Lookout Solar Park I

Draft Environmental Assessment

Custer and Oglala Lakota Counties, South Dakota

Western Area
Power Administration

DOE/EA-2075

November 2019

Table of Contents

List of Tables

List of Figures

List of Appendices

Appendix A: Public Involvement Information
Appendix B: Aquatic Resource Inventory Report
Appendix C: Biological Resources Inventory Report

List of Acronyms

BIA	Bureau of Indian Affairs
BOR	United States Bureau of Reclamation
DOE	United States Department of Energy
EA	Environmental Assessment
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
GHG	greenhouse gas
HDD	Horizontal Directional Drilling
kV	Kilovolt
Lookout Solar	Lookout Solar Park I, LLC
MW	megawatts
NEPA	National Environmental Policy Act
NPS	National Park Service
NRCS	Natural Resources Conversation Service
NWP	Nationwide Permit
O&M	operations and maintenance
PRIR	Pine Ridge Indian Reservation
Project	Lookout Solar Project
PV	photovoltaic
Reservation	Pine Ridge Indian Reservation
ROW	right-of-way
SBHWS	Southern Black Hills Water System
SDGFP	South Dakota Game, Fish, and Parks
SHPO	State Historic Preservation Officer
SPP	Southwest Power Pool
T&E	threatened and endangered
THPO	Tribal Historic Preservation Office
Tribe	Oglala Sioux Tribe
Trihydro	Trihydro Corporation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WAPA	Western Area Power Administration

1. INTRODUCTION AND BACKGROUND

Lookout Solar Park I, LLC (Lookout Solar) proposes to construct and operate the Lookout Solar Project (Project) on 810-acres located on the Pine Ridge Indian Reservation (PRIR or Reservation; Figure 1-1). Because the Project would be partially located on the PRIR, the Bureau of Indian Affairs (BIA), as required by their tribal trust responsibilities, reviewed the project to ensure that it complied with the National Environmental Policy Act (NEPA), supported tribal sovereignty and self-determination, and met the BIA's mission. BIA prepared an Environmental Assessment (EA) in 2016 to analyze the parts of the Project within the PRIR. On June 7, 2016, the BIA determined the Project met the requirements listed above and issued a Finding of No Significant Impact (FONSI).

Since 2016, Lookout Solar submitted an interconnection request to Western Area Power Administration (WAPA) to connect the Project to WAPA's transmission system. WAPA's decision to grant or deny the interconnection request is considered a federal action under NEPA. Therefore, WAPA prepared this EA to analyze the impacts of the interconnection, as well as portions of the Project located outside of the PRIR boundary, which were not analyzed in the BIA EA.

1.1 WAPA's Authority

WAPA's action is to consider and respond to Lookout Solar's interconnection request in accordance with the Southwest Power Pool (SPP) Tariff (WAPA is a member of SPP) and the Federal Power Act.

1.2 Lookout Solar's Purpose and Need

The overall purpose of Lookout Solar's Project is to generate and distribute solar photovoltaic (PV) energy, provide public education on the benefits of solar energy, encourage future renewable-energy interest and investments, and reduce greenhouse gas (GHG) emissions.

1.3 Public Involvement

There have been several opportunities for public involvement. In 2016, the BIA requested public comments from 32 local, state, and federal agencies; seven comments were received in response. The BIA provided public notice of the EA and FONSI, also in 2016.

Additionally, WAPA conducted public scoping between December 5, 2018 and February 16, 2019. WAPA requested public comments via a letter mailed to 52 local, state, and federal agencies and 19 private landowners in the vicinity of the Project; seven comments were received in response. Table 1-1 provides a brief summary of comments received; full comment letters and other public involvement information can be found in Appendix A. In addition, two open-house style public scoping meetings were held, including a meeting on December 5, 2018 and a second meeting on January 16, 2019. Both public meetings were held at the Hot Springs Public Library, in Hot Springs, SD. The second public scoping meeting was scheduled as a result of a mandatory government furlough that prohibited key WAPA personnel from attending the December 5th meeting. Approximately thirty members of the public attended the January 16, 2019 meeting. Newspapers announcements were published 15 days

prior to the January 16, 2019 meeting including publications in the Rapid City Journal, Hot Springs Star, the Custer County Chronicle, and the Lakota Country Times.

