Appendix H

Wildlife Studies

2017 Prairie Grouse Lek Survey
2020 Prairie Grouse Lek Survey
2020 Raptor Nest Survey

Wild Springs Solar, LLC
May 15, 2020

Prairie Grouse Lek Survey Report

Wild Springs Solar Project

Prepared for:

Geronimo Energy, LLC

Prepared by:

AREA M

June 2017

TABLE OF CONTENTS

INTRODUCTION 1
BACKGROUND 1
PROJECT DESCRIPTION 2
SURVEY METHODOLOGY 2
RESULTS 3
CONCLUSIONS and RECOMMENDATIONS 4
REFERENCES 5

TABLES

Table 1. Survey point locations and survey results. 4

APPENDICES

Appendix A. Maps
Appendix B: Project Photographs

INTRODUCTION

Area M Consulting (Area M), on behalf of Geronimo Energy, LLC (Geronimo), conducted greater prairie chicken (*Tympanuchus cupido*) and prairie sharp-tailed grouse (*Tympanuchus phasianellus jamesi*) lek surveys for the proposed Wild Springs Solar Project (Project) located within Pennington County, South Dakota. Both species, hereafter "prairie grouse", are native prairie-obligates of South Dakota, dependent on large tracts of grassland for all phases of their life-cycle. Area M biologists conducted lek surveys following guidance and protocols published by the South Dakota Game, Fish, and Parks (SDGFP) and the Wyoming Game and Fish Department (WGFD) to maximize grouse and lek detection. This prairie grouse survey was conducted to fulfill requirements by the SDGFP, the South Dakota Public Utilities Commission (SDPUC), and to comply with the National Environmental Policy Act (NEPA).

BACKGROUND

Greater prairie chicken and sharp-tailed grouse are the most common grouse species in South Dakota (SDGFD, 2017). However, populations have declined precipitously due to a combination of habitat conversion and destruction stemming from agricultural practices and cattle grazing (SDGFD, 2017; Johnson et al., 2011; Connelly et al., 1998). Prairie grouse utilize heterogeneous habitats throughout their life stages, including native prairie with tall grass and medium grass components, field edges, croplands, and grasslands with thick residual growth (Johnson et al., 2011; Connelly et al., 1998). Although there are slight differences between greater prairie chicken and sharp-tailed grouse habitat, the SDGFD combined the species for a single state-wide management plan due to both species' dependence on native prairies and grasslands (2017).

Greater prairie chickens are likely absent from Pennington County, though suitable habitat occurs in patches throughout the county (SDGFD, 2017). The International Union for Conservation of Nature and Natural Resources (IUCN) Red List depicts the Project as being outside of the current known greater prairie chicken range (IUCN, 2017) (Appendix A). Sharp-tailed grouse leks are known to occur within Pennington County (SDGFD, 2017). However, the IUCN Red List depicts the Project as being outside of the extant range of this species (IUCN, 2017) (Appendix A).

Prairie grouse use leks (or dancing grounds or booming grounds), which are historic areas where males annually display, for courtship and mating. Leks are typically located on small rises with shorter vegetation, allowing maximum visibility for courtship activities and predator vigilance. Males begin establishing territories on leks in late February to early March, with females typically beginning to attend in late March to early April (Johnson et al., 2011; Connelly et al., 1998). Due to prairie grouse dependence on leks for reproduction, leks are identified as crucial areas for conservation, warranting protection by numerous state, federal, and local agencies.

PROJECT DESCRIPTION

The Wild Springs Solar Project, located on the southern boundary of New Underwood, South Dakota, encompasses 999.5 acres within the following sections in Pennington County, South Dakota (Project Site) (Appendix A):

- Sections 5, 6 T001N:R11E
- Section 1 T001N:R10E
- Section 31 T002N:R11E
- Section 36 T002N:R10E

Major Land Resource Unit

The Project Site is located entirely within the Pierre Shale Plains Major Land Resource Unit (60A), encircling the Black Hills in western South Dakota (United States Department of Agriculture, 2006). This Major Land Resource Region is characterized by old plateaus and eroded terraces with long, smooth slopes. Vegetation communities include grass and forb prairies, with shrub or trees. A diverse mixture of hardwood and conifer occur within this region, with sugar maple, basswood, yellow birch, white ash, red oak, white oak, aspen, hemlock, red pine, and white pine being the most common tree species. Cropland dominates the landscape, but large tracts of forests remain intact. Dairy farming, cattle ranching, and lumber/pulp production are also prevalent within this region.

Project Environment

The Project Site topography is undulating, containing several hills with an overall relief of approximately 90 feet. Box Elder Creek bisects the northern corner of the Project Site, running east towards its confluence with the Cheyenne River 20 miles to the southeast. Generally, the Project Site slopes to the north towards Box Elder Creek. The existing landscape is a mixture of pastureland, cropland, disturbed grassland, and riparian areas, with the majority of the land currently being used as cattle pasture. The most common plant species identified by Area M biologists during ground surveys included blue grama, poa spp., buffalo grass, western wheat grass, crested wheat grass, and several low-lying forbs. Woodlands and shrublands are absent from the Project, with the exception of the cottonwood-dominated riparian corridor along Box Elder Creek. Sparse cottonwoods are scattered within the shallow swales and drainageways.

SURVEY METHODOLOGY

Leks were surveyed by Area M biologists following protocols published by the SDGFP and WGFD April 10-14, 2017 (SDGFP, 2017; WGFD, 2007). These surveys consisted of a hybrid of techniques including point observations on topographic rises, pedestrian transects, and field investigation for sign (e.g. roost piles) on high-quality potential lek habitat (e.g. sparsely vegetated rises). These multiple survey methods were employed to increase the probability of detecting leks within the Project Site.

Survey Points

Survey points were established at locations with favorable viewsheds, such as on top of knolls or ridges, to cover the entire Project Site (Appendix A). Each survey point was accessed by either truck or on foot and surveyed at least once between 0.5 hours before sunrise and 1.5 hours after sunrise. Multiple days of survey were allotted due to the risk of losing a survey day because of inclement weather or the presence of predators. At each survey point, Area M biologists scanned the surrounding landscape for prairie grouse both with 8-10x binoculars and without optics for 3-5 minutes. The biologists also listened for the distinct booming or dancing of male grouse. All visual or auditory prairie grouse observations were recorded with GPS points and grouse were monitored to determine if they were exhibiting lekking behavior.

Potential Lek Investigation

Area M biologists also investigated potential lek locations, including slight topographic rises, knolls, or areas with sparse vegetative cover, within the Project Site. These areas were visited between 1100 and 1700, to ensure booming/dancing birds were not disturbed. At each potential lek location, Area M biologists searched for prairie grouse sign such as roost piles, feathers, or prints. All areas containing prairie grouse sign were surveyed the following morning.

Pedestrian Transects

Finally, Area M field technicians were trained on prairie grouse identification and sign to concurrently survey for prairie grouse and prairie grouse sign while conducting cultural resource surveys. Pedestrian transects were surveyed across the entire Project Site April 10 - May 4, spaced 30-75 feet apart. All prairie grouse and prairie grouse sign were recorded with GPS points and later investigated by Area M biologists.

RESULTS

Overall, no prairie grouse leks were detected within the Project Site. Two roosting sharp-tailed grouse were observed while conducting surveys, but no diagnostic sign indicative of lekking was detected. The results of each survey method are described in greater detail below.

Survey Points

Sixteen total survey points (SP) were established and visited in the early morning at least once April 10-14, 2017 (Table 1, Appendix A). Two sharp-tailed grouse were flushed moving between SP 6 and SP 7 in the western portion of the Project Site. The grouse flew approximately 150 feet to the west and were observed at both survey points. A definitive confirmation of sex could not be determined. No other grouse were observed during this survey, and no leks were detected.

Table 1. Survey point locations and survey results.

Survey Point	Survey Date			UTM	
	4/19/2017	4/20/2017	4/21/2017	X	Y
SP1	N	N	N	192607	4888132
SP2	N	N	N	192079	4888166
SP3	N	N	N	191760	4888161
SP4	N	N	N	191122	4888200
SP5	N	N	N	191755	4887721
SP6	––	PV	PV	191098	4887736
SP7	––	PV	PV	191010	4887649
SP8	N	N	N	193318	4886493
SP9	N	––	––	193177	4886696
SP10	N	––	––	192805	4886822
SP11	N	––	––	192341	4886972
SP12	N	––	––	192113	4887010
SP13	N	N	N	191775	4886560
SP14	N	N	N	193753	4886478
SP15	––	––	N	191455	4888723
SP16	––	––	N	192089	4888650

N =Negative; PV = Positive/Visual; ––=Not Surveyed

Potential Lek Investigation

Several areas exhibiting high-quality lek characteristics were identified and investigated within the Project Site during morning lek surveys and concurrently during other environmental surveys. No roost piles, feathers, tracks, or other sign indicative of lekking activity were observed at any location.

