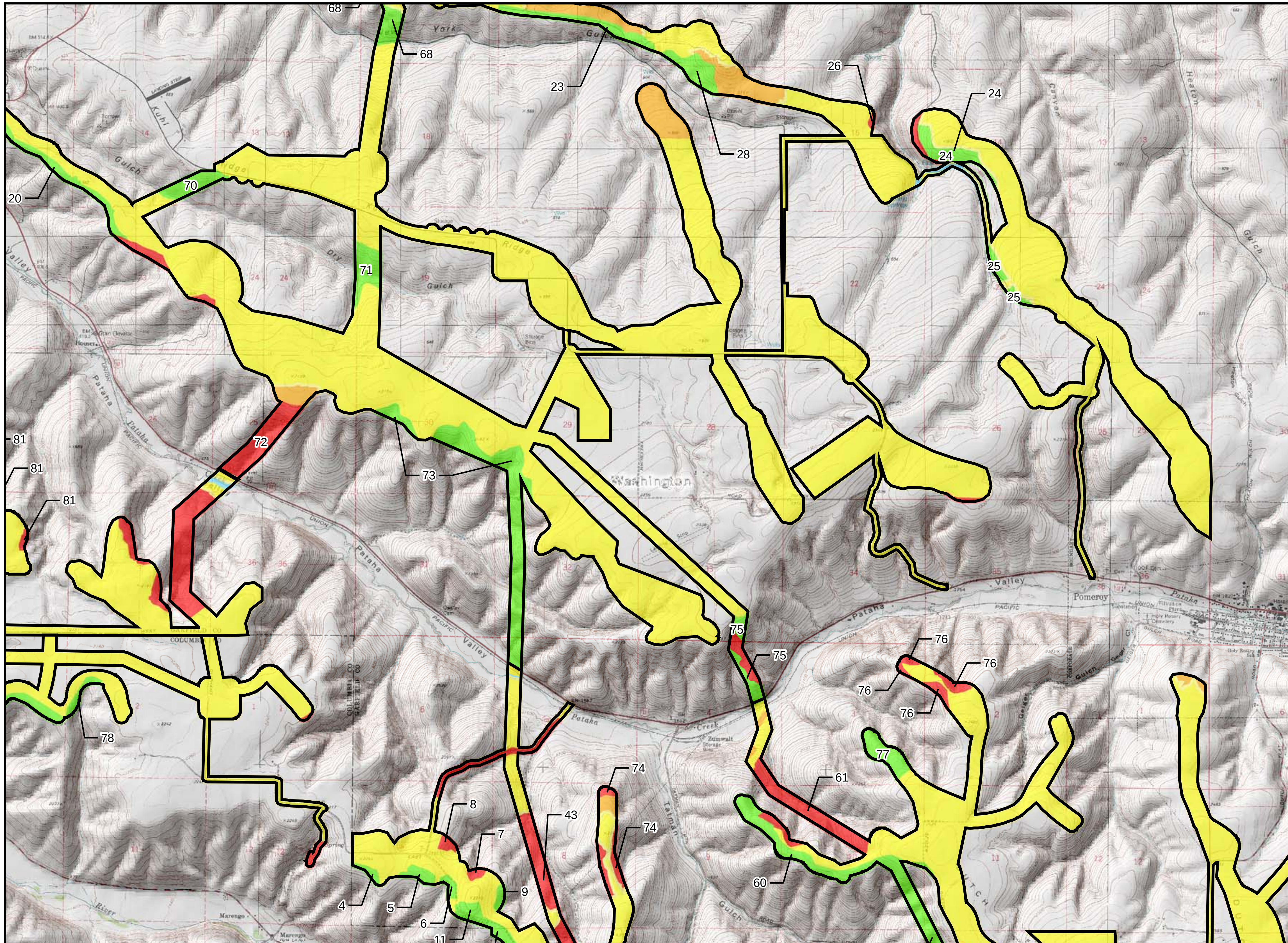

Lower Snake River Wind Energy Project

Figure 2E
Topographic Habitat Map

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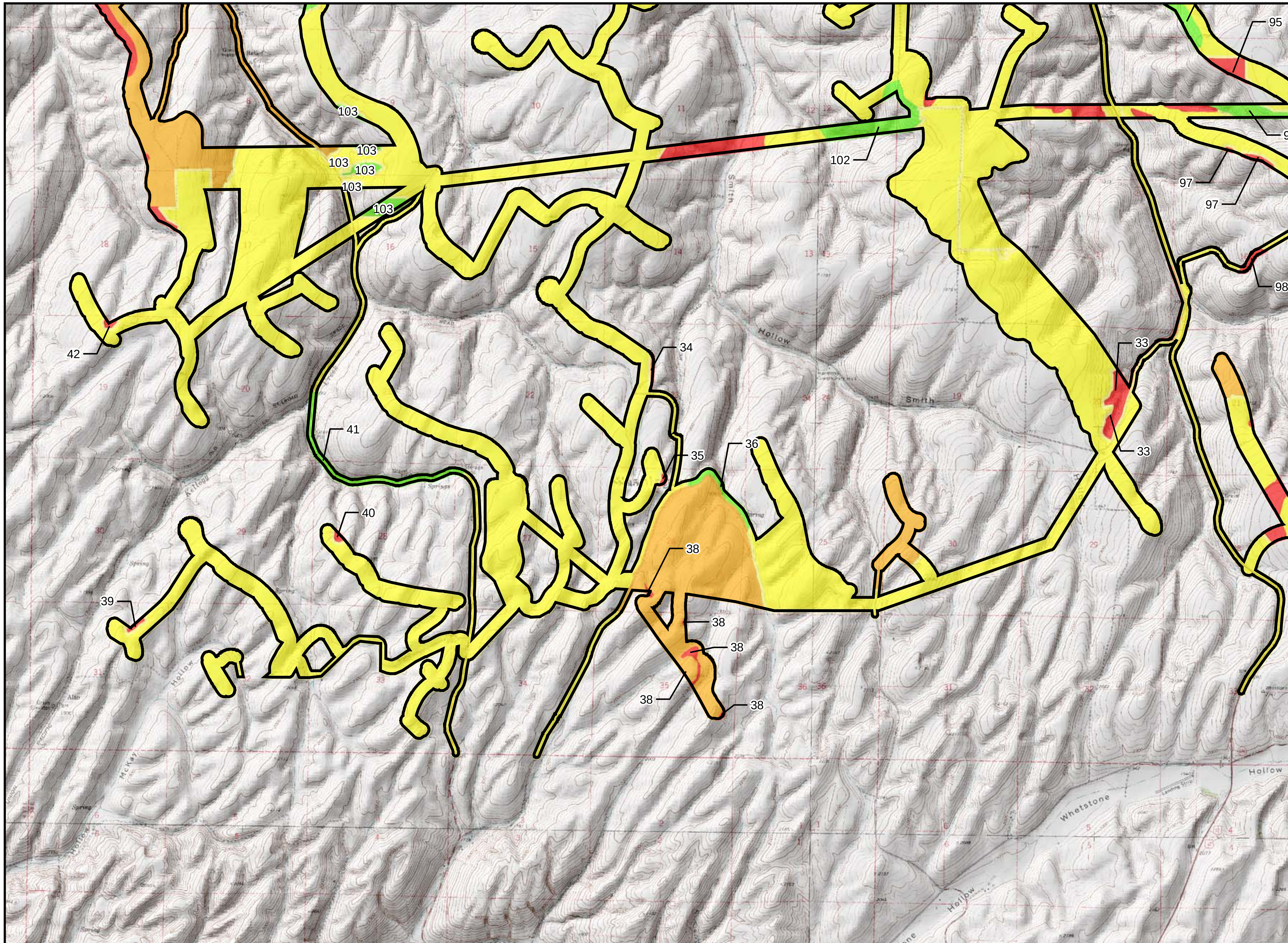


Lower Snake River Wind Energy Project

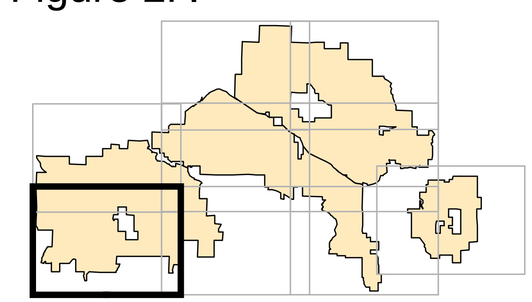
Figure 2F
Topographic Habitat Map

Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area
- ## Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 2F.



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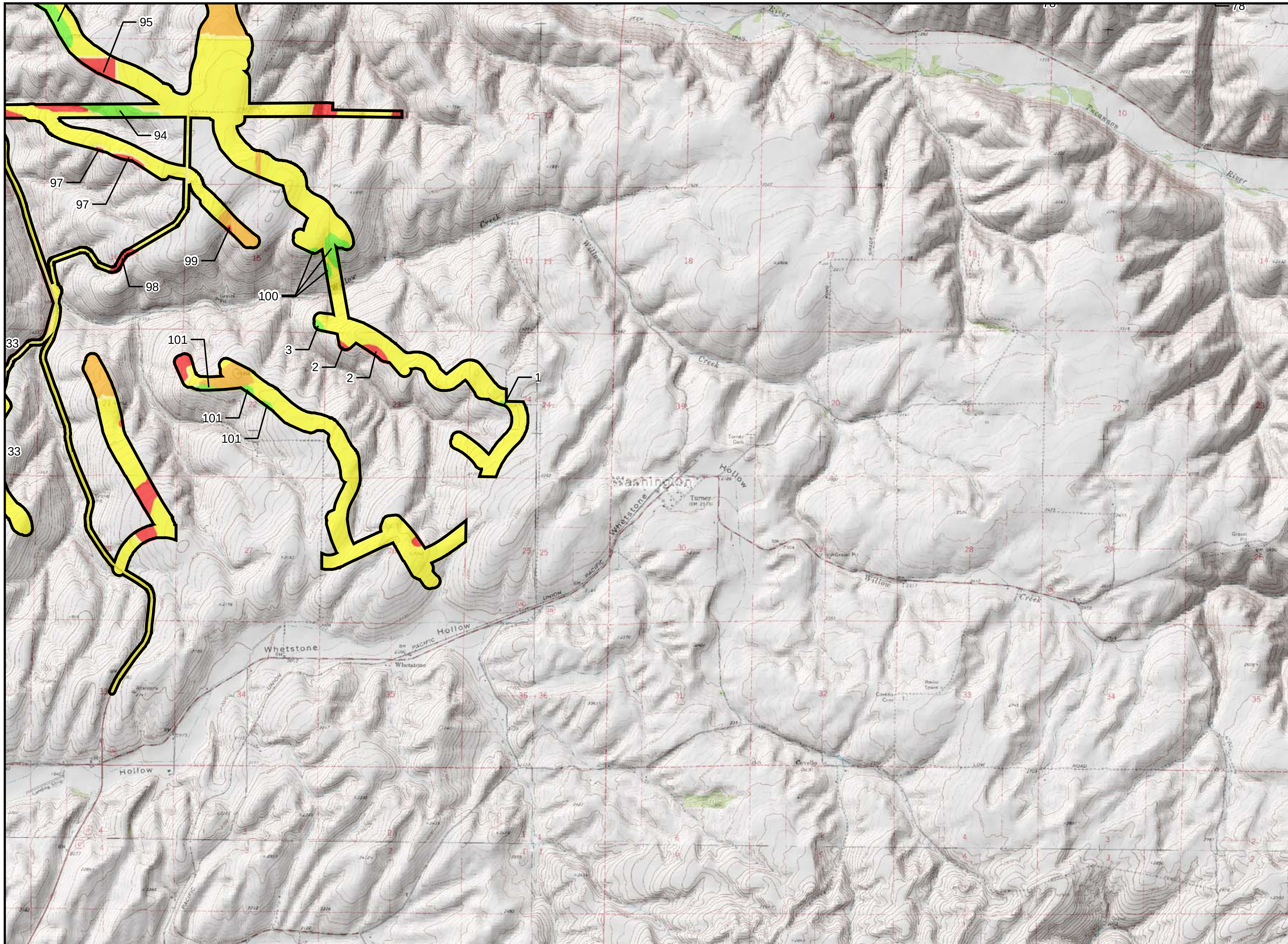


Lower Snake River Wind Energy Project

Figure 2G
Topographic Habitat Map

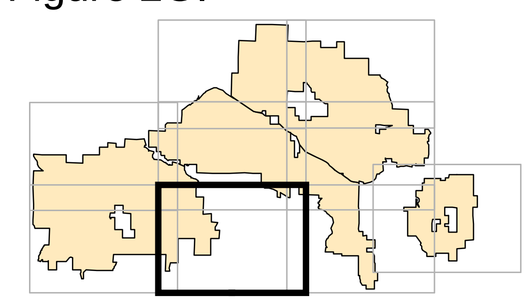
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 2G.