Table 1-1. Public Scoping Comments

Party Contacted	Comment Summary
Private Citizen	Concern regarding project difficulties based on perceived problems with the way previously proposed projects in area were handled (*i.e.*, wind farm).
South Dakota Department of Environment and Natural Resources (DENR)	Construction using conventional construction techniques should not cause violation of statutes or regulations administered by the DENR based on: 1. Controls for discharge of pollutants, 2. Surface water discharge permit(s) if any construction dewatering is to occur, and minimization of impacts to tributaries and wetlands.
U.S. Department of Agriculture Farm Service Agency	Requested additional detail of the Project in order to determine if any Farm Service producers may be affected. Follow up letter indicated no effect to producers.
South Dakota Game, Fish, and Parks	Concern for potential direct and indirect impacts to wildlife including grassland habitat and rare and protected species. Recommended avoidance and mitigation measures for avian species, bats and other mammals, sensitive plants, and grassland habitat.
Sierra Club	Expressed general support for the Project and recommended transparency and engagement with tribal nations.
U.S. Fish and Wildlife Service (USFWS)	Referred WAPA to obtain listed species information from the USFWS Information for Planning Consultation (IPaC) website.

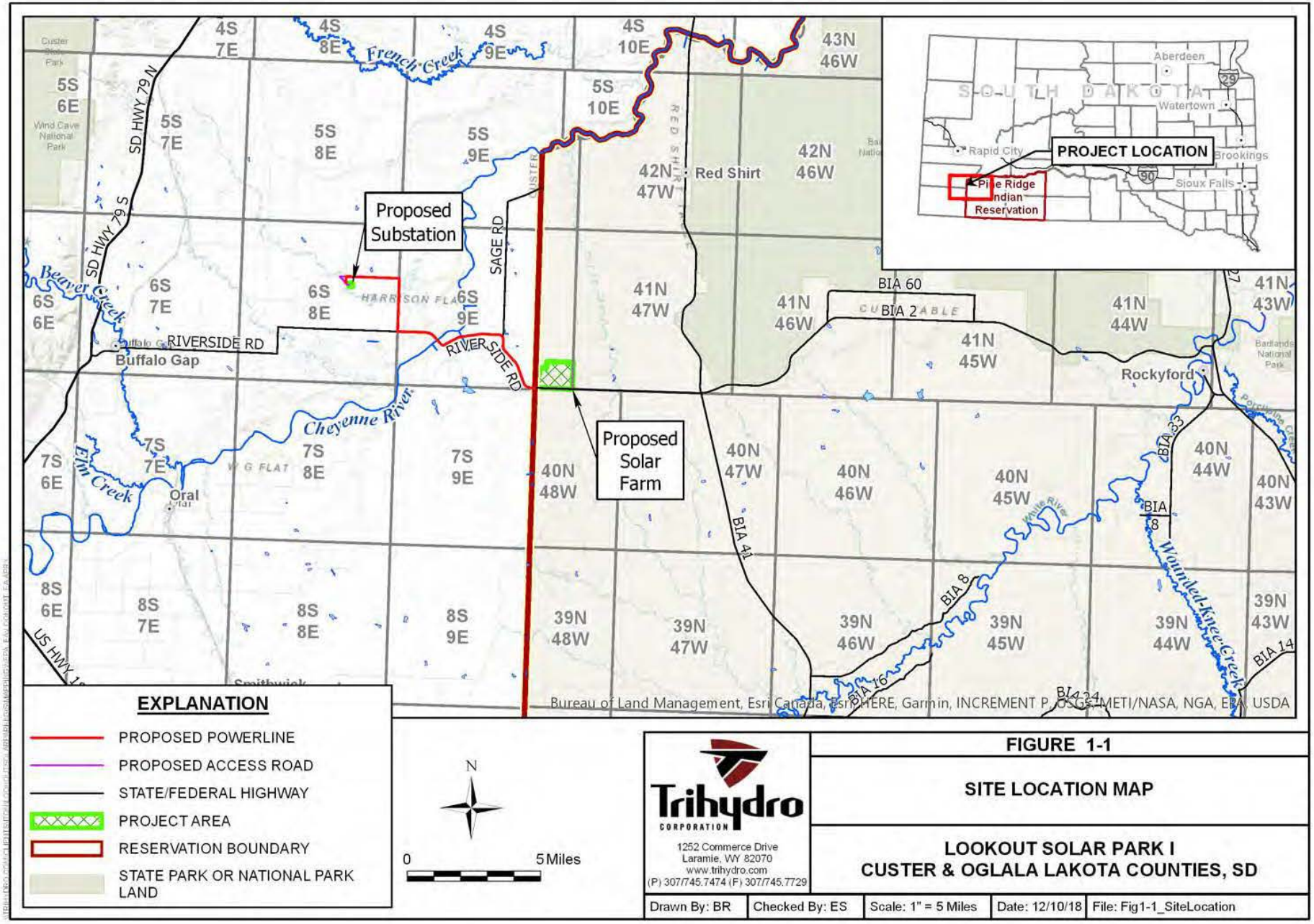
1.4 Tribal Consultation

The BIA and the Oglala Sioux Tribal Historic Preservation Office (THPO) consulted on the portions of the Project within the PRIR boundary, per Section 106 of the National Historic Preservation Act. The BIA and Oglala Sioux Tribal Archeologist completed field surveys in 2015 and found no historic properties. THPO concurrence was received on the survey results and determinations in 2015.

In 2016, the Oglala Sioux Tribal Council issued a resolution (Resolution No. 16-50) in support of the Project.

WAPA began consultation with the Oglala Lakota Nation by contacting their THPO, Mr. Tom Brings, by email on January 16, 2019. WAPA requested his comments on the project and provided him cultural resource documentation to review. Mr. Brings responded to WAPA's January email on May 2, 2019, indicating that if any culturally significant tribal sites were discovered that they would have to be inventoried by a tribal representative.