Pedestrian Transects

No grouse or grouse sign were detected by field technicians during cultural resource pedestrian surveys. Transects were successfully completed within the entire Project Site.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the survey, it is the professional opinion of Area M that prairie grouse leks do no occur within the Project Site. This conclusion is based on the low number of observed prairie grouse, the absence of observed grouse exhibiting lekking behavior, and the lack of concentrated sign. Should a potential lek be identified by Geronimo employees or contractors within the Project Site in the future, Geronimo should contact the SDGFD.

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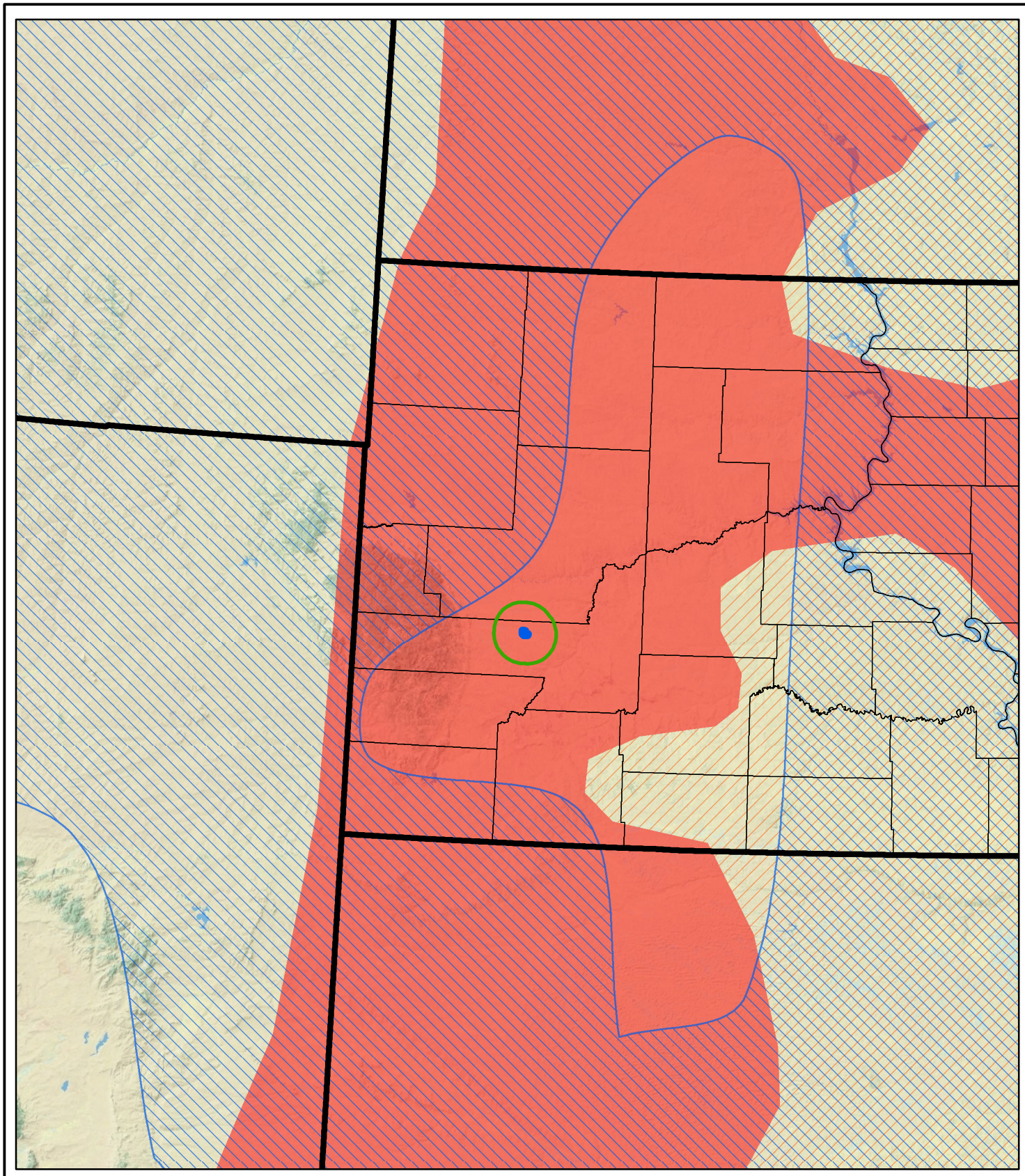
Appendix A:

Maps



Prairie Grouse Range Map

Geronimo Energy, LLC - Wild Springs Solar Project

Pennington County, South Dakota

	Tympanuchus cupido	Tympanuchus phasianellus
Project Site	Extant (resident)	Extant (resident)
10-Mile Buffer	Possibly Extinct	