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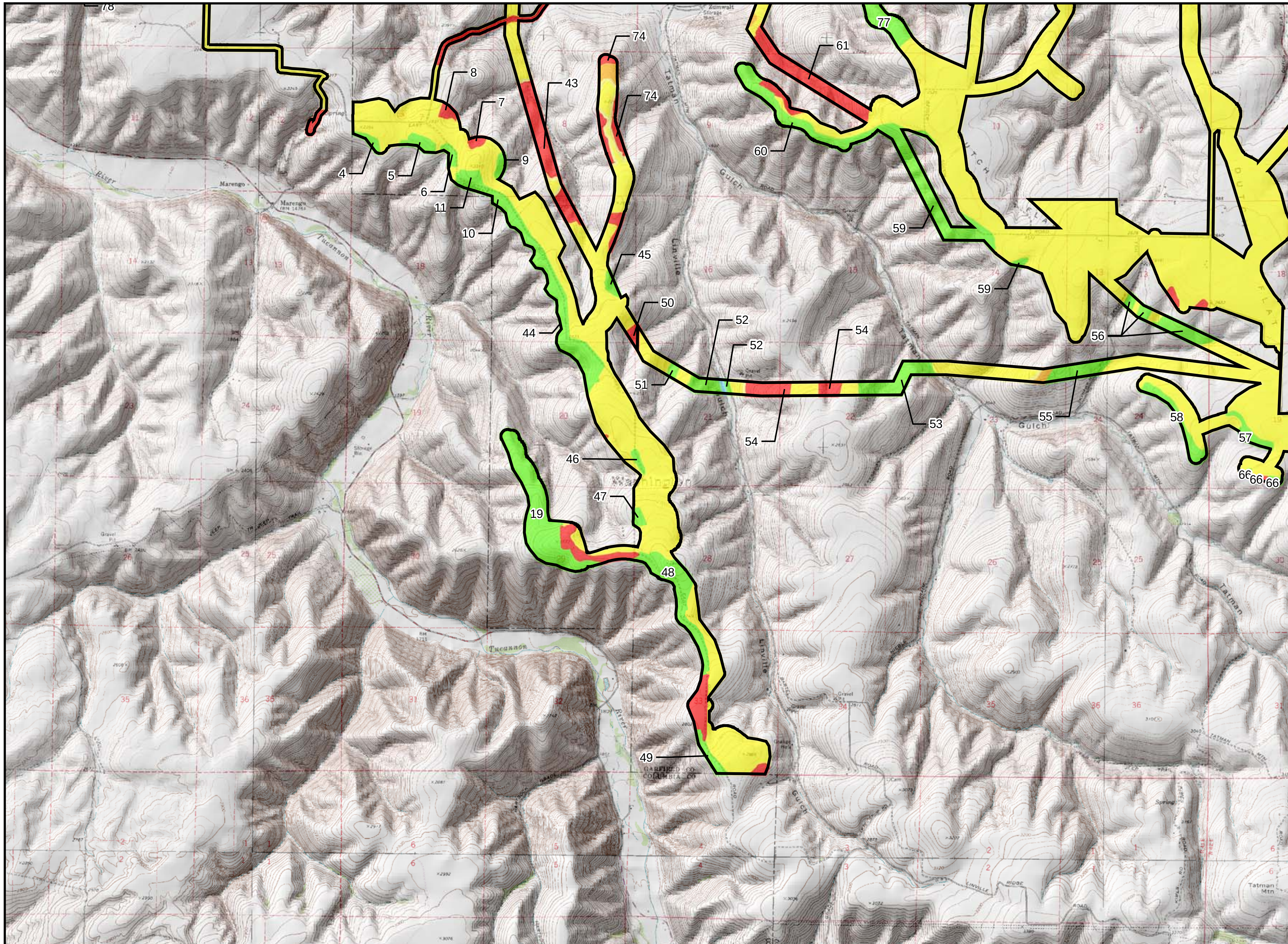
Lower Snake River Wind Energy Project

Figure 2H
Topographic Habitat Map

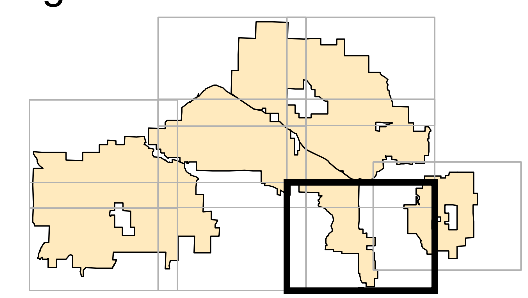


Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area
- ## Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 2H.



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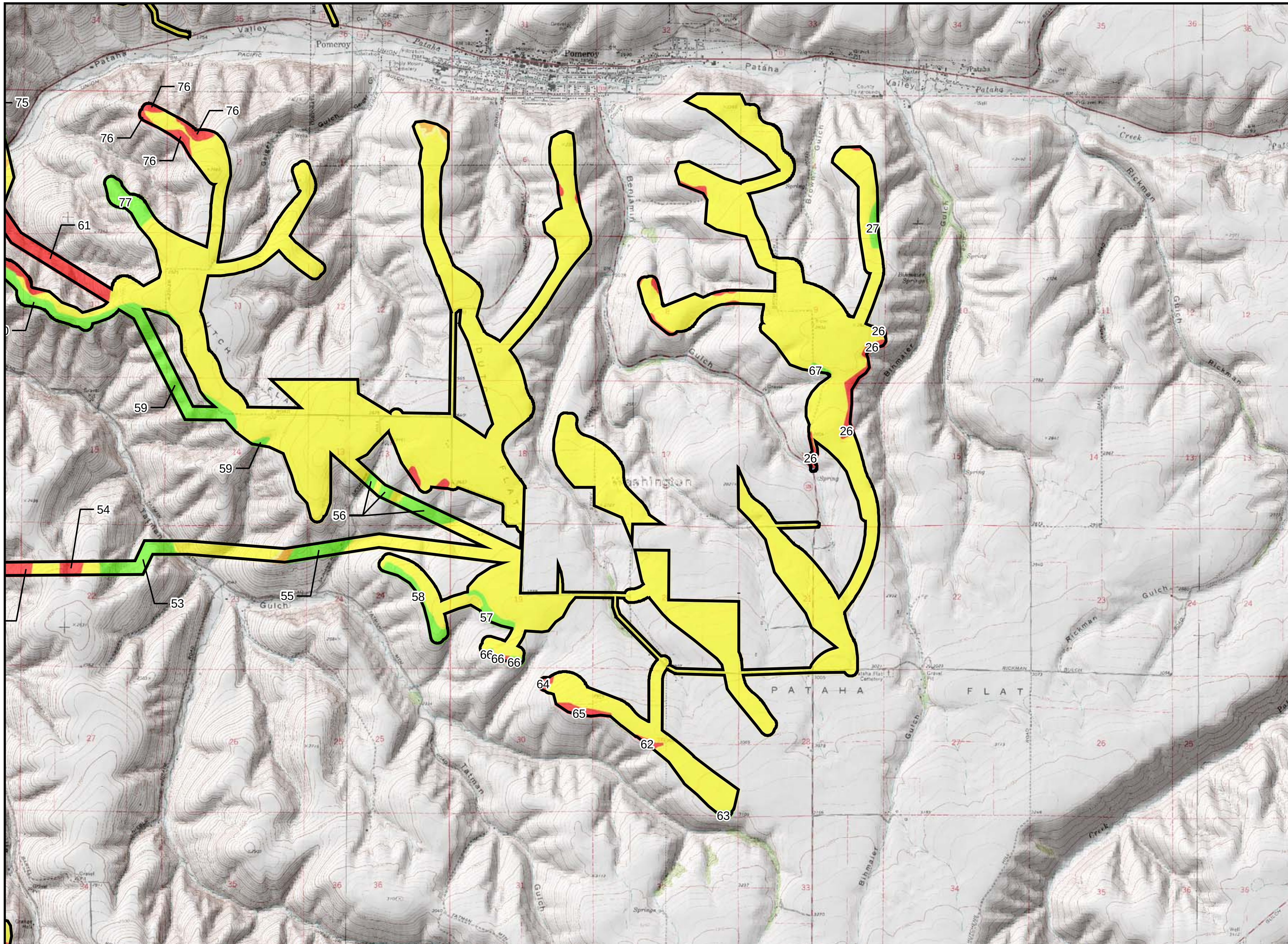


Lower Snake River Wind Energy Project

Figure 2I
Topographic Habitat Map

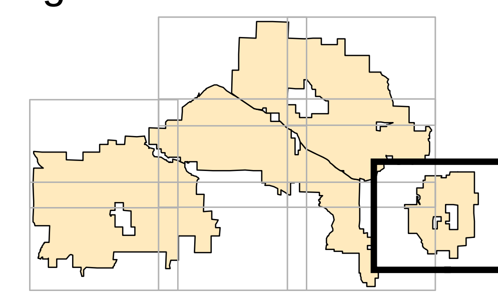
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 2I.



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Lower Snake River Wind Energy Project

Figure 3A
Aerial Photograph Habitat Map

Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 3A.

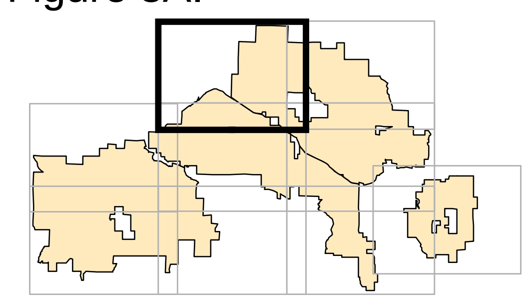

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Figure 3B
Aerial Photograph Habitat Map

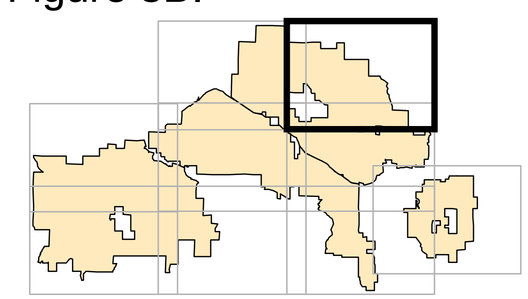
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 3B.