On April 8, 2019, WAPA provided Mr. Brings a copy of the final cultural resource inventory report for his review and comment. No culturally significant tribal sites were identified in the report and Mr. Brings did not comment on the document.


Proposed Substation
Proposed Solar Farm
PROJECT LOCATION
Pine Ridge Indian Reservation
Aberdeen
Watertown
Rapid City
Brookings
Sioux Falls
SOUTH DAKOTA
French Creek
Beaver Creek
Cheyenne River
Elm Creek
White River
Wounded Knee Creek
Red Shirt
Buffalo Gap
Rockyford
Oral
Smithwick
RIVERSIDE RD
SAGE RD
SD HWY 79 N
SD HWY 79 S
US HWY 18
BIA 60
BIA 2
BIA 33
BIA 8
BIA 41
BIA 16
BIA 24
BIA 14
Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, NGA, EPA, USDA
EXPLANATION
PROPOSED POWERLINE
PROPOSED ACCESS ROAD
STATE/FEDERAL HIGHWAY
PROJECT AREA
RESERVATION BOUNDARY
STATE PARK OR NATIONAL PARK LAND
N
0
5 Miles
Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729
FIGURE 1-1
SITE LOCATION MAP
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: ES
Scale: 1" = 5 Miles
Date: 12/10/18
File: Fig1-1_SiteLocation

2. PROPOSED ACTION AND ALTERNATIVES CONSIDERED

This chapter describes the action WAPA and Lookout Solar propose to take (the Proposed Action), as well as practical alternatives to the action.

2.1 No Action Alternative

Under the No Action Alternative, WAPA would deny Lookout Solar's interconnection request. Although the Project could pursue an interconnection with a private utility, for comparison purposes, this alternative assumes the Project would not be built. Current conditions would likely continue, including livestock grazing, which is the primary land use in the Project Area (described in Section 2.3).

2.2 Alternatives Considered but Eliminated from Further Study

During internal scoping, many alternatives were discussed and considered, including four different project locations and/or project sizes within the PRIR and two substation locations. These were eliminated from further study due to potential issues with geology, migratory birds, viewsheds, and/or access.

2.3 Proposed Action

Lookout Solar would construct, operate, and maintain the 110 megawatt (MW) Lookout Solar generating facility, which would include the following components:

- Approximately 500,000 (covering 250 acres) solar panels,
- 4 miles of new access roads,
- A new 6 acre substation,
- A 0.5 acre Operations and Maintenance (O&M) facility,
- A 0.5 acre parking area,
- 11 miles of buried transmission line,
- A potential 0.1 acre energy storage facility, and
- Roughly 20 acres of laydown area for construction.