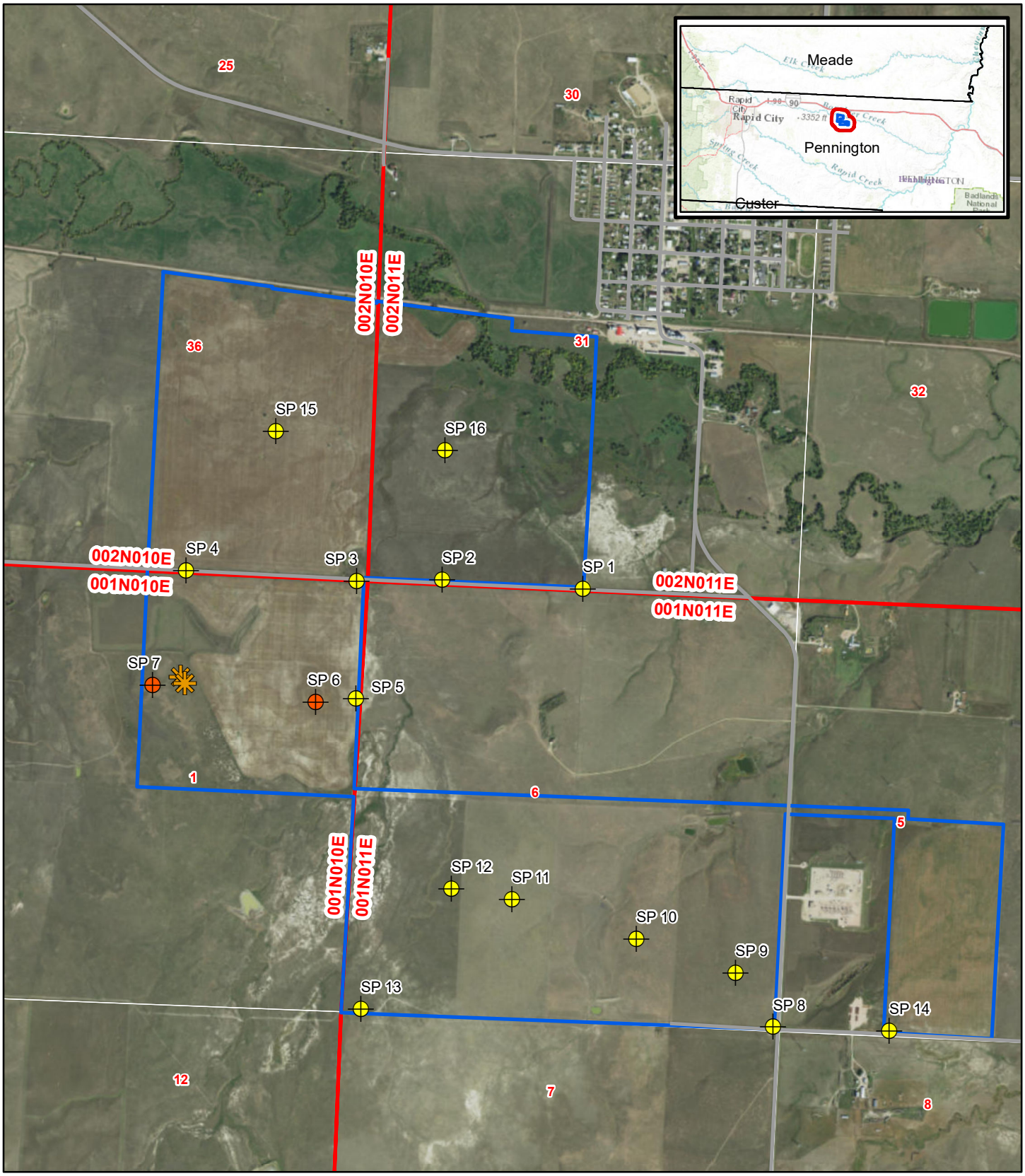
0 20 40 80

1:3,000,000 Miles

N

AREA M

Source: IUCN Red List



Prairie Grouse Survey - Aerial Map

Geronimo Energy, LLC - Wild Springs Solar Project

Pennington County, South Dakota

Prairie Grouse Survey Point

Negative

Positive

Sharp-tailed Grouse Observation

Local Roads

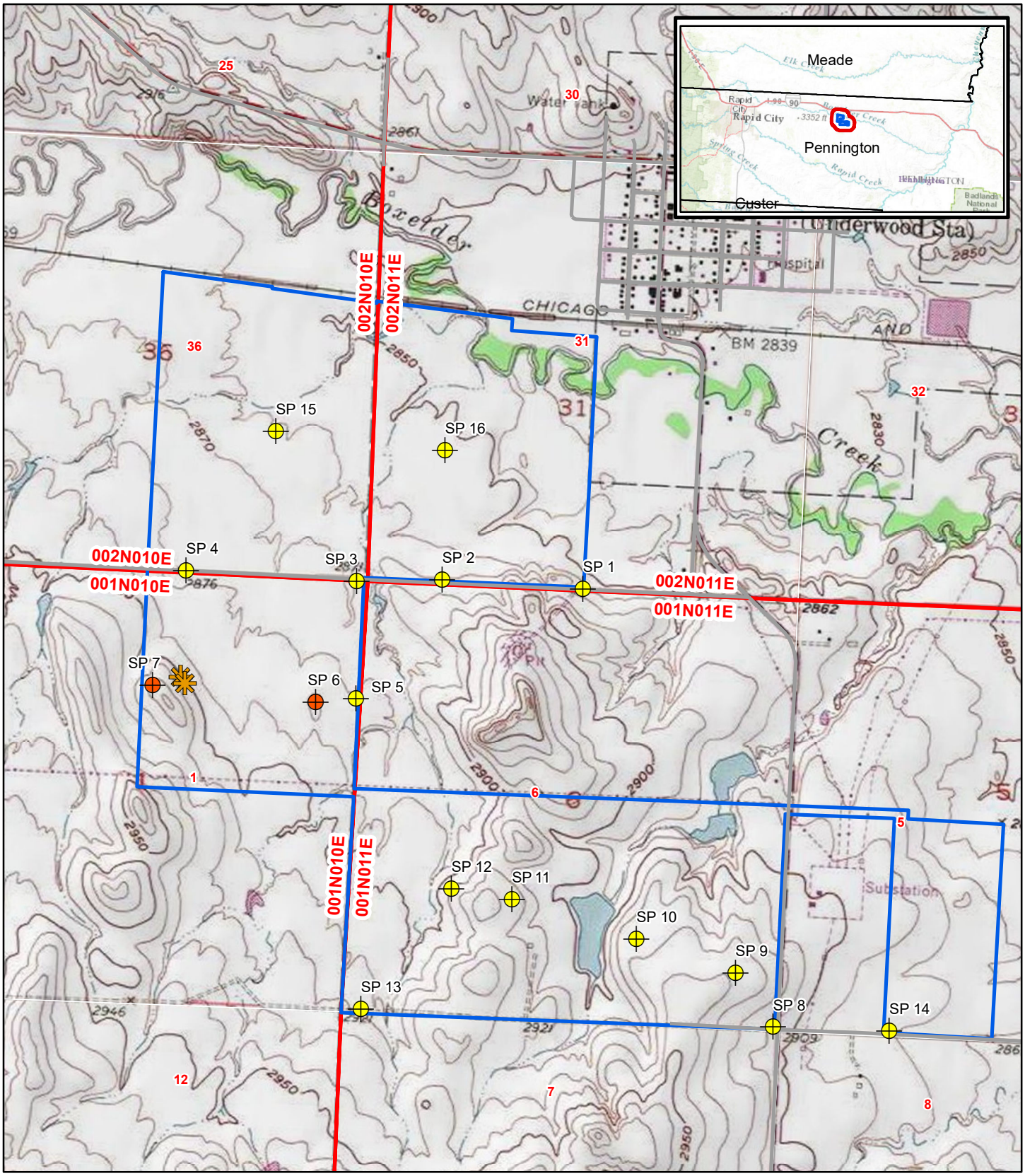
0 0.25 0.5 1

Miles

1:20,000

N

AREA M



Prairie Grouse Survey - Topo Map

Geronimo Energy, LLC - Wild Springs Solar Project

Pennington County, South Dakota

Prairie Grouse Survey Point

Negative

Positive

Sharp-tailed Grouse Observation

Local Roads

0 0.25 0.5 1

1:20,000 Miles

N

AREA M

Appendix B:

Project Photographs

Box Elder Creek and associated riparian corridor in the northern portion of the Project Site.

Typical pasture habitat within the Project Site.

Cropland habitat within the Project Site.

Mixed pastureland and disturbed grassland habitat within the Project Site.

Prairie Grouse Lek Survey Report
Wild Springs Solar
Pennington County, South Dakota

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TABLE OF CONTENTS

INTRODUCTION 1
BACKGROUND 1
PROJECT SETTING 1
SURVEY METHODOLOGY 2
RESULTS 3
CONCLUSIONS and RECOMMENDATIONS 5
REFERENCES 6

TABLES

Table 1. Survey point locations and prairie grouse survey results 4

APPENDICES

Appendix A: Maps
Appendix B: Field Photographs

INTRODUCTION

Area M Consulting (Area M), on behalf of Wild Springs Solar, LLC (Client), a wholly-owned subsidiary of Geronimo Energy, LLC, a National Grid Company, conducted greater prairie chicken (*Tympanuchus cupido*) and prairie sharp-tailed grouse (*Tympanuchus phasianellus jamesi*) lek surveys for the proposed Wild Springs Solar Project (Project) located within Pennington County, South Dakota. Both species, hereafter "prairie grouse", are native prairie-obligates of South Dakota, dependent on large tracts of grassland for all phases of their life-cycle. Area M biologists conducted lek surveys following guidance and protocols published by the South Dakota Game, Fish, and Parks (SDGFP) and the Wyoming Game and Fish Department (WGFD) to maximize grouse and lek detection. Prairie grouse lek surveys were initially conducted within a portion of the current Project area in 2017, with no leks detected (Area M, 2017).

BACKGROUND

Greater prairie chicken and sharp-tailed grouse are the most common grouse species in South Dakota (SDGFP, 2017). However, populations have declined precipitously due to a combination of habitat conversion and destruction stemming from agricultural practices and cattle grazing (SDGFP, 2017; Johnson et al., 2011; Connelly et al., 1998). Prairie grouse utilize heterogeneous habitats throughout their life stages, including native prairie with tall grass and medium grass components, field edges, croplands, and grasslands with thick residual growth (Johnson et al., 2011; Connelly et al., 1998). Although there are slight differences between greater prairie chicken and sharp-tailed grouse habitat, the SDGFP combined the species for a single state-wide management plan due to both species' dependence on native prairies and grasslands (2017).

Greater prairie chickens are likely absent from Pennington County, though suitable habitat occurs in patches throughout the county (SDGFP, 2017). The International Union for Conservation of Nature and Natural Resources (IUCN) Red List depicts the Project as being outside of the current known greater prairie chicken range (IUCN, 2016a). Sharp-tailed grouse leks are known to occur within Pennington County (SDGFP, 2017). However, the IUCN Red List depicts the Project as being outside of the extant range of this species (IUCN, 2016b).

Prairie grouse use leks (or dancing grounds or booming grounds), which are historic areas where males annually display, for courtship and mating. Leks are typically located on small rises with shorter vegetation, allowing maximum visibility for courtship activities and predator vigilance. Males begin establishing territories on leks in late February to early March, with females typically beginning to attend in late March to early April (Johnson et al., 2011; Connelly et al., 1998).