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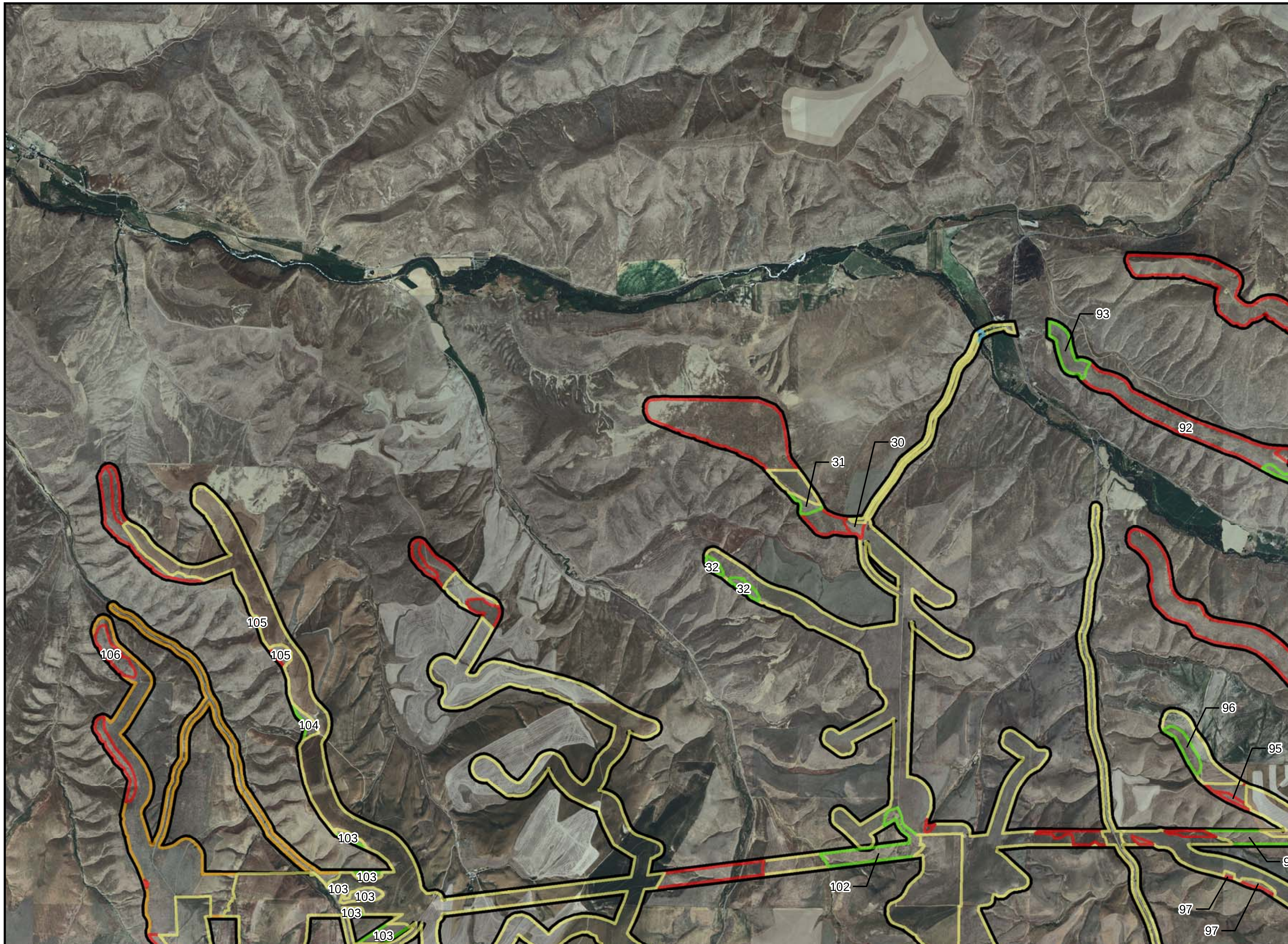


Lower Snake River Wind Energy Project

Figure 3C
Aerial Photograph Habitat Map

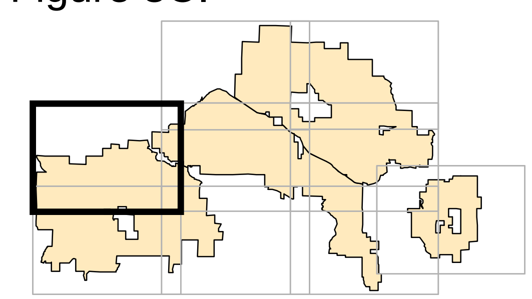
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 3C.



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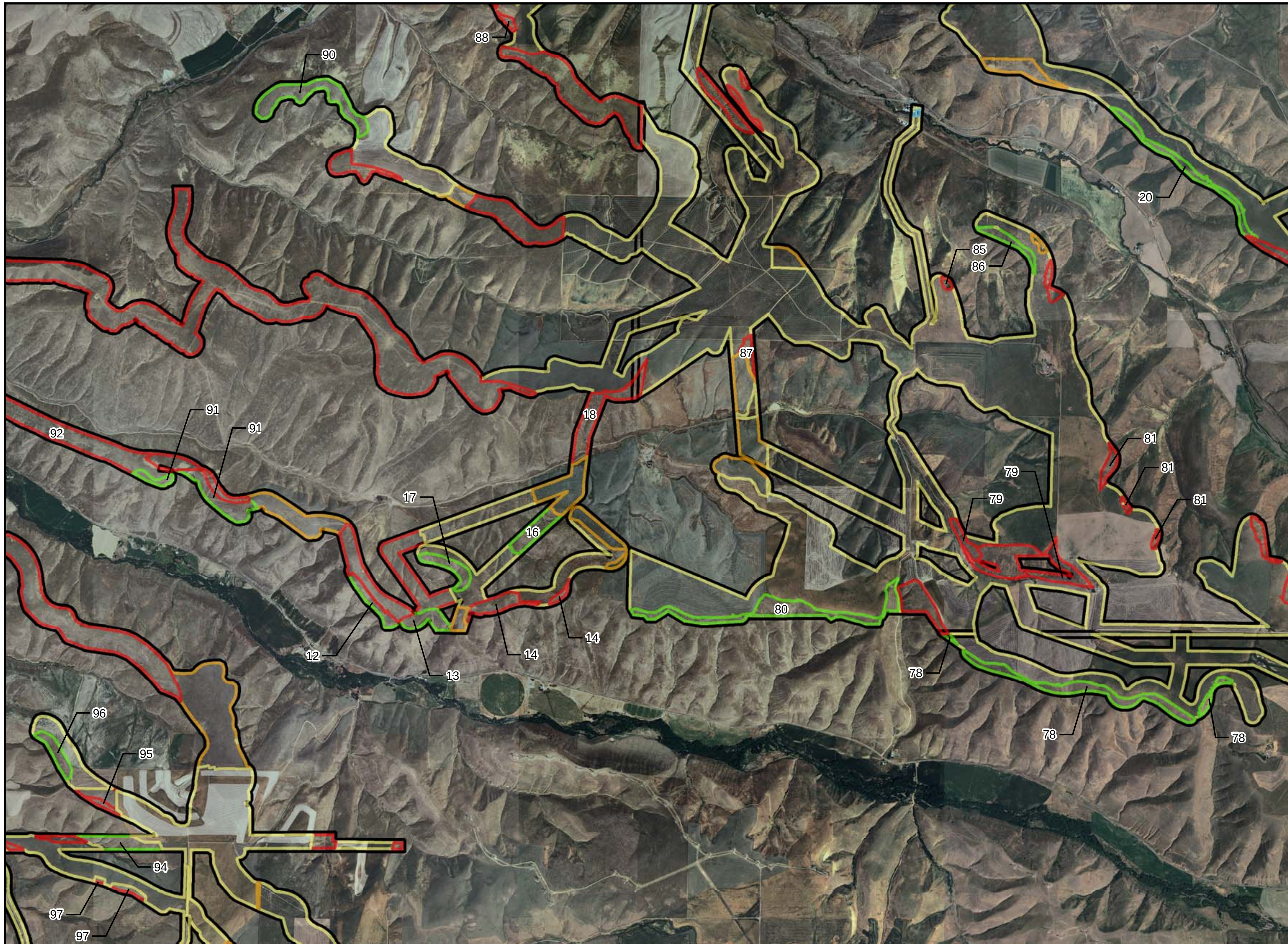


Lower Snake River Wind Energy Project

Figure 3D
Aerial Photograph Habitat Map

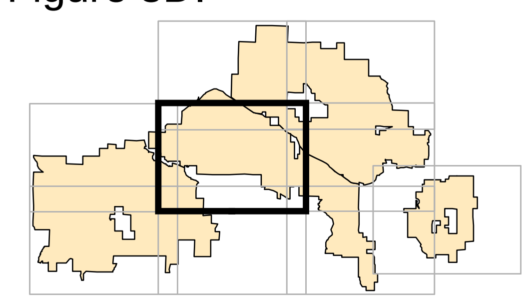
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 3D.



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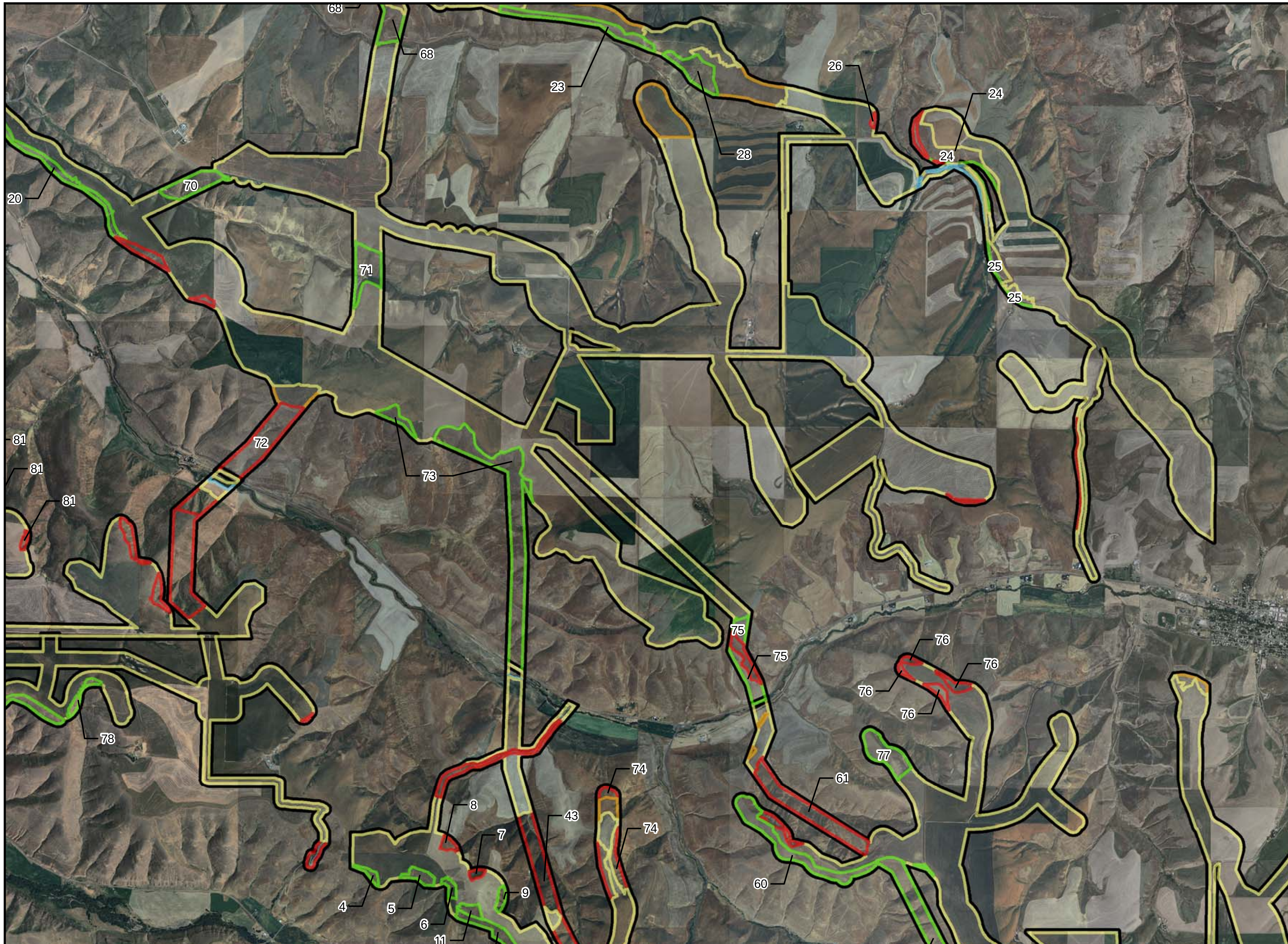


Lower Snake River Wind Energy Project

Figure 3E
Aerial Photograph
Habitat Map

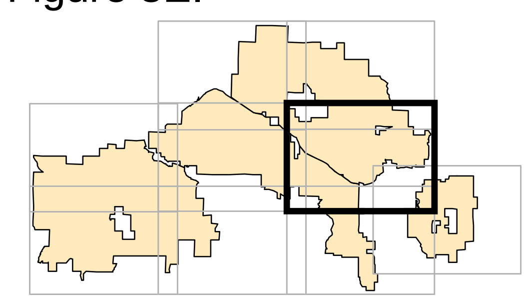
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 3E.