The exact layout of the solar panels, storage facility, access roads, O&M facility, parking area, and laydown areas has not been finalized, but the entire facility would be located within an 892-acre area in Oglala Lakota and Custer Counties, South Dakota (Project Area; Figures 2-1 and 2-2). The 892-acre Project Area includes an 810-acre parcel of land where the generating facilities would be located, a 10-acre parcel of land where the substation would be located, and a 72-acre Right-of-Way (ROW) where the transmission line would be buried. The anticipated surface disturbance is shown in Table 2-1.

WAPA would enter into an Interconnection Agreement with SPP and Lookout Solar, which would allow the Project to interconnect to WAPA's existing New Underwood to Wayside 230 kV transmission line. Additionally, WAPA would make any necessary design or equipment changes to WAPA-owned facilities, as specified in the Interconnection Agreement, to accommodate the interconnection.

Table 2-1. Anticipated Surface Disturbance

Component	Assumptions	Acres
PV Modules/Panels/Array[1,2]	2-3 acres per 1 MW[3]	250
O&M facility and Parking Area	0.5 acres for the warehouse, equipment storage, O&M facility, and 0.5 parking area	1
Access Roads	4 miles of 12.5-foot wide roads	2
Substation	500-foot by 500-foot substation area within a 10-acre parcel	6
Transmission Line Route	11 mile long transmission line (11 feet wide) consisting of eighteen bundled 34.5 kilovolt (kV) transmission cables	15
Temporary Laydown Area	20 acres	20
TOTAL		294

[1] Modules are also referred to as panels. Multiple modules or panels make up an array.
[2] Battery storage is included with this project component.
[3] Average area requirements are dependent on the solar irradiation factor and can vary (Tisza 2014).

2.3.1 Solar Arrays

The bottom edge of the PV panels would be 3-4 feet from the soil surface. The total height of the panels would range from 12-13 feet, depending on the terrain. The panels would be situated at site-specific angles and mounted facing due south for maximum sunlight absorption; alternatively, solar trackers may be used to allow the panels to rotate to follow the sunlight throughout the course of the day. Once the PV panels are installed, underground electrical wiring between each PV array would be connected. The entire 250-acre array would be fenced for security.

In the solar array locations, the area would be cleared, grubbed, and partially graded. Prior to grading, native topsoil would be removed from the area and stockpiled onsite for re-distribution over the disturbed area after the grading is completed.

Typical equipment needed for construction activities at the Project would include a compactor, impact/vibratory pilings or drill shafts, dump truck, dozer, excavator, generator, grader, pick-up trucks, and a crane.

2.3.2 Access Roads

Approximately 4 miles of 12.5-foot-wide gravel access roads around the perimeter of the facility and between the solar blocks would be installed during the construction phase. Some of these access roads would then be used during O&M activities after construction and would be maintained during the life of the project.

2.3.3 Construction Timing

Construction of the Project would take approximately 12 to 18 months, depending on the time of the year when construction starts. The construction workforce could range between 50 workers up to 200 workers.

2.3.4 Operation

Operating and maintaining the Project would include routine activities such as verifying connections through electrical tests and inspections, groundskeeping, and implementing repairs. If a solar panel is damaged or faulty as identified through electric tests, then the solar panel will be replaced. Operational activities would require no more than three full-time employees. The Project would operate for approximately 30 to 40 years.