PROJECT SETTING

The Wild Springs Solar Project, encompassing 1,498.6 acres, is contained within the following sections in Pennington County, South Dakota (Project Area) (Appendix A):

- Sections 5, 6, 7, 8, 9 T001N:R11E
- Section 1 T001N:R10E
- Section 31 T002N:R11E
- Section 36 T002N:R10E

Project Environment

The Project Area is located entirely within the Pierre Shale Plains Major Land Resource Unit (60A), encircling the Black Hills in western South Dakota (United States Department of Agriculture, 2006). The Project Area is composed primarily of pastureland, cropland, and disturbed grassland, with the majority of the land currently being used as cattle pasture. Boxelder Creek and its associated riparian corridor form part of the northern boundary of the Project Area, running west to east towards its confluence with the Cheyenne River 20 miles to the southeast. The topography is undulating, including the toe slope of an eroded plateau with several intermittent and ephemeral tributaries and eroded channels which slope towards Boxelder Creek. Several small hills, stock ponds, and roads are also present within the Project Area. Dominant grass species identified by Area M biologists during ground surveys included blue grama, poa spp., buffalo grass, western wheat grass, and crested wheat grass (Area M, 20191). Low-lying forbs, shrubs, and sub-shrubs are present in varying densities across the landscape, and include fringed sage (*Artemesia frigida*), broom snakeweed (*Gutierrezia sarothrae*), curlycup gumweed (*Grindelia squarrosa*) and white sagebrush (*Atremesia ludoviciana*) which are frequently co-dominant with grasses, in their respective stratum. Woodlands and shrublands are mostly absent from the Project, with the exception of the Boxelder Creek riparian corridor. Sparse cottonwoods (*Populus deltoides*) are scattered within the shallow swales and drainageways. The Project Area experienced an irregular boom year of sweet clover (*Melilotus officinalis*) in 2019, resulting in large patches of residual growth scattered across the landscape in 2020 (Van Riper & Larson, 2009; Bruns, 2020; Area M, 2019).

SURVEY METHODOLOGY

Lek surveys were conducted by Area M biologists following protocols published by the SDGFP and WGFD April 7-10, 2020 (SDGFP, 2017; WGFD, 2007). These surveys consisted of a hybrid of techniques including point observations on topographic rises, pedestrian surveys, and field investigation for sign (e.g. roost piles) on high-quality potential lek habitat (e.g. sparsely vegetated rises). These multiple survey methods were employed to increase the probability of detecting leks within the Project Area.

Survey Points

Survey points were established at locations with favorable viewsheds, such as on top of knolls or ridges, to cover the entire Project Area (Appendix A). Each survey point was accessed by either truck or on foot and surveyed at least once between 0.5 hours before sunrise and 1.5 hours after sunrise. Multiple days of survey were allotted due to the risk of losing a survey day because of inclement weather or the presence of predators. At each survey point, Area M biologists scanned the surrounding landscape for prairie grouse both with 8-10x binoculars and without optics for 3-5 minutes. The biologists also listened for the distinct booming or dancing of male grouse. All visual or auditory prairie grouse observations were recorded with GPS points and grouse were monitored to determine if they were exhibiting lekking behavior.

Potential Lek Investigation

Area M biologists also investigated potential lek locations, including slight topographic rises, knolls, or areas with sparse vegetative cover, within the Project Area. These areas were visited between 10AM and 5PM, to ensure booming/dancing birds were not disturbed. At each potential lek location, Area M biologists

searched for prairie grouse sign such as roost piles, feathers, or prints. If such areas were identified, they would be have been surveyed the following morning.

Pedestrian Surveys

Finally, Area M field technicians were trained on prairie grouse identification and sign to survey for prairie grouse and prairie grouse sign while conducting concurrent ground raptor nest surveys. All prairie grouse and prairie grouse sign were recorded with GPS points and later investigated by Area M biologists.

RESULTS

Overall, no prairie grouse leks were detected within the Project Area. Four individual roosting sharp-tailed grouse were detected while conducting the grouse surveys, but no diagnostic sign indicative of lekking was observed. One large group of sharp-tailed grouse was identified while surveying for raptors during the day but were not lekking. The results of each survey method are described in greater detail below.

Survey Points

Twenty-three total survey points (SP) were established and visited in the early morning at least twice April 10-14, 2020 (Table 1, Appendix A). A total of four individual sharp-tailed grouse were observed during these point surveys. No leks were detected.

Table 1. Survey point locations and prairie grouse survey results

Survey Point	Survey Date				Survey Point Coordinate	
	4/7/2020	4/8/2020	4/9/2020	4/10/2020	Lat	Long
SP 1	N	--	N	N	44.08184	-102.839
SP 2	N	--	N	N	44.08192	-102.846
SP 3	N	--	ST-V	N	44.08174	-102.85
SP 4	N	--	ST-V	N	44.08182	-102.858
SP 5	--	--	N	N	44.07778	-102.850
SP 6	--	--	N	N	44.07761	-102.851
SP 7	--	--	N	N	44.07792	-102.859
SP 8	N	N	--	--	44.06740	-102.829
SP 9	N	N	--	--	44.06917	-102.831
SP 10	N	N	--	--	44.07014	-102.836
SP 11	N	N	--	--	44.07130	-102.842
SP 12	N	N	--	--	44.07155	-102.845
SP 13	N	N	--	--	44.06736	-102.849
SP 14	N	N	--	--	44.06745	-102.824
SP 15	N		N	N	44.08665	-102.854
SP 16	N		N	N	44.08627	-102.846
SP 17	--	N	N	--	44.06034	-102.846
SP 18	--	ST-V	N	--	44.06194	-102.840
SP 19	--	N	N	--	44.06330	-102.834
SP 20	N	N	--	--	44.07183	-102.829
SP 21	--	--	N	N	44.06669	-102.809
SP 22	--	--	N	N	44.06176	-102.802
SP 23	--	--	ST-V	N	44.06503	-102.794

Grouse Detected: N =Negative; ST-V = Sharp-tailed grouse - visual; —=Not Surveyed

PG-1

A sharp-tailed grouse was flushed while navigating to SP 18. The grouse was roosting and not exhibiting lekking behavior. The individual flew approximately 200 feet to the south and landed in an area dominated by residual sweet clover. No other grouse were detected in that area.

PG-2

A sharp-tailed grouse flew into the Project Area at PG-2 while an Area M biologist scanned the landscape at SP 2. The grouse flew in from across a small rise to the west and did not move once it landed. No other grouse were detected in that area.

PG-4

A sharp-tailed grouse was flushed while navigating between SP 23 and SP 21. The individual was roosting, and not exhibiting lekking behavior. The grouse flew approximately 500 feet to the southeast and landed in a mesic area near a waterway. One other grouse (PG-5) was detected nearby.

PG-5

A sharp-tailed grouse was flushed while navigating between SP 22 and SP 23. The individual was roosting, and not exhibiting lekking behavior. The grouse flew approximately 600 feet to the north and landed in a cultivated hay field. One other grouse (PG-4) was detected nearby.

Potential Lek Investigation

Areas exhibiting high-quality lek characteristics were identified and investigated within the Project Area during morning lek surveys and concurrently during the raptor surveys. No roost piles, feathers, tracks, or other sign indicative of lekking activity were observed at any location.

Pedestrian Surveys

One group of 11 roosting sharp-tailed grouse was flushed from the northern portion of the Project Area (PG-3) while conducting raptor surveys (Appendix A). The group of grouse flew to the west over a ridge and out of view. This area was subsequently investigated several times in the morning to confirm the absence of a nearby lek. Grouse were not detected at this location or the nearby field again. No other grouse or grouse sign were identified during pedestrian surveys.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the survey, it is the professional opinion of Area M that prairie grouse leks do no occur within the Project Area. This conclusion is based on the low number of observed prairie grouse, the absence of observed grouse exhibiting lekking behavior, and the lack of concentrated sign. Lek surveys in both 2017 and 2020 resulted in negative prairie grouse lek detection, though the Project Area appears to provide a suitable landscape and habitat for sharp-tailed grouse leks. Should a potential lek be identified by employees or contractors of the Client within the Project Area in the future, Area M advises the Client to contact SDGFP.