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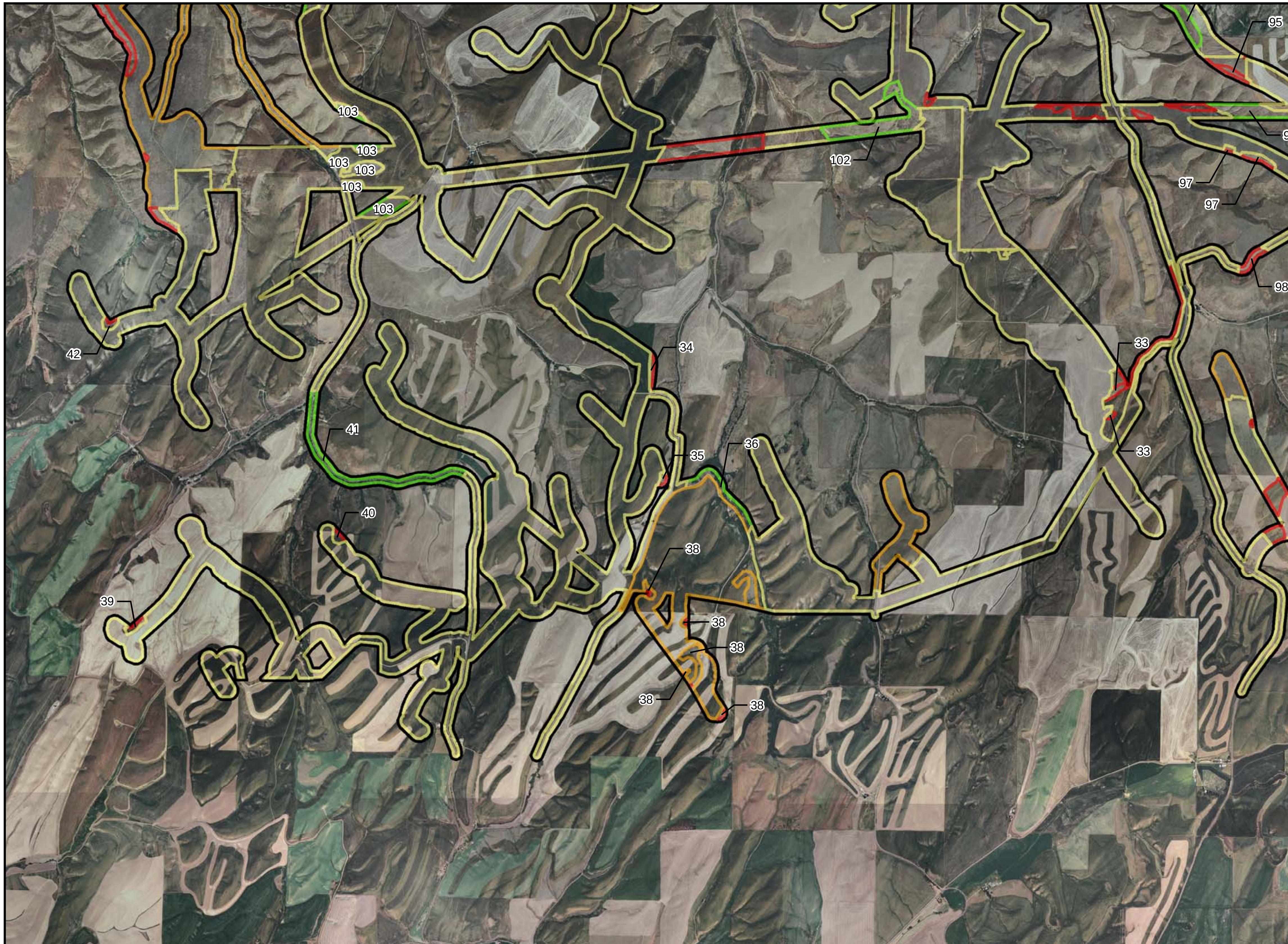


Lower Snake River Wind Energy Project

Figure 3F Aerial Photograph Habitat Map

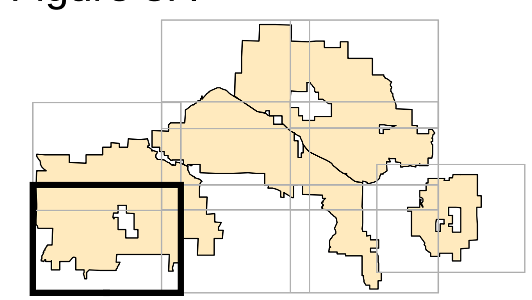
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 3F.



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Lower Snake River Wind Energy Project

Figure 3G
Aerial Photograph Habitat Map

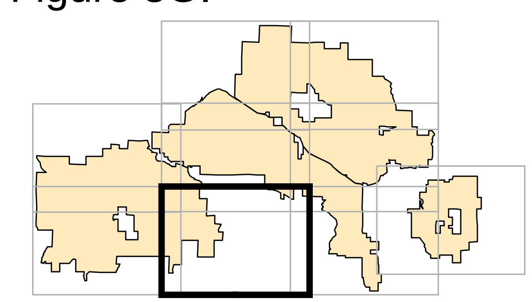
Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 3G.



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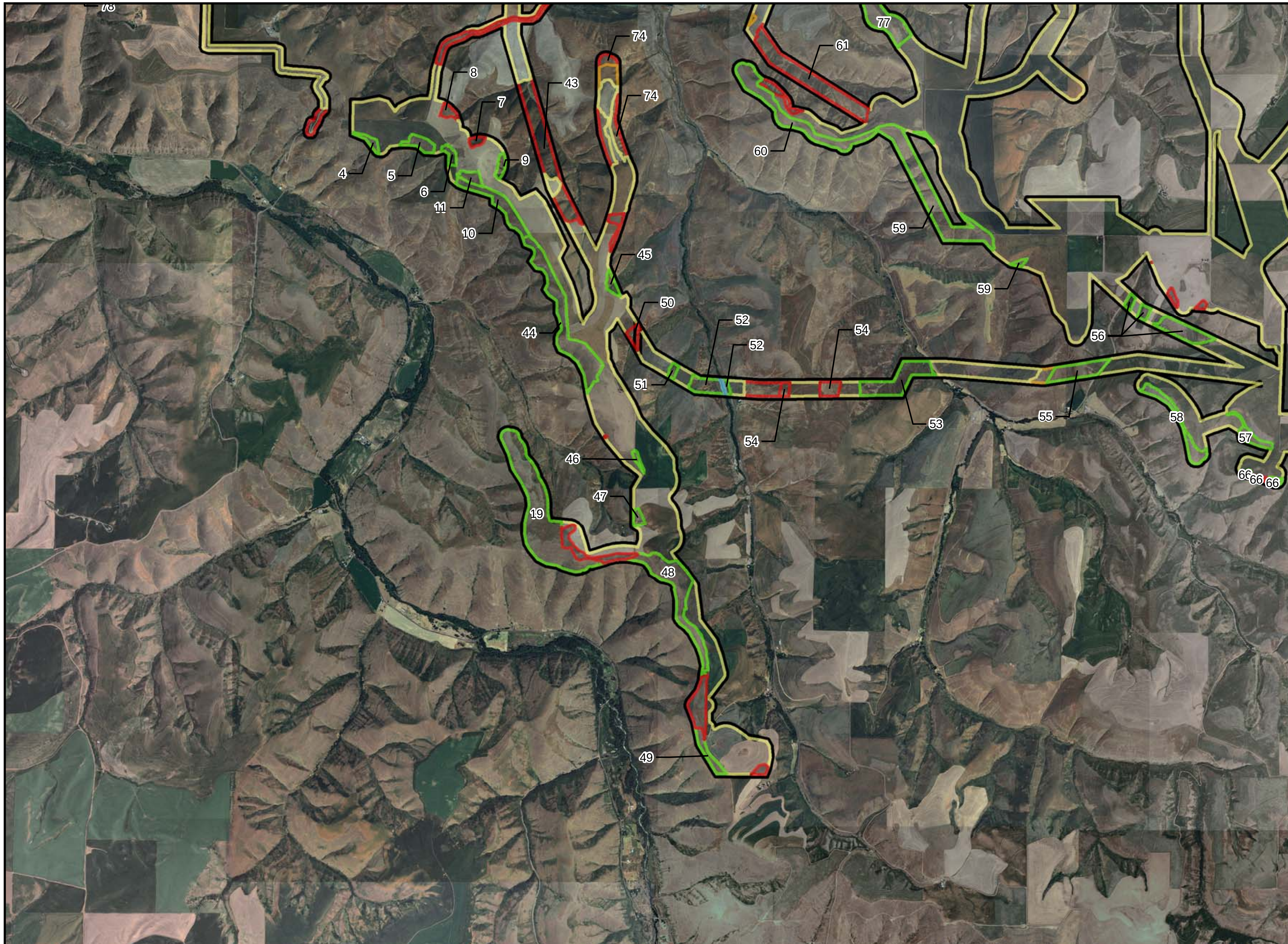


Lower Snake River Wind Energy Project

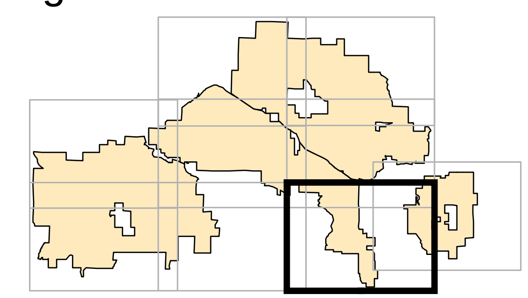
Figure 3H
Aerial Photograph Habitat Map

Legend

- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area
- ## Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 3H.