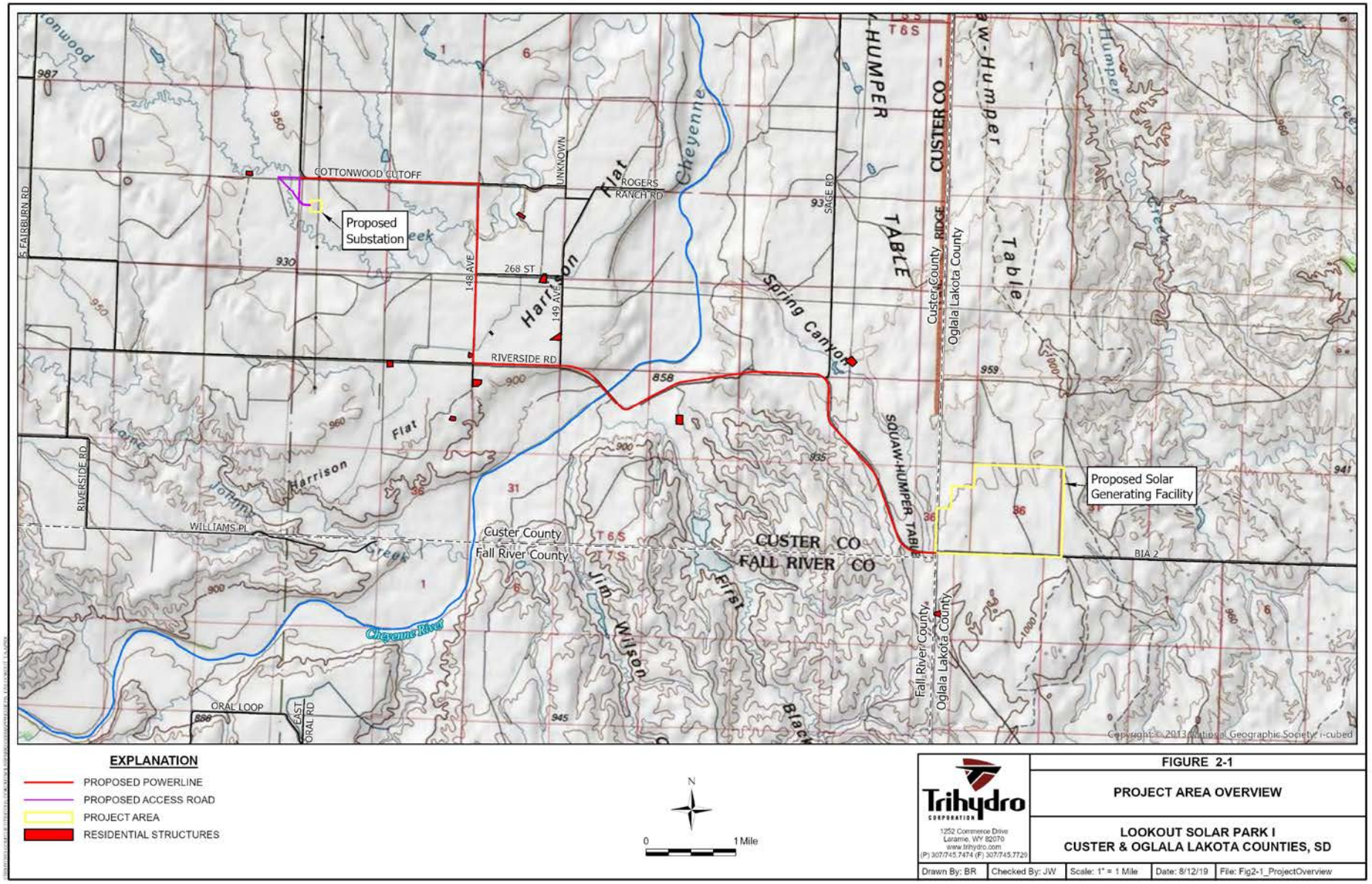
Vegetation on the Project would be actively maintained (mowed, trimmed, or removed) to control growth and prevent overshadowing or shading of the solar PV arrays. Periodically, the solar modules would need to be washed. Washing would occur, at most, once per year. The necessary water would be obtained from the Mni Wiconi Water District or would be transported to the solar park by trucks.