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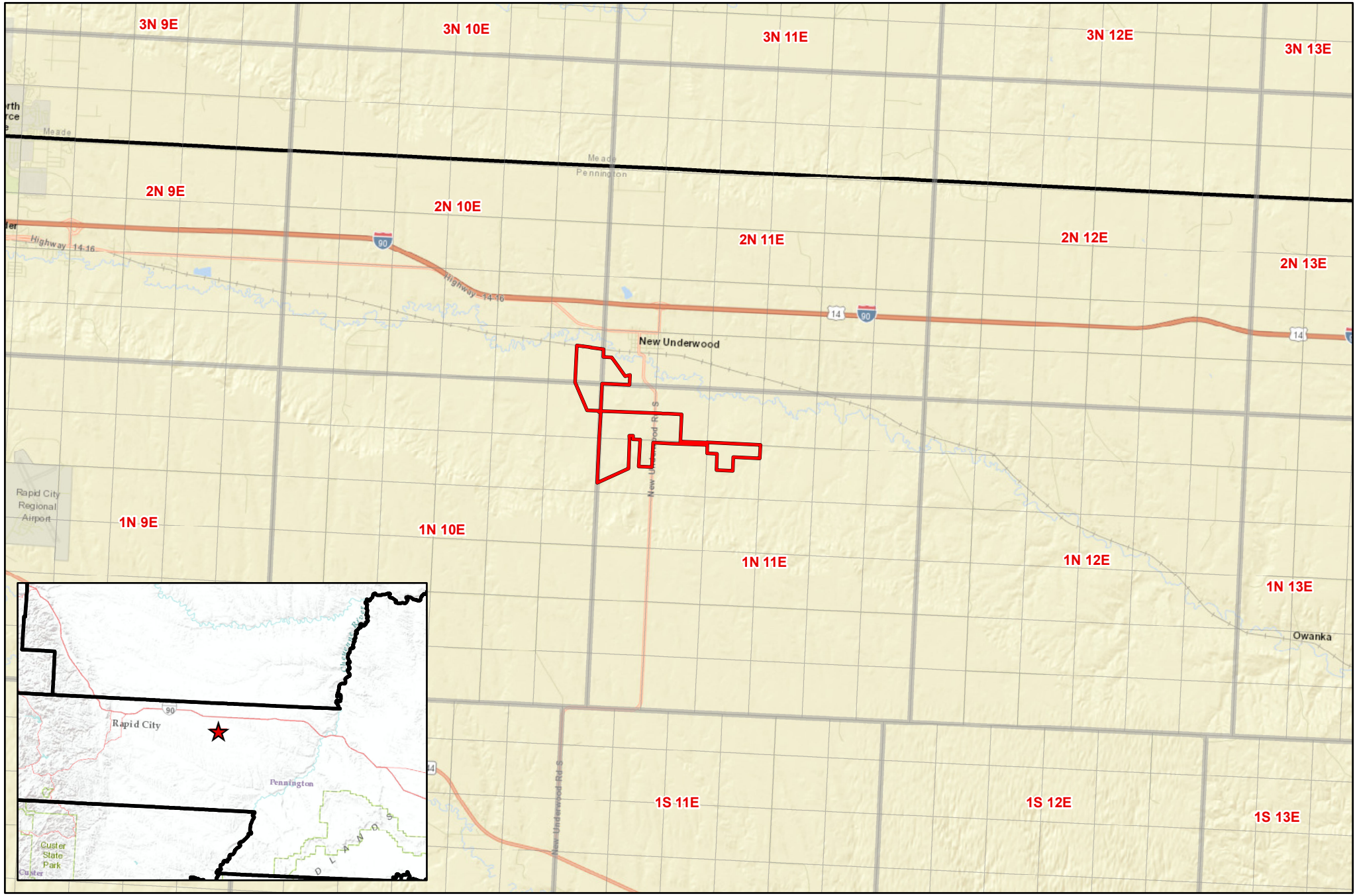


Project Location

Wild Springs Solar

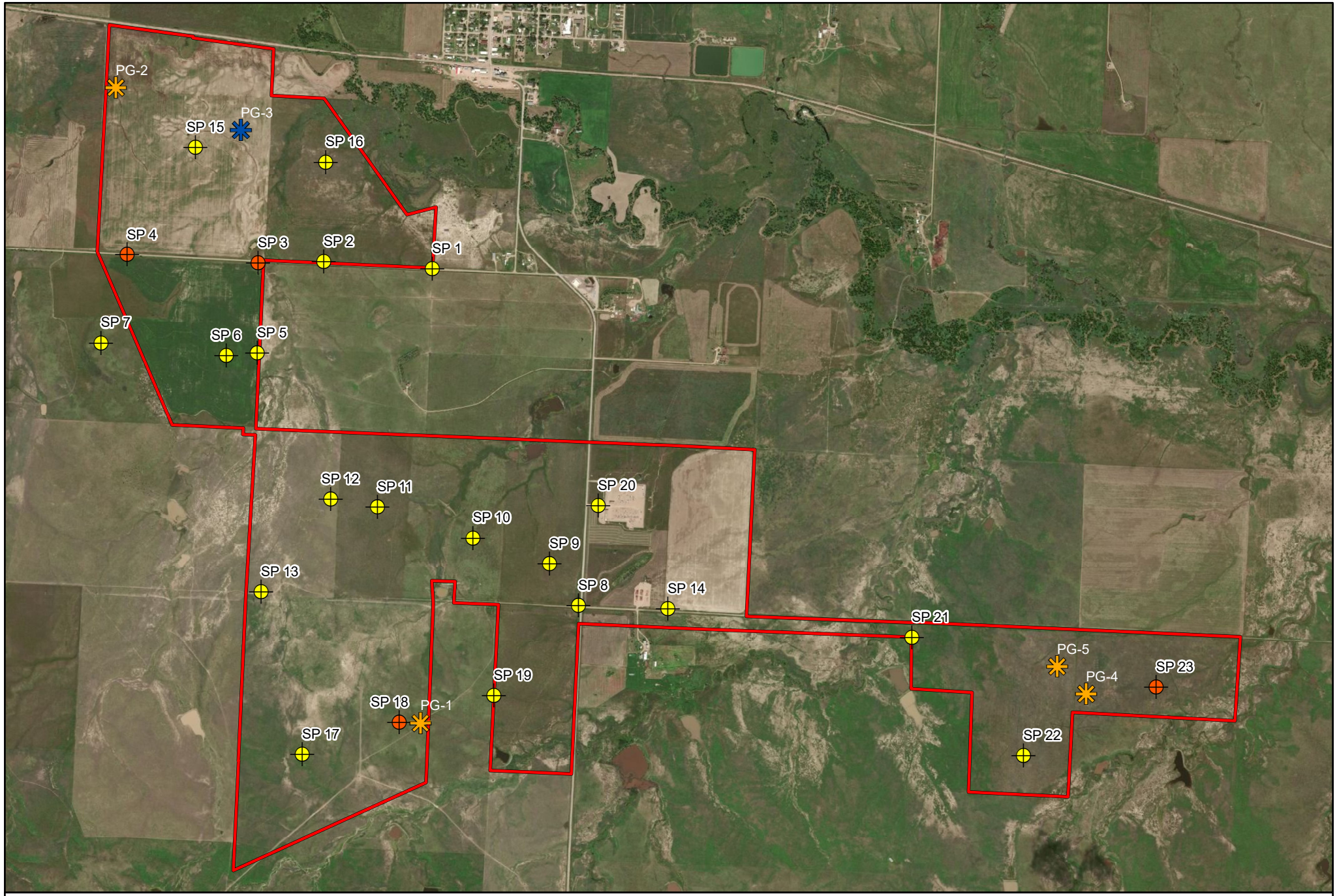
Pennington County, South Dakota

- Wild Springs Project Area
- Project Location
- Township Boundary
- Section Boundary
- County Boundary

0 6,250 12,500 25,000
1:150,000 Feet

N

AREA M



Prairie Grouse Survey Map - Aerial

Wild Springs Solar

Pennington County, South Dakota

Wild Springs Project Area

Observation Type

- Single (During Survey)
- Group (Incidental)