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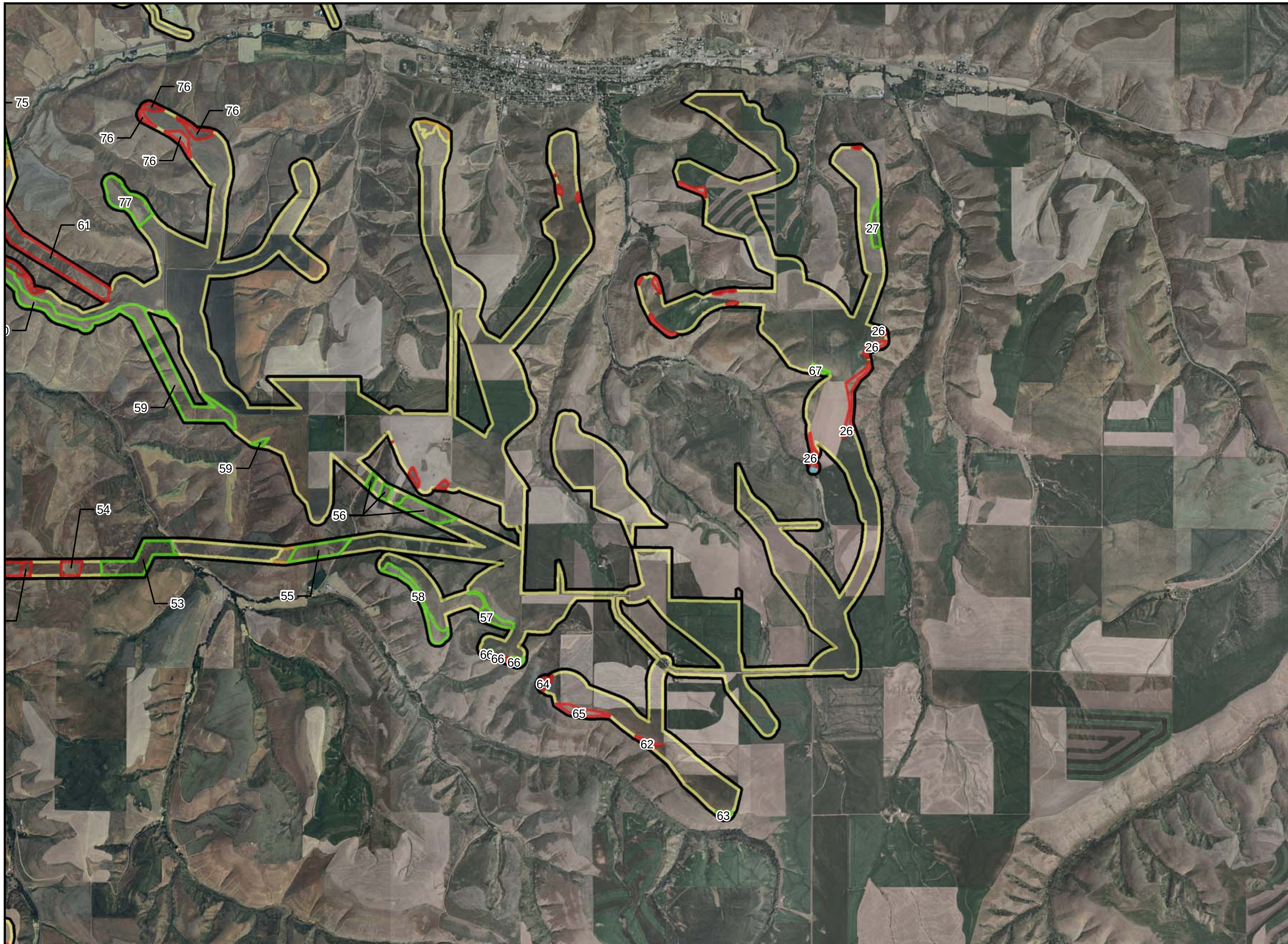


Lower Snake River Wind Energy Project

Figure 3I
Aerial Photograph Habitat Map

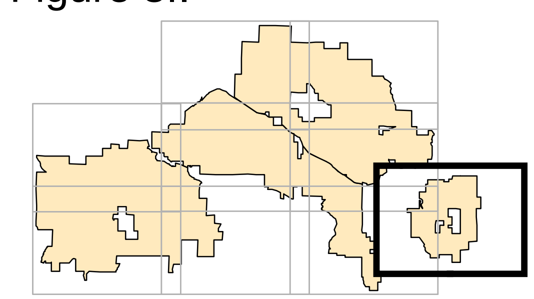
Legend

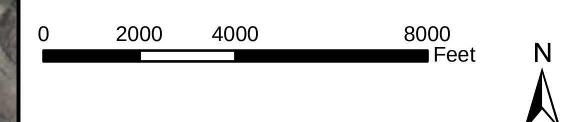
- Eastside Steppe (Native Grasslands)
- Nonnative Grasslands
- Conservation Reserve Program (CRP)
- Dryland Agriculture
- Riparian
- Study Area

Numbered sites described in Appendix C.

Source:
Field surveys identified areas of native grasslands, nonnative grasslands, and riparian areas. Other classes derived from NLCD 2001 data (USGS), aerial imagery, and some field surveys.

Figure 3I.





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Appendices

Appendix A. Representative Photographs
Appendix B. Vegetation Species List
Appendix C. Field Observations

Appendix A. Representative Photographs

Lower Snake River Wind Energy Project Plant Communities

Dryland agricultural field—Wheat (background)

Conservation Reserve Program (*A. intermedium*)

High value steppe with balsamroot and stoney soil

Intact high value steppe with weedy mounds

Lower Snake River Wind Energy Project Plant Communities

Heavily grazed medium value steppe

Nonnative grassland (*B. tectorum*)

Nonnative (left) and steppe vegetation (right)

Riparian vegetation along tributary to Tucannon River

Appendix B. Vegetation Species List

Lower Snake River Wind Energy Project Plant Species List 2009		
Common Name	**Scientific Name**	**Origin**
common yarrow	*Achillea millefolium*	native
goatgrass	*Aegilops cylindrica*	introduced
quack grass	*Agropyron [Elytrigia] repens*	noxious
intermediate wheatgrass	*Agropyron intermedium*	introduced
bluebunch wheatgrass	*Agropyron spicatum*	native
bentgrass	*Agrostis species*	-
spreading bentgrass	*Agrostis stolonifera*	native
ranchers fiddleneck	*Amsinckia intermedia [menziesii var. intermedia]*	native
bristly fiddleneck	*Amsinckia tessellata*	native
low pussy-toes	*Antennaria dimorpha*	native
bur chervil	*Anthriscus scandicina [caucalis]*	introduced
common burdock	*Arctium minus*	introduced
white sagebrush	*Artemisia ludoviciana*	native
showy milkweed	*Asclepias speciosa*	native
hill milk-vetch	*Astragalus collinus*	native
wooly-pod milkvetch	*Astragalus purshii*	native
wild oat	*Avena fatua*	introduced
arrowleaf balsamroot	*Balsamorhiza sagittata*	native
creeping Oregongrape	*Berberis repens*	native
California brome	*Bromus carinatus*	native
smooth brome	*Bromus inermis*	introduced
ripgut brome	*Bromus rigidus [diandrus]*	introduced
downy cheat grass	*Bromus tectorum*	introduced
white bryony	*Bryonia alba*	noxious
sagebrush mariposa	*Calochortus macrocarpus var. macrocarpus*	native
bachelor's button	*Centaurea cyanus*	introduced
yellow star-thistle	*Centaurea solstitialis*	noxious
hoary false yarrow	*Chaenactis douglasii*	native
rushlike skeleton-weed	*Chondrilla juncea*	introduced
gray rabbitbrush	*Chrysothamnus nauseosus*	native
green rabbitbrush	*Chrysothamnus viscidiflorus*	native
Canada thistle	*Cirsium arvense*	invasive
prairie thistle, Platte thistle	*Cirsium canescens*	native
bull thistle	*Cirsium vulgare*	invasive
western clematis	*Clematis ligustifolia*	invasive
poison hemlock	*Conium maculatum*	noxious
field morning-glory	*Convolvulus arvensis*	invasive
crested dogtail	*Cynosurus cristatus*	introduced
teasel	*Dipsacus sylvestris [fullosum ssp. sylvestris]*	invasive
large barnyard grass	*Echinochloa crusgalli*	introduced
russian olive	*Elaeagnus angustifolia*	introduced
basin wildrye	*Elymus cinereus*	native
tall autumn willow-herb	*Epilobium paniculatum [brachycarpum]*	native

Lower Snake River Wind Energy Project Plant Species List 2009		
Common Name	**Scientific Name**	**Origin**
common horsetail	*Equisetum arvense*	native
fleabane	*Erigeron species*	native
snow buckwheat	*Eriogonum niveum*	native
broom buckwheat	*Eriogonum vimineum*	native
redstem stork's bill	*Erodium cicutarium*	introduced
tall fescue	*Festuca arundinacea*	introduced
Idaho fescue	*Festuca idahoensis*	native
red fescue	*Festuca rubra*	native
rough fescue	*Festuca scabrella [campestris]*	native
low gumweed	*Grindelia nana*	native
common sunflower	*Helianthus annuus*	native
meadow barley	*Hordeum brachyantherum*	native
fox-tail barley	*Hordeum jubatum*	native
western juniper	*Juniperus occidentalis*	native
prickly lettuce	*Lactuca serriola*	introduced
clasping peppergrass	*Lepidium perfoliatum*	introduced
blue flax	*Linum perenne*	native
smallflower woodland-star	*Lithophragma parviflorum*	native
Columbia puccoon	*Lithospermum ruderale*	native
Gray's biscuitroot	*Lomatium grayii*	native
smooth-fruited desert parsley	*Lomatium leptocarpum*	native
large-fruited lomatium	*Lomatium macrocarpum*	native
nine-leaf lomatium	*Lomatium triternatum*	native
deervetch	*Lotus species*	-
silky lupine	*Lupinus sericeus*	native
slender tarweed	*Madia gracilis*	native
alfalfa	*Medicago sativa*	introduced
smoothstem blazingstar	*Mentzelia laevicaulis*	native
common large monkey-flower	*Mimulus guttatus*	native
white-leaf phacelia	*Phacelia hastata*	native
reed canarygrass	*Phalaris arundinacea*	invasive
mockorange	*Philadelphus lewisii*	native
longleaf phlox	*Phlox longifolia*	native
bulbous bluegrass	*Poa bulbosa*	introduced
Kentucky bluegrass	*Poa pratensis*	introduced
Sandberg's bluegrass	*Poa sandbergii [secunda]*	native
prostrate knotweed	*Polygonum aviculare*	introduced
rabbitfoot grass	*Polypogon monspeliensis*	introduced
celery-leaf buttercup	*Ranunculus sceleratus*	native
watercress	*Rorippa nasturtium-aquaticum [Nasturtium officinale]*	introduced
sweetbriar rose	*Rosa eglanteria*	introduced
baldhip rose	*Rosa gymnocarpa*	native
Nootka rose	*Rosa nutkana*	native

Lower Snake River Wind Energy Project Plant Species List 2009		
Common Name	**Scientific Name**	**Origin**
Wood's rose	*Rosa woodsii*	native
curly dock	*Rumex crispus*	introduced
Pacific willow	*Salix lasiandra [lucida var. lasiandra]*	native
Russian thistle	*Salsola kali*	introduced
blue elderberry	*Sambucus cerulea*	native
cultivated rye	*Secale cereale*	introduced
tall tumblemustard	*Sisymbrium altissimum*	introduced
giant goldenrod	*Solidago gigantea*	native
stiff-branch wirelettuce, skeletonweed	*Stephanomeria paniculata*	native
snowberry	*Symphoricarpos albus*	native
medusahead rye	*Taeniatherum caput-medusae*	noxious
yellow salsify	*Tragopogon dubius*	introduced
cultivated wheat	*Triticum aestivum*	introduced
brodiaea	*Triteleia (Brodiaea) species*	native
narrow-leaf cattail	*Typha angustifolia*	native
broad-leaf cattail	*Typha latifolia*	native
stinging nettle	*Urtica dioica*	native
common mullein	*Verbascum thapsus*	introduced
American speedwell	*Veronica americana*	native
American vetch	*Vicia americana*	native
hairy vetch	*Vicia villosa*	introduced
barren (brome) fescue	*Vulpia bromoides*	introduced
mule-ears	*Wyethia amplexicaulis*	native
death-camas	*Zigadenus venenosus*	native

[Synonymy] per Reed 1988 and per Kartesz 1994; see also USDA Plants Database
http://plants.usda.gov/