Prairie Grouse Survey Point

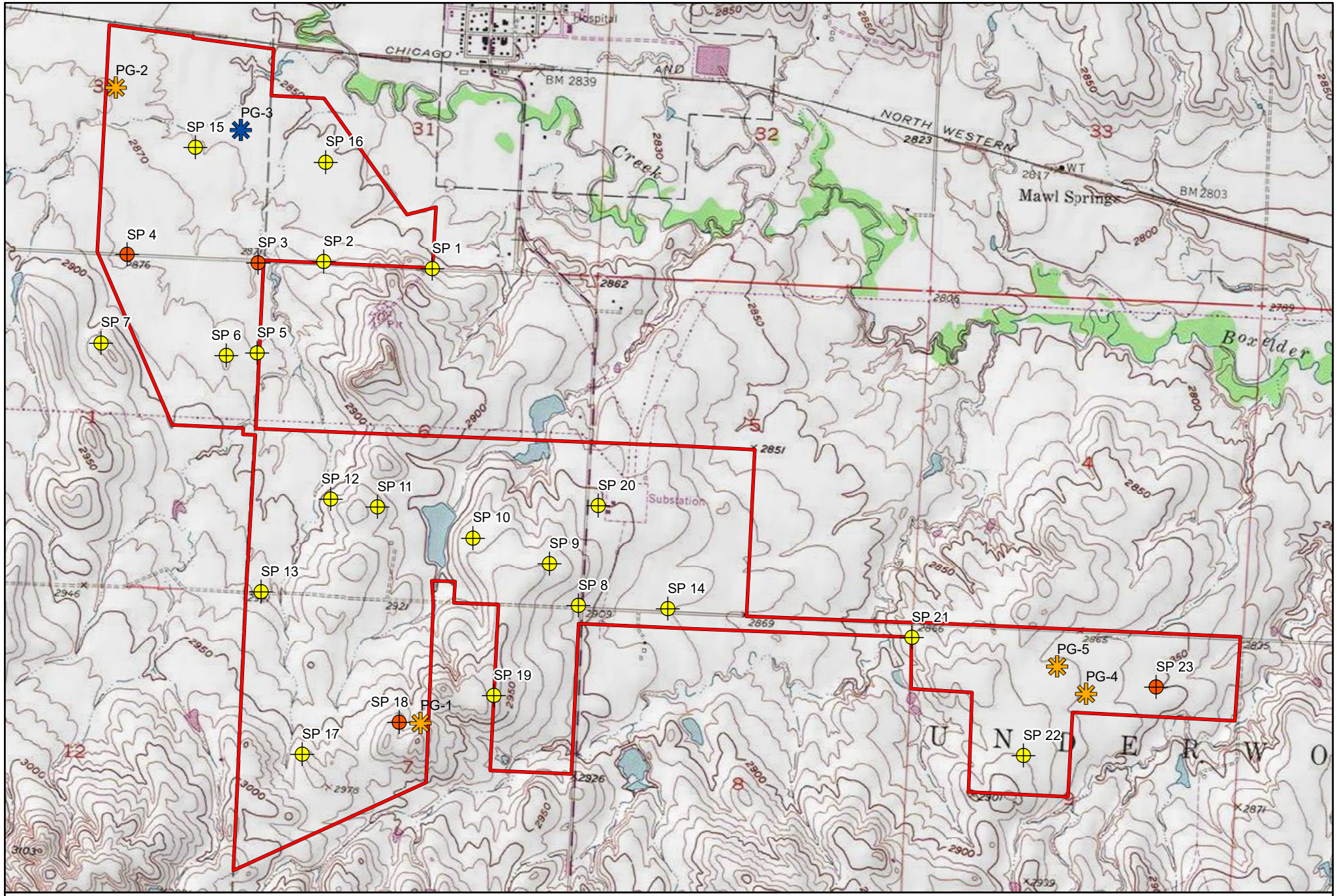
- Negative
- Positive

0 1,000 2,000 4,000 Feet

1:24,000

N

AREA M



Prairie Grouse Survey Map - Topographic (1:24,000)

Wild Springs Solar

Pennington County, South Dakota

Wild Springs Project Area

Observation Type

- Single (During Survey)
- Group (Incidental)

Prairie Grouse Survey Point

- Negative
- Positive

0 1,000 2,000 4,000 Feet

1:24,000

N

AREA M

Appendix B:

Field Photos

Representative grassland/pastureland within the Project Area

Representative cropland within the Project Area

Representative pastureland within the Project Area

Large monocultures of residual sweet clover within the Project Area

Raptor Nest Survey Report
Wild Springs Solar
Pennington County, South Dakota

Prepared for:

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TABLE OF CONTENTS

INTRODUCTION 1

PROJECT SETTING 1

METHODS 2

RESULTS 2

General Raptor Nesting Habitat 2
Raptor Nests 3
Raptor Inventory 4

DISCUSSION 5

REFERENCES 6

TABLES

Table 1. Raptor nests and characteristics within the Study Area. 3

APPENDICES

Appendix A: Maps

Appendix B: Field Photographs

INTRODUCTION

Area M Consulting (Area M), on behalf of Wild Springs Solar, LLC (Client), a fully-owned subsidiary of Geronimo Energy, LLC, a National Grid Company, conducted a raptor nest survey for the Wild Springs Solar Project (Wild Springs or the Project), a proposed utility-scale solar facility, located within Pennington County, South Dakota. The purpose of this study is to locate raptor nests within 1-mile of the Project, determine nest activity status, and inventory raptor species present within the Project vicinity during the breeding season. This survey was conducted to assist the client with internal planning, inform design, and identify areas where specific measures may need to be implemented during construction.

PROJECT SETTING

The Wild Springs Project site, encompassing 1,498.6 acres, is located approximately one mile south of New Underwood, South Dakota within Pennington County (Appendix A). The Study Area includes a one-mile buffer around the Project site, encompassing 10,844 acres. The Study Area is contained within the following sections:

- Sections 3, 4, 5, 6, 7, 8, 9, 10, 15,16, 17, 18, T001N:R11E
- Sections 1, 2, 11, 12, 13 T001N:R10E
- Sections 30, 31, 32 T002N:R11E
- Sections 25, 26, 35, 36 T002N:R10E

Project Environment

The Study Area is located entirely within the Pierre Shale Plains Major Land Resource Unit (60A), encircling the Black Hills in western South Dakota (United States Department of Agriculture, 2006). The Study Area is composed primarily of pastureland, cropland, and disturbed grassland, with the majority of the land currently being used as cattle pasture. Boxelder Creek and its associated riparian corridor bisect the northern portion of the Study Area, running west to east towards its confluence with the Cheyenne River 20 miles to the southeast. The topography is undulating, containing an eroded plateau with several intermittent and ephemeral tributaries with eroded channels which slope towards Boxelder Creek. Several small hills, stock ponds, homesteads, a stretch of I-90, and the town of New Underwood are also present within the Study Area.

Background

Twenty-five species of hawks, eagles, falcons, and owls (herein, "raptors") are seasonal residents of South Dakota, all of which are protected under the federal Migratory Bird Treaty Act (MBTA) and/or the Bald and Golden Eagle Protection Act (BGEPA). Of these, 16 species have the potential to nest within the Study Area, with ranges overlapping Pennington County during the breeding season (Sibley, 2000). Raptors in general use a variety of nesting substrates, dependent on species ecology and regional landscape, ranging from trees, to buildings, to cliffs, and to bare ground. The Study Area includes potential nesting habitat for multiple species, though suitable substrate for tree-nesting species, including bald eagles (*Haliaeetus leucocephalus)*, ospreys (*Pandion haliatus*), and red-tailed hawks (*Buteo jamaicensis*), is mostly limited to the Boxelder Creek riparian corridor.

METHODS

Area M biologists conducted ground surveys to locate raptor nests, monitor nest activity, and document resident raptor species within the Study Area. Surveys were conducted April 7-10, before leaf-out and during the nesting window for most breeding raptor species, to maximize the number of nests detected. Nesting substrate within the Project boundaries was investigated via pedestrian survey, but the 1-mile buffer was surveyed along public roads by truck due to limited access. All suitable nesting substrate, including riparian corridors, shelterbelts, solitary trees, eroded banks, and rocky pinnacles were scanned by binoculars or spotting scopes to detect large stick nests and raptors. For each nest detected, characteristics including substrate, condition, occupant species, and relative size were recorded. Activity status for each nest was defined using the following classes:

- Active – Visited: A nest with a raptor perched or flying nearby
- Active – Tended: A nest which shows recent (this year) maintenance, such as new sticks
- Active – Incubating: A nest with a raptor incubating eggs
- Active – Chicks: A nest with a raptor feeding or brooding chicks
- Active – Productive: A nest which has observed evidence of fledged chicks
- Inactive: A nest which does not have nearby raptor activity
- Inactive – Failed: A nest which was active earlier in the season but was abandoned or did not produce fledglings

All data were collected using handheld Trimble XT Global Positioning System (GPS) with sub-meter accuracy recorded directly or off-set via compass bearing and distance, depending on land access and raptor activity status. Active raptor nests were not approached on foot to avoid causing stress or possible nest abandonment. Nests that were determined to be inactive were approached to records an accurate GPS coordinate and were searched for signs of recent activity (e.g. fresh mute, regurgitated pellets, eggshell fragments, prey remains). Surveys were conducted between 0700 and 1800 hours. Particular attention was given to stick nests due to the timing of the survey and scope of the Project. A comprehensive pedestrian sweep to detect ground nests across the entire Study Area was not performed.