Native per Hitchcock & Cronquist 1973

Noxious per ODA (2007) and Washington State NWCB (2006)

Appendix C. Field Observations

Site #	Fig #	Quality	Characteristics
1	G	H	Small SW rocky ridge top grassland remnant with cryptobiotic soil surrounded by disturbed weedy areas.
2	G	L	All weeds
3	G	H	SW ridge top slope with nice bunchgrass community.
4	E, H	H	Rocky SW ridge top with nice bluebunch wheatgrass community and many native forbs.
5	E, H	H	Rocky S ridge top with nice bluebunch wheatgrass community, cryptobiotic soils, and many native forbs.
6	E, H	M	SW very rocky ridge top nearly bare of foliage. Cryptobiotic soils, stunted rough fescue, and some weed inclusions.
7	E, H	L	Steep N slope nearly solid weeds but includes Rosa sp., Elymus, and a few native forbs
8	E, H	L	Steep N slope nearly solid weeds. Few individual Idaho fescue plants and Mahonia sp.
9	E, H	M	Steep E slope nearly solid weeds with one small patch of high quality bunchgrass on a SE aspect.
10	E, H	M	Includes rocky native bunchgrass communities surrounded by weedy inclusions.
11	E, H	H	S and SE rocky slopes with nice bluebunch wheatgrass and rough fescue community.
12	D	M	SW ridge top slope with rocky cryptobiotic soil/bunchgrass areas and solid weed areas. Heavily grazed.
13	D	M	Steep rocky S slope with a native bunchgrass community and weedy inclusions. Heavily grazed.
14	D	L	All weeds with occasional rocky cryptobiotic soils and few bunchgrasses
15	-	-	No location 15.
16	D	M	SW rocky slope with weeds as well as rough fescue and native forbs. Heavily grazed
17	D	M	Small rocky bluebunch wheatgrass patch on top of knoll surrounded by weeds.
18	D	L	S slope nearly solid weeds w/ a few individual bluebunch wheatgrass survivors.
19	H	H	~ 50% intact grasslands with weedy inclusions on all aspects of ridge top.
20	A,B,D,E	H	SW ridge top with nice bunchgrass community and weedy mounds.
21	A, B	H	SW slopes and ridge top with bunchgrass community in rocky cryptobiotic soils with weedy mounds.
22	A, B	H	SW slopes and ridge top with bunchgrass community in rocky cryptobiotic soils with weedy mounds.
23	B, E	M	Rocky. Some bunchgrass with cryptobiotic soil & weedy mounds surrounded by solid weeds.
24	B, E	H	S to W slope around hillside contains nice bunchgrass community with some weedy inclusions.
25	E	H	Strip of native bluebunch wheatgrass habitat in very good condition.
26	I	L	Low quality with high weed content on E slope.
27	I	M	Shrubby weedy draw with E and W slopes. Some patches of Sandberg bluegrass on the E slope and bluebunch wheatgrass on the W. Overall few native forbs.
28	B, E	H	Bluebunch wheatgrass community on rocky outcrop and SW slope.
29	B	L	Nearly solid weeds and heavily grazed.
30	C	L	Nearly solid weeds and heavily grazed.
31	C	H	Rocky SW slope with cryptobiotic soils and bunchgrass community.
32	C	H	SW ridge top slope with nice bunchgrass community and some weedy inclusions.

Site #	Fig #	Quality	Characteristics
33	F	L	Weeds and intermediate wheatgrass w/ few bluebunch wheatgrass individuals
34	F	L	Solid weeds.
35	F	L	Solid weeds.
36	F	H	Very steep N to E slope w/ shrubs and Sandberg bluegrass
37	-	-	Planted by Conservation Reserve Program. Not native grassland.
38	F	L	Nearly solid weeds.
39	F	L	Steep W hillside with few natives. Some rosa sp.
40	F	L	Very steep N hillside with mostly weeds, equisetum and hawthorn.
41	F	H	Road corridor contains nice native shrub community and varying native grasses. Also includes weedy areas.
42	F	L	Very steep N hillside with some rosa sp. and snowberry. No native grasses
43	E, H	L	Solid weeds with few native individuals along south end.
44	H	H	Long SW strip along road with bunchgrass community including rocky soils; many native forbs; some areas grazed.
45	H	M	NE steep slope with nice bunchgrass areas and solid weed areas
46	H	H	Narrow strip adjacent to road with a nice tall stand of native bunchgrass.
47	H	M	E side of road where old equipment has been abandoned has nice native grass with weedy inclusions. Not grazed.
48	H	H	Grazed but still contains native habitat below fence. Above fence not recently grazed and mostly native.
49	H	H	Very nice bunchgrass community with virtually no weeds.
50	H	L	Small SW slope in bottom of drainage contains mostly weeds, few bluebunch wheatgrass individuals, and a rose.
51	H	H	Steep ravine with running water contains a riparian area. A variety of native grassland species and weedy inclusions.
52	H	H	E slope above deeply incised perennial stream w/ willow, cottonwood, & boxelder; slope consists of about 50% native grassland
53	H, I	M	South slope all weeds; east and north slopes grazed but ~40% native grassland community; and 60% solid weeds.
54	H, I	L	Overgrazed and weedy.
55	H, I	H	S and W slopes have a nice bunchgrass community on them but toes of hills and E slopes are solid weeds.
56	H, I	M	Poor quality range. Heavily grazed in past and very weedy but still contains many native grasses and forbs.
57	H, I	H	Large rocky area surrounded by wheat field. Untilled and ungrazed. In good condition with very few weeds.
58	H, I	H	Fringe along SW edge of field in excellent shape. S half lightly grazed with some weeds and N half ungrazed with almost no weeds.
59	H, I	H	Area grazed in the past but mostly a nice native bunchgrass community with some weedy inclusions.
60	E, I	H	Long narrow SW ridge top with native bunchgrass community in good condition with few weeds.
61	E, H, I	L	Long N slope down valley has only a few small remnants of native grass habitat. Almost solid weeds.
62	I	L	Heavily grazed wit little native vegetation remaining.
63	I	H	Nearly pristine tall native grassland with no weeds or evidence of grazing.
64	H, I	L	Not native but replanted to partially native community.
65	H, I	L	Heavily grazed wit little native vegetation remaining.
66	H, I	H	S ridge top with small bunchgrass community.

Site #	Fig #	Quality	Characteristics
67	I	M	Small S hillside below road with a bunchgrass community that has been invaded with weeds.
68	B, E	H	Lower S hillside solid weeds and upper hillside rocky with stunted bunchgrass and cryptobiotic crust.
69	A, B	M	Large area that is overgrazed and very weedy with patches of rocky soil that support native bunchgrass and a cryptobiotic layer.
70	A,B,D,E	M	S slope not grazed recently but has been in the past. Rocky areas still support native grasses and a cryptobiotic layer and the rest has been invaded by weeds.
71	E	M	Some rocky stunted bunchgrass areas with cryptobiotic soil near top with many invasive weeds.
72	E	L	Completely overgrazed and weedy.
73	E	M	Wide variety of habitats ranging from nice native grassland (20%) to solid weeds (50%).
74	E, H	L	Solid weeds.
75	E, I	M	Many weeds and grazed areas but also a few remnant native areas in rocky steep areas.
76	E, I	L	Few natives surviving on the south side but solid weeds on the north side of ridge.
77	E, H, I	M	Native bluebunch wheatgrass community but heavily grazed.
78	D, E	H	Area in good but grazed condition with mostly rocky soil natives with a cryptobiotic crust. Few weedy areas.
79	D	L	S slope is mostly weeds.
80	D	H	Long stretch of S ridge top with native bluebunch wheatgrass and rough fescue bunchgrasses & with a few weedy inclusions
81	D, E	L	A few bluebunch wheatgrass individuals but otherwise solid weeds
82	A	M	Two small patches of bunchgrass on S slope with some weedy inclusions
83	A	M	S slope on heavily grazed hillside. Still supports native bunchgrasses in rocky areas but is also weedy.
84	A	H	S facing head of valley containing small rocky soil bunchgrass community and a cryptobiotic layer.
85	D	L	Nearly solid weeds with one tiny patch of native grass on N slope.
86	A, D	H	SW ridge top with bluebunch wheatgrass and rough fescue community with many forbs.
87	D	L	Solid weeds.
88	A, D	L	Solid weeds except for one small patch of rough fescue.
89	A	H	Bluebunch wheatgrass community with several forbs and inclusions of weeds.
90	A, D	H	Native bluebunch wheatgrass community in areas with an unusual number of forbs represented. Weedy inclusions from all sides.
91	C, D	H	Very rocky soil native grass community sometimes with a cryptobiotic layer along SW ridge top.
92	C, D	L	Solid weeds along the entire ridgetop
93	C	H	Native bluebunch wheatgrass community in areas with an unusual number of forbs represented. Weedy inclusions from all sides.
94	C,D,F,G	H	SW slope contains some high quality grasslands with weedy mounds (50%) and some parts are solid weeds (50%)
95	C,D,F,G	L	Weedy margin of field and weed covered mounds extending to better quality bunchgrass communities outside of study area.
96	C,D,F,G	H	Very nice bluebunch wheatgrass and rough fescue bunchgrass habitat with rocky cryptobiotic soil. Many mounds invaded with weeds.
97	C,D,F,G	L	Few remaining bluebunch wheatgrass, but mostly solid weeds

Site #	Fig #	Quality	Characteristics
98	F, G	L	Road corridor. Few remaining bluebunch wheatgrass, but mostly solid weeds
99	D, G	L	S and W slopes with some small rocky areas that are dominated by weeds and are overgrazed.
100	G	H	S slope a nice bunchgrass community near the top with weedy mounds.
101	G	H	SE ridge top with a nice bluebunch wheatgrass and rough fescue community that contains an unusual number of biscuitroot. Some weedy mounds.
102	C, F	H	Long corridor that contains mostly nice bunchgrass areas, rocky bunchgrass areas with a cryptobiotic layer, and some weedy mounds. Not many forbs. A couple areas are infested with weeds.
103	C, F	H	Very large area. 50% is solid weeds and the remaining is a nice rocky soil bluebunch wheatgrass and rough fescue community; most on SW and W slope.
104	C, F	H	A small patch of native bunchgrass and few forbs on SW ridge where farm roads divide. Some weedy mounds and other weedy inclusions.
105	C	L	Heavily grazed with few native grass individuals. Mostly weeds.
106	C	L	Heavily grazed with few native grass individuals. Mostly weeds.

K SWCA's Technical Memorandum: Cultural Resources Methodology

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TECHNICAL MEMORANDUM

Date: September 25, 2009
To: Larry Tornberg, Puget Sound Energy, Senior Siting Project Manager
From: Stephanie Butler, SWCA, Cultural Resources Program Director
Subject: Lower Snake River Wind Energy Project, Garfield & Columbia Counties
Cultural Resources Methodology

SWCA field personnel are conducting the cultural resource inventory according to methods and standards required by the Washington State Department of Archaeology and Historic Preservation (DAHP), including its Washington State Standards for Cultural Resource Reporting— Survey and Inventory Standards (DAHP 2008) and the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (Volume 90 of the Federal Register [FR], No. 140:44716). All SWCA archaeological supervisors are qualified under the Secretary of the Interior's Professional Qualification Standards (Appendix M in Title 36 of the Code of Federal Regulations [CFR], Part 61). All field personnel possess formal archaeological training and worked under the direct supervision of a qualified field director. During the course of investigations, all field notes and photographs are being kept on file at the offices of SWCA under project number 14530.

Surveys of the direct and indirect APE have been completed for the Kuhl Ridge and Oliphant Ridge WRA's, and the Tucannon and Dutch Flats surveys are underway. To the extent portions of the surveys have been completed for particular WRA's, the discussion contained herein reflects the past tense. Once all portions of the surveys are completed, SWCA will analyze the results and synthesize them to generate a final report. Once the final report is completed, it will be provided to DAHP prior to any site disturbance. All concurrences necessary will be obtained prior to any ground disturbance.

1 AREA INVENTORIED FOR CULTURAL RESOURCES

The proposed project area consists of four Wind Resource Areas (WRAs) designated Dutch Flats, Kuhl Ridge, Oliphant Ridge and Tucannon collectively totaling 124,000 acres of leased land in Columbia and Garfield counties. The WRAs are comprised of private lands. The overall footprint of the proposed ground disturbance, defined as the direct area of potential effects (APE), is smaller than the total area of the WRAs. The direct APE consists of the environmental permitting corridors, which contain the proposed wind turbine strings, access roads, utility lines, borrow pits, laydown and staging areas and other associated infrastructure. The direct APE is approximately 28,556 acres: the Dutch Flats direct APE consists of 4,461 acres; the Kuhl Ridge direct APE consists of 7,916 acres; the Oliphant Ridge direct APE consists of 7,462 acres; and the Tucannon direct APE consists of 8,717 acres. These acreages do not include any additional areas of ground disturbance that are identified during the micrositing process (see below). The direct APEA includes all areas of ground disturbance associated with this project.

Visual impacts were assessed within an area approximately 1.5 miles from the proposed turbine strings; this area is referred to as the indirect APE. The indirect APE was determined to be appropriate given the physical characteristics of the landforms (rolling hills with deep gulches restricting further views, except directionally along the alignment of creeks and rivers, draws, and seasonal streams) and the diminishing impact upon the viewshed of wind turbines beyond 1.5 miles. This 1.5 mile radius distance has been recommended by DAHP for another project in the same area and has also been used by consultants working on similar wind-power siting projects in Washington state.

The surveys to which this methodology applies include both the surveys conducted for the preliminary project layout presented in the August 2009 Lower Snake River Wind Energy Draft Environmental Impact Statement (EIS) (EnE, 2009), and any micrositing that may occur afterwards. Micrositing is the final process of assessing site-specific attributes in order to determine the final locations of wind turbine generators, below-ground electrical cables, and above-ground electrical transmission towers. This process occurs after comprehensive environmental and permit review and prior to actual construction. Micrositing will occur for each phase of project construction.

During micrositing, technical and engineering factors, including limitations posed by the terrain, wind data, (e.g., speed, wind sheer), wake effects of the turbines, feasibility of access, geotechnical considerations (subsurface conditions), environmental restrictions (avoidance of sensitive habitat), cultural/archeological restrictions (avoidance of cultural resources sites), telecommunications constraints, Federal Aviation Administration (FAA) requirements, and other site-specific criteria are assessed. Based on these site-specific results, further refinement is made to yield a final layout of approximately 795 turbines.

Locations of project facilities that require temporary or permanent ground disturbance at each phase of construction will be finalized. If any ground disturbance is located in an area that has not yet been surveyed for a specific resource, the appropriate surveys will be conducted. For purposes of the discussion below these are referred to as “micrositing surveys”.

With respect to cultural resources, any new areas identified during the micrositing process that will require ground disturbance and that were not previously surveyed and documented, will be surveyed according to the methodology described below. Because these new areas are proposed for the ground disturbance activities, they will be incorporated into the project’s “Area of Potential Effect” as defined in If any cultural resources are found they will be documented, assessed for eligibility, reported, and mitigation of the resources addressed in coordination with the respective County, DAHP and the Affected tribes as described in the mitigation measures included in Section 2.17.3.1 , “Mitigation” of the final EIS. These actions will occur before any ground disturbance occurs in this newly identified area.

The County, and as appropriate to the resource, other regulatory agencies, will review the survey results and the proposed mitigation measures for consistency with local, state and federal regulations and the mitigation measures presented in the final EIS. The ground disturbance activity will only proceed once their approval is obtained.

2 OBJECTIVES OF THE CULTURAL RESOURCE INVENTORY

The objectives of the cultural resource inventory were to 1) identify archaeological resources and historic properties by means of systematic in-field inspection; 2) interpret identified cultural resources within a regional context; 3) develop National Register of Historic Places (NRHP), Washington Heritage Register (WHR), and Washington Heritage Barn Register eligibility recommendations for the identified resources; and 4) propose management recommendations for significant cultural resources that may be affected by the proposed project.

2.1 Definitions of Cultural Resources

2.1.1 Archaeological Sites

Precontact and historic-period archaeological sites were defined following the Washington DAHP guidelines (DAHP 2008), Washington State Law (Revised Code of Washington [RCW] 27.44 and RCW 27.53), and the Secretary of the Interior's Standards and Guidelines (48 FR 44716).

In Washington, an archaeological site is defined as two or more artifacts likely to have been generated by patterned cultural activity within a geographic locality; or as the presence of any archaeological feature, with or without associated artifacts.

In Washington, an archaeological site is defined as being greater than 50 years of age. In general, to be considered eligible for the NRHP, an archaeological site must be 50 years of age or older, which is a general estimate of the time needed to develop historical perspective and to determine significance. Only directly observed cultural materials and/or feature(s) were recorded as archaeological sites. If available, informant testimony was also recorded on the site form for sites identified within the environmental permitting buffers. Unsubstantiated informant testimony regarding archaeological sites was recorded in the supervisor's field notes but not on site forms, and it was not used to define archaeological sites.

2.1.2 Isolate

Isolates were defined as any precontact or historic artifact occurrence that did not qualify for a site designation (i.e., a single artifact). Isolates usually reflect a single event, loci, or activity. Ordinarily, isolates are not eligible for listing in the NRHP under Criteria A through D (36 CFR 60.4 [a-d]) because they do not contribute to our knowledge of the past and often lack integrity.

2.1.3 Built Environment (Historic Properties)

In general, this category of cultural resources refers to non-archaeological sites and features of historic age, including structures, buildings, objects, and linear features such as trails, roads and railroads. According to Washington's Statewide Historic Property Inventory Guide (DAHP 2005:31),

> A building is a structure created to shelter any form of human activity. Buildings may refer to a historically related complex. Resources commonly classified as "buildings" include single buildings such as a courthouse, city hall, social hall, commercial building, library, train depot, residence, hotel, theater, store, school, or church; or groups of buildings such as courthouse and jail, house and barn, college quadrangle, farmstead, mansion and carriage house, apartment complex, and church and school.

The same guide defines a structure as:

> [A] work made up of interdependent and interrelated parts in a definite pattern of organization. Constructed by man, it is often an engineering project large in scale.
>
> Resources commonly classified as "structures" include canals, bridges, trestles, dams, power plants, silos, roadways, grain elevators, kilns, and railroad grades.

An object is defined in this guide as:

> [A] thing of functional, aesthetic, cultural, historical, or scientific values that may be, by nature or design, movable yet related to a specific setting or environment. Objects should be located in a setting appropriate to their significant historic use, roles, or character.
>
> Resources commonly classified as "objects" include ships, locomotives, aircraft, carousels, boats, trolley cars, monuments, boundary markers, statues, and murals.

2.1.4 Traditional Cultural Properties

In addition to archaeological sites, isolates, and traditional historic properties, project personnel were cognizant of other types of cultural resources that could occur in the project area, including properties of traditional religious and cultural importance to Indian tribes, which could be eligible for inclusion in the National Register of Historic Places under the Historic Preservation Act (16 U.S.C. Code (U.S.C.) §§ 470, 470a(d)(6); see also 36 C.F.R. § 800.16(l(1)). Properties of traditional religious and cultural importance to Indian tribes frequently are described as traditional cultural properties (TCPs) - see National Register Bulletin 38 (Parker and King 1998).

2.1.5 Archaeological or Historic Districts

Project personnel were cognizant of previously recorded archaeological or historic districts as well as individual sites and structures recorded therein, which are located within or near the direct APE. In general, historic districts are groupings of buildings, structures, and/or objects that together have more significance than they do individually. These resources are typically unified by a common element, such as age, and/or common associations with people, events, or style. For example, the city of Pomeroy includes the NRHP-listed Downtown Pomeroy Historic District that encompasses the majority of the downtown commercial district. These buildings are unified by their association with the development of downtown Pomeroy, their use as commercial buildings, their proximity to one another (each belonging to the historic period), and their ability, when taken together, to convey a sense of the historic nature of Pomeroy's main street.

2.2 Evaluation Criteria

The criteria for evaluating cultural resources in terms of their potential nominations to the NRHP provide a systematic, definable means of evaluating historic and cultural properties. Site significance was evaluated with regard to the criteria in 36 CFR 60.4, which are as follows:

> The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> a) That are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> b) That are associated with the lives of persons significant in our past; or
>
> c) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> d) That has yielded or may be likely to yield information important in prehistory or history.

According to 36 CFR 60.4, in addition to these standard criteria, there are several exceptional categories of cultural resources that may, in certain cases, also be eligible for the NRHP even though they fail to meet all the necessary and sufficient conditions. For example, resources that are not yet 50 years old may still qualify if they are of “exceptional importance.” Reconstructed or relocated buildings and structures may also be eligible even though they have lost most or all of their original contextual integrity, for example, if they are the sole remaining examples of a significant architectural style or period.

3 FIELD METHODOLOGY

3.1 Archaeological Survey

A pedestrian survey was conducted of the entire direct APE consisting of 28,556 acres. The transect spacing was established in conformance with Washington State and the Secretary of Interior’s standards and guidelines referenced above, and with the consideration of professional judgment applied to the specific area being surveyed. Field crews walked parallel transects spaced at 20-meter (66-foot) intervals. In areas with greater than 30 percent slope or soils that have been severely disturbed over time from agricultural activities, transect intervals were widened to 30 meters (98 feet). Each crew was equipped with a hand-held Trimble Geo XT global positioning system (GPS) unit into which a shape file of the survey area was loaded. The GPS unit ensured complete and accurate coverage of the survey area. This data was supplemented by the use of aerial photographs and topographic maps that show the project boundaries and UTM coordinates for various waypoints.

Field crew members examined the ground surface for artifacts, features, or other evidence of cultural occupation, such as charcoal-stained sediments, historic structures, and linear sites (e.g., trails and roads). Site boundaries were defined based on the extent of visible cultural material. Artifacts or features were temporarily flagged. Upon identifying an archaeological resource, transects were reduced to a 5-meter (16-foot) interval in order to define site boundaries.

Prior to field survey, SWCA also defined high probability areas (HPAs) in the environmental permitting corridors. Defining HPAs in advance of the survey provided a focus for field observations in areas of poor ground surface visibility. Poor ground surface visibility was anticipated in areas with active cultivation of wheat during the planned field season. HPAs were defined for both precontact and historic-period archaeological resources. The SWCA field crew was directed to pay particular attention to these HPAs in areas of poor ground surface visibility.

The HPAs for historic-period archaeological resources were focused on the mid-nineteenth-century travel corridors in the area. SWCA reviewed the General Land Office maps for the project to define the routes of historic-period roads that could intersect current project boundaries, as well as any indications of other Euro-American homesteads, farmsteads, and other resources in the project area. Likely locations of where these roads, railroads, or trails would have crossed the project boundary were designated HPAs.

Definition of HPAs for precontact archaeological resources was initially based on theoretical considerations. Because the majority of archaeological studies have been performed closer to the Snake River, virtually all of the previously recorded sites are along the river. Few sites have been recorded in the seldom-surveyed uplands. As a result, known site locations are poor indicators of areas in the uplands likely to contain archaeological resources. Ethnohistoric and ethnographic studies of Native American land-use patterns provide further information in attempting to predict where archaeological resources are likely to occur. Upland areas within the current project area would have been used during spring, summer, and fall for occasional travel between major drainages, and for hunting and collecting upland game and plant resources.