RESULTS

General Raptor Nesting Habitat

Nesting substrate for tree-nesting raptor species is limited to the Boxelder Creek riparian corridor, sparse or solitary cottonwood (*Populus deltoides*) stands, and residential ornamental trees and shelterbelts associated with farmsteads and New Underwood. Steep cliffs suitable for peregrine falcons (*Falco perigrinus*) are absent from landscape, but eroded banks and rock faces may provide adequate nesting habitat for prairie falcons (*Falco mexicanus*) and American kestrels (*Falco sparverius*). Habitat for ground nesting raptors, including northern harriers (*Circus hudsoniu*) and short-eared owls (*Asio flammeus*), is plentiful across the landscape. A large black-tailed prairie dog (*Cynomys ludovicianus*) colony, located in

the southwestern portion of the Project site, provides suitable nesting habitat for burrowing owls (*Athene cunicularia*) (Kotlier, 1999).

Raptor Nests

In total, nine raptor nests were detected within the Study Area, including five active and four inactive nests (Table 1). Active nests include 2 great horned owl (*Bubo virginianus*) nests and 3 red-tailed hawk nests. Note that all 9 nests located within the Study Area are located outside of the area leased for the Project (Appendix A).

Table 1. Raptor nests and characteristics within the Study Area.

Nest ID	Status	Occupant Species	Nest Condition	Lat	Long
RN-1	Inactive	NA	Fair	44.084771	-102.816926
RN-2	Active - Incubating	Great Horned Owl	Good	44.064710	-102.816540
RN-3	Active - Chicks	Great Horned Owl	Good	44.091994	-102.867967
RN-4	Active - Visited	Red-tailed Hawk	Good	44.092378	-102.872835
RN-5	Active - Visited	Red-tailed Hawk	Fair	44.088552	-102.844457
RN-6	Active - Incubating	Red-tailed Hawk	Good	44.090992	-102.846792
RN-7	Inactive	NA	Poor	44.091698	-102.847890
RN-8	Inactive	NA	Fair	44.091547	-102.845570
RN-9	Inactive	NA	Fair	44.089465	-102.840348

RN-1

This medium stick nest of fair condition was located in the Boxelder Creek drainage, in a medium-sized cottonwood. The nest was identified by spotting scope, and no raptor activity was observed. Based on the nest size, stick composition, and substrate, this nest was likely constructed by a medium-sized buteo (red-tailed hawk or Swainson's hawk). This nest could be used in its current condition by owl species or with moderate maintenance by buteo species.

RN-2

This medium stick nest of good condition was located in a large cottonwood within a tributary of Boxelder Creek. The nest was identified previously by Area M biologist during alternative environmental survey in 2019 (Area M, 2019). The nest was active at the time of this survey, containing an incubating great horned owl (Appendix B). This nest was likely constructed by a red-tailed hawk, based on the size, stick composition, and substrate.

RN-3

This medium stick nest of good condition was located in a large cottonwood along the perimeter of an impoundment. The nest was active at the time of this survey, with a great horned owl brooding at least two chicks (Appendix B). This nest was likely constructed by a red-tailed hawk, based on the size, stick composition, and substrate.

RN-4

This medium stick nest of good condition was located in a large cottonwood within Boxelder Creek. The nest was active at the time of this survey, with a red-tailed hawk visiting the nest branch (Appendix B). This nest was likely constructed by a red-tailed hawk, based on the size, stick composition, and substrate. This nest could be used in its current condition by owl or buteo species.

RN-5

This medium stick nest of fair condition was located in a medium-sized cottonwood within Boxelder Creek. The nest was active at the time of this survey, with a red-tailed hawk visiting the cottonwood (Appendix B). This nest was likely constructed by a red-tailed hawk, based on the size, stick composition, and substrate. This nest could be used in its current condition by owl species or with some maintenance by buteo species.

RN-6

This medium stick nest of good condition was located in a large cottonwood within Boxelder Creek. The nest was active at the time of survey, with a red-tailed hawk in incubating position (Appendix B).

RN-7

This medium stick nest of poor condition was located in the Boxelder Creek drainage, in a small cottonwood. The nest was identified by spotting scope, and no raptor activity was observed. Based on the nest size, stick composition, and substrate, this nest was likely constructed by a medium-sized buteo (red-tailed hawk or Swainson's hawk). This nest could be used in its current condition by owl species or with substantial maintenance by buteo species.

RN-8

This medium stick nest of fair condition was located in the Boxelder Creek drainage, in a medium-sized cottonwood. The nest was identified by spotting scope, and no raptor activity was observed. Based on the nest size, stick composition, and substrate, this nest was likely constructed by a medium-sized buteo (red-tailed hawk or Swainson's hawk). This nest could be used in its current condition by owl species or with some maintenance by buteo species.

RN-9

This medium stick nest of fair condition was located in the Boxelder Creek drainage, in a medium-sized cottonwood. The nest was identified by spotting scope, and no raptor activity was observed. Based on the nest size, stick composition, and substrate, this nest was likely constructed by a medium-sized buteo (red-tailed hawk or Swainson's hawk). This nest could be used in its current condition by owl species or with some maintenance by buteo species.

Raptor Inventory

During the raptor survey, five species of raptors were observed within the Study Area. Across three years of surveys within the Study Area by Area M biologists, a cumulative total of 10 raptor species have been identified, including: American kestrels, bald eagles (*Halieeatus leucocephalus*), burrowing owls, great horned howls, northern harriers, prairie falcons, red-tailed hawks, rough-legged hawks (*Buteo lagopus*),

short-eared owls, and Swainson's hawks (Area M, 2017a-c and Area M, 2019) The most encountered species, across all surveys, have been red-tailed hawks, northern harriers (seasonally), and great horned owls.

DISCUSSION

Overall, stick nests were exclusively found within the Boxelder Creek riparian corridor and secondary tributaries. The tight cluster of nests with similar characteristics found southwest of New Underwood (RN-5-9), suggests they may have been built by a single pair of red-tailed hawks. This species frequently builds multiple nests across years, and either refurbishes or builds a nest each nesting season (Preston & Bean, 2020). RN-6 was confirmed as an active nest with an incubating red-tailed hawk, but it was not confirmed whether RN-5 was visited by its mate or if the nest will be used as nesting site by an additional nesting pair. Nests that were both active and inactive at the time of the survey may also become active later in the breeding season; red-tailed hawks may attempt to re-nest if their clutch fails or the nest is destroyed and Swainson's hawks, summer residents of Pennington County, have a later nesting phenology than other stick-nesting species (Bechard & Houston, 2020). Swainson's hawks may even use a productive owl or buteo nest from earlier in the same year.

Bald eagles have been identified within the Project boundaries during previous surveys, and golden eagles are known to occur within the region. However, conspicuous eagle nests were not detected within the Study Area. Trees large and strong enough to support eagle nests are limited to the Boxelder Creek riparian area and are scarce even within the drainage. Both eagle species require larger nests than those found within the Study Area. Furthermore, the South Dakota Natural Heritage Database has no record of eagle nests within the Study Area (Area M, 2019)

Ground-nesting species including burrowing owls and northern harriers have a slightly later nesting season than most stick-nesting species within the Project vicinity. During the April raptor nest survey, burrowing owls were not detected and had likely not reached their breeding grounds. Only a single northern harrier (male) was detected within the Study Area, indicating this species was just beginning to migrate through the region. Although Area M biologists were vigilant when surveying for nests, this raptor nest survey was focused on locating stick nests which have the potential of being reused in future years. A comprehensive survey was not conducted to locate all ground nests.

This raptor nest survey reflects conditions within the Study Area during April 7-10, 2020. Activity status, occupant species, and nest condition are all dynamic characteristics that can change over the course of a season. Additionally, new nests, particularly built by raptor species with later nesting phenology, may be constructed and used in 2020.