Based on this pattern of land use, upland landforms that might be likely to contain archaeological deposits include the bottoms of major drainages, the courses of minor drainages, and springs on upland slopes, which would have served as travel corridors and provided water for people and the game they were hunting. Due to the scarcity of water in the project area, it is likely that upland use would be confined to drainages that contain water, food, and shelter. Alluvial terraces to the major drainage bottoms should be considered likely to contain archaeological resources.

These sheltered areas near a source of water are the most likely portions of the project vicinity to have been used for more than short-term campsites or resource-extraction locations. However, occasional significant flood events scour the local drainages, severely damaging or destroying any archaeological sites within the flood zone. As a result, flat areas on the lower portions of the canyon sides hold the greatest potential for intact archaeological deposits. The tops of ridges overlooking these drainages that would have provided an excellent view of the surrounding terrain and potential prey are also considered HPAs. The head of drainages would have been ideal locations to observe the movement of people or game within those drainages, and would have provided a travel corridor between watersheds.

The HPAs were re-evaluated during and after the field survey, which resulted in a refined identification of the locations considered to have high probability for archaeological resources within the framework of the variables discussed in above. Some pre-survey HPA designations were reinforced, new HPAs were defined, and others were eliminated based on ground truthing.

For those HPAs at which field crews encountered good to excellent ground-surface visibility and there was considered to be little probability for buried cultural deposits, no further field investigations are warranted. For those HPAs at which there was poor ground-surface visibility at the time of the pedestrian survey, limited subsurface exploratory probes may be recommended. Shovel probing may also be recommended at HPAs with good surface visibility if the potential for buried cultural deposits is strong enough to merit further testing. Additional field studies (shovel probing) within the HPAs should be conducted during micrositing of the project facilities and prior to any ground disturbing activities associated with operation or construction of the proposed project. If construction and operation of the proposed project would not result in ground disturbance at a particular HPA, then additional shovel probing would not be necessary.

3.1.1 Archaeological Site/Isolate Recording

When cultural resources were encountered, and depending on the nature of the find, project archaeologists collected sufficient data to complete Washington DAHP Archaeological Site Inventory or Archaeological Isolate Inventory forms. Archaeological sites and isolates were mapped with Trimble GPS equipment capable of sub-meter accuracy. All linear site features such as site boundaries, roads, fence lines, distinctive environmental features, as well as point data such as the site datum, cultural features, and precontact tools, were also mapped with the Trimble GPS unit. Field GPS data were post-processed using Trimble Pathfinder software and projected into UTM, Zone 11 North using North American Datum 1983. GPS data were exported into ArcMap 9.2 shape files and plotted onto the associated georeferenced USGS 7.5-minute quadrangle to ensure accuracy in producing location maps for all resources.

In addition to site mapping, a minimum of two overview photographs were taken facing different compass directions. Associated features and diagnostic artifacts were described, measured, recorded with GPS, and photographed, as appropriate.

3.2 Historic Properties Inventory

A reconnaissance-level survey was conducted of the entire direct and indirect APE, excluding areas within the corporate boundaries of the City of Pomeroy, which were the subject of an historic context statement (discussed under section 3.2.2). Field crew members identified the locations of historic properties through examination of modern and historic USGS quadrangle maps, aerial photography, and a reconnaissance of the project area. During reconnaissance, clearly modern resources (less than 50 years old) were noted on field maps and not recorded during the field survey. The field survey crew consisted of one historic preservation specialist (qualified under the Secretary of the Interior's Standards), and one field assistant. Field surveyors recorded all historic properties that appeared to meet the 50-year-age criterion, including physical descriptions of any and all associated buildings, structures, and objects. Where field surveyors were uncertain whether or not a resource met the 50-year-age criterion, they were recorded in the field as if they did, and assigned a temporary field number. When resources were later found to not meet the 50-year-age criterion, they were removed from the survey results. For consistency, temporary field numbers were not reassigned when a recorded resource was eliminated for lack of age, resulting in some gaps in the sequential numbering. Resources were assigned temporary field numbers, photographed, and plotted on field maps, using the field number as the associating identifier.

3.2.1 Historic Properties Inventory Documentation

All identified historic properties were recorded according to the standards set forth by the Washington State DAHP. Field surveyors recorded individual resources on forms provided by the DAHP. Field recording included locational data (address, phase, etc.), physical data (number and descriptions of resources and associated elements), photographic data (views of all accessible elevations and detail images of key features), and preliminary eligibility assessments for listing in the NRHP. Where resources were clustered and clearly related, such as farmsteads, they were documented together and recorded as a single resource with multiple elements. Data collected during the field survey were entered into the Washington Historic Properties Inventory Database, and original field forms were preserved for quality control purposes. The database entries were completed by professionals meeting the National Park Service qualifications (see 36 CFR 61) for architecture, architectural history, or history.

3.2.2 City of Pomeroy Historic Context Statement

The areas within the corporate boundaries of the City of Pomeroy were excluded from the 100-percent historic properties inventory; instead, these areas were the subject of a historic context statement. This approach for the City of Pomeroy was selected because of the singular nature of the city and the common impacts the project will have on the various individual elements within the city. The context statement is intended to assist in the assessment of visual impacts to historic resources within the City of Pomeroy, should they occur.

The City of Pomeroy is the only incorporated city within the boundaries of the indirect APE, as well as being the only city within Garfield County, where the majority of the project area is located. (The remainder of the project area is in neighboring Columbia County, and there are no incorporated cities in the Columbia County portion of the project's indirect APE). Approximately 63 percent of the total population of Garfield

County lives within the City of Pomeroy, easily distinguishing it from the rest of the county, which is extremely rural and sparsely populated (Garfield County Chamber of Commerce 2009). For this reason, the City of Pomeroy can be seen as a distinct entity, separate and different from the rest of the areas within the indirect APE.

Pomeroy is located within the valley of Pataha Creek, and although the corporate boundaries extend up the hillsides to the north and south of the populated areas, development is constricted to those areas between the bases of those slopes. No wind turbines will be located within the boundaries of the City of Pomeroy, and so the entirety of the impact to any individual resources within the city will be indirect, if any impact occurs at all. Because of the compact and discreet nature of the developed areas of the City of Pomeroy, the indirect impacts to any individual resources within the city will be shared by all resources within the city, both in nature and intensity. For this reason, it was determined that the proper approach was to consider the City of Pomeroy as a distinct entity.

The context statement provides a unified review of the elements of the city, presents their shared attributes, and provides analysis of the key historical themes that construct the history of the city, as well as identifying resource types for each as they are represented in the historic built environment of Pomeroy, with representative examples provided for illustrative purposes. Although no formal documentation was prepared for individual resources within the city, the survey team conducted an informal windshield survey of the city, noting styles and forms and the relative frequency with which they appear in Pomeroy's historic built environment. This information, along with that provided by the 2003 NRHP nomination of the Pomeroy Downtown Historic District (Donovan 2003), was distilled and used to inform the historic context statement.

4 ARTIFACT ANALYSIS

An artifact inventory was completed in the field for each site and isolate. Artifacts were observed and documented in the field and left where they were found. No artifacts were collected. Forms listing artifacts by categories and type were filled out in the field. Analysis of the cultural material generally included morphological classification, material type identification, and recordation of metric attributes, where appropriate. The specific attributes recorded for each artifact class were intended to provide diagnostic and significant information for each specimen analyzed. For example, farm equipment was inspected for patent numbers and data plates that may provide relevant information regarding manufacturing location and date. Databases were used to store and organize all information regarding artifact assemblages.

4.1 Precontact Artifacts

Lithics were the most common class of precontact artifacts recovered from sites in the project area. In order to make the lithic analysis consistent and comparable for intra- and inter-site analyses, a technological/morphological classification was used. The classification is divided into discrete categories that together represent a continuous lithic reduction sequence. While not mutually exclusive, three reduction sequences resulting in different idealized end products have been defined and were applied to lithic assemblages. The first sequence involves the reduction of flakes, pebbles, cobbles, and cores into bifacial implements. This is referred to as the biface reduction sequence, and it results in the production of various classes or stages of bifaces, including projectile points and other final bifaces, preforms, blanks, and preblanks. The second reduction sequence involves flakes removed from nodules, cores, bifaces, and other source material as flake tools. Flake tools are classified as retouched flake tools if one or more of their margins has been modified, or as utilized flake tools if the flake exhibits evidence of use but not intentional modification. The third reduction sequence involves the limited modification (or flaking) of cobbles, pebbles, and other nodules as tools. Certain attributes were recorded for all flaked stone tools, including portion, length, width, thickness (in millimeters), and raw material type.

The unutilized debris, including flakes and shatter resulting from flaked stone reduction, was classified as debitage. Flakes were classified in terms of the amount of cortex present on their exterior surface. Those resulting from removal of cortex in primary reduction of cores or source stone and demonstrating a dorsal surface dominated by cortex were designated as primary flakes. Flakes produced from further reduction of core materials to create tool blanks, and that demonstrate only residual cortex, such as near the flaking platform, were designated as secondary flakes. Flakes that had been produced from a core's interior by the thinning or retouching processes during tool shaping and that retained no cortex were designated as tertiary flakes. These categories are intended to roughly differentiate flakes removed at various stages during the reduction process. Raw material type as well as a maximum dimensional span was recorded for each flake.

Ground stone artifacts, primarily mortars and pestles (complete and fragmented), were recorded similarly to other lithic artifacts. The material type and dimensions (maximum length, width, and thickness) of ground stone artifacts were recorded. Typical ground stone characteristics were also documented, including unifacial or bifacial grinding surfaces, direction of wear, shaping of the stone through knapping techniques, and other features indicative of cultural modification, including polish, striation, shouldering, or pecking of the grinding surface.

4.2 Historic Artifacts

Historic artifacts were recorded by material type (e.g., glass, ceramic, or metal) and subtype (e.g., manganese discolored glass or selenium discolored glass; stoneware or china; tin or steel), as well as object class (e.g., bottle, crockery, or can) largely based on functional categories. These categories are broad, but are useful for interpreting site use. Object classes were further divided on the basis of more detailed morphologies and manufacturing traits (e.g., hand-wrought square versus wire nails; ceramic glaze types; bottle mold seams, colors, shapes, and finishes; and can types). Measurements and diagnostic attributes, especially maker's marks, were described where identifiable.

5 DISCOVERY PLAN FOR HUMAN REMAINS

No human remains, funerary objects or burial features were observed or discovered during the work described in this document. However, field staff understood that, if human remains were discovered, they were to be treated with respect, secured, and protected until such time as the appropriate action had been determined, in accordance with applicable state and federal statutes including Revised Code of Washington (RCW) 27.44; 68.50; 68.60 and the Native American Graves Protection and Repatriation Act (NAGPRA; 25 USC 3001-3013).

By law, all persons who know of the existence and location of human remains must notify both the county coroner and local law enforcement. This must be done in the most expeditious manner possible (RCW 27.44; 68.50; 68.60). Any person engaging in ground disturbing activity that encounters skeletal human remains must cease all activity which may cause further disturbance to the remains, make a reasonable effort to protect the area from further disturbance, and report the presence and location of those remains to the coroner and local law enforcement (RCW 27.44; 68.50; 68.60). The county coroner will assume jurisdiction over the human skeletal remains and make a determination of whether those remains are forensic or non-forensic (RCW 27.44; 68.50; 68.60). If the county coroner determines the remains are non-forensic, then the DAHP will take jurisdiction over the remains. The State Physical Anthropologist will provide a determination of whether the remains are Indian or Non-Indian and report that finding to the affected parties (RCW 27.44, 68.50; 68.60). If there is no federal agency involved, the DAHP will conduct all consultation with the affected parties as to the future preservation, excavation, and disposition of the remains.

6 References

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