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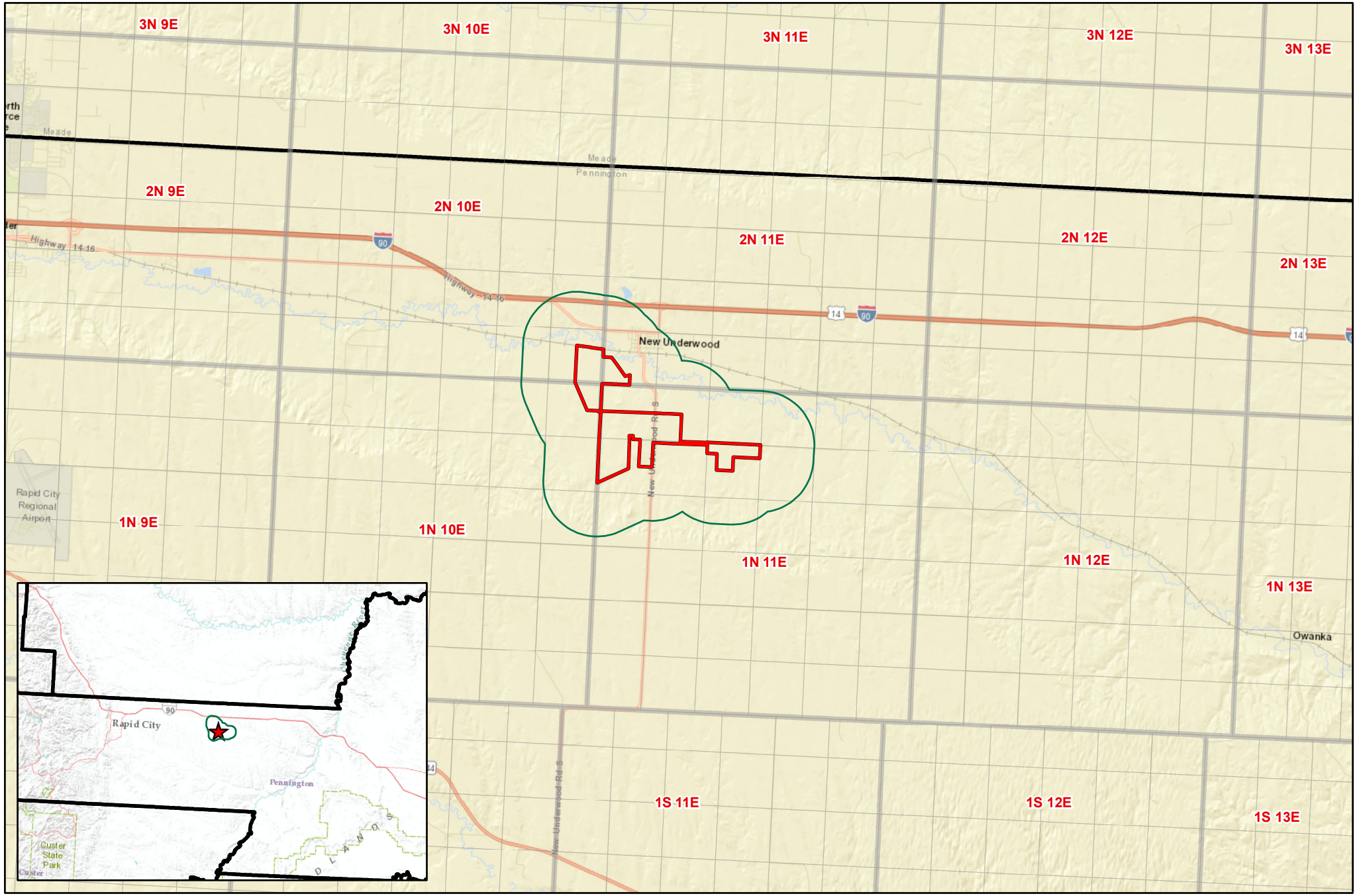
Appendix A:

Maps



Project Location

Wild Springs Solar

Pennington County, South Dakota

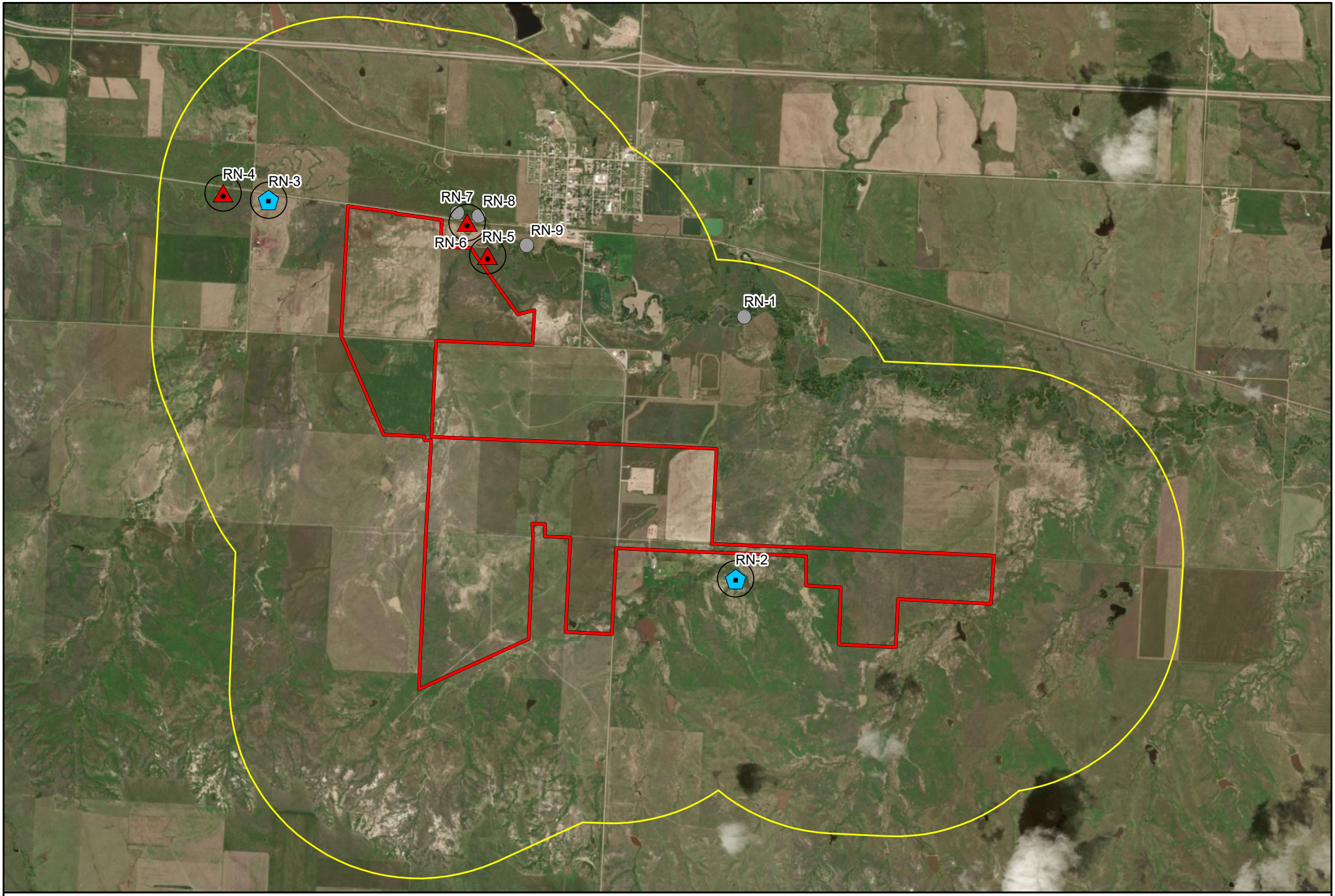
- Wild Springs Project Site
- 1-Mile Buffer (Study Area)
- Project Location
- Township Boundary
- Section Boundary
- County Boundary

0 6,250 12,500 25,000 Feet

1:150,000

N

AREA M



Raptor Nest Map

Wild Springs Solar

Pennington County, South Dakota

Wild Springs Project Site

1-Mile Buffer (Study Area)

0 1,250 2,500 5,000 Feet

1:42,000

Occupant Species*

GHOW RTHA Unknown

*During April 2020 surveys

Nest Status

Occupied

N

AREA M

Appendix B:

Field Photos

Representative grassland/pastureland within the Survey Area

Representative cropland within the Survey Area

Representative broken riparian wetlands within the Survey Area

Boxelder Creek and riparian corridor, running west to east through the northern portion of the Survey Area

RN-2, with incubating great horned owl, viewed to the south

RN-3, with incubating great horned owl, viewed to the southeast

RN-4, visited by a red-tailed hawk, viewed to the northwest

RN-5, with occupant red-tailed hawk, viewed to the northeast

RN-6, visited by a red-tailed hawk, viewed to the north