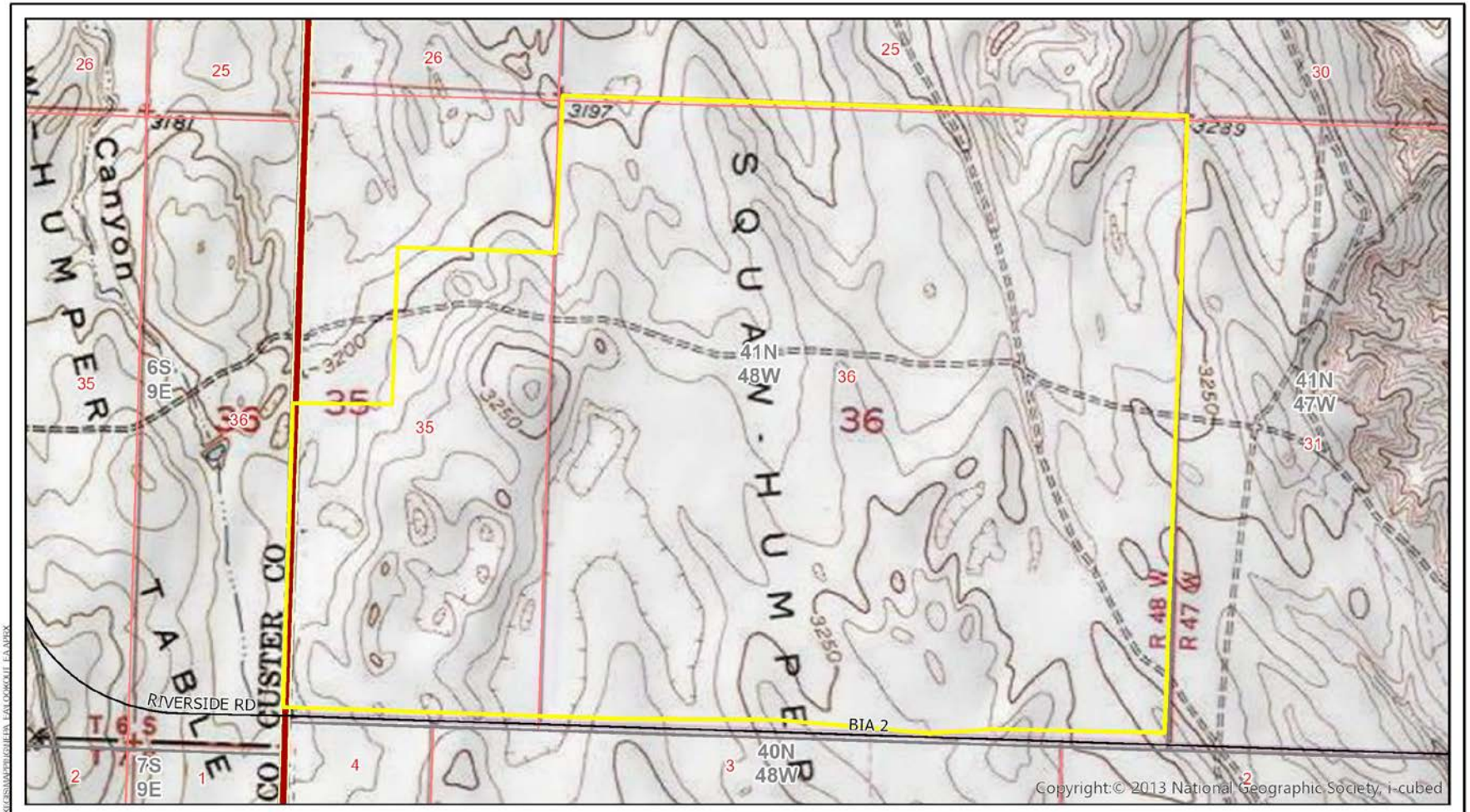
2.3.5 Decommissioning and Reclamation

At the end of the Project lifespan (30-40 years), Lookout Solar would assess whether to cease operations or attempt to enter into a new power purchase contract. If a new power purchase agreement is reached, the Project could continue operating. If no arrangement is possible, the facilities would be decommissioned and dismantled. In general, the majority of decommissioned equipment and materials would be recycled. Materials that cannot be recycled would be disposed of at approved/permitted facilities.

General decommissioning activities would typically include:

- Dismantling and removing above ground equipment (e.g., solar panels, the substation, the O&M facility, etc.)
- Breaking up and removing concrete pads and foundations.
- Removing panel support posts.
- Abandoning the transmission line and underground utilities.


Proposed Substation
Proposed Solar Generating Facility
COTTONWOOD CUTOFF
ROGERS RANCH RD
268 ST
RIVERSIDE RD
WILLIAMS PL
ORAL LOOP
EAST ORAL RD
148 AVE
149 AVE
SAGE RD
CUSTER CO
Custer County
Fall River County
Oglala Lakota County
CUSTER CO
FALL RIVER CO
T6S
T7S
Cheyenne River
Spring Canyon
SQUAW-HUMPER TABLE
BIA 2
EXPLANATION
PROPOSED POWERLINE
PROPOSED ACCESS ROAD
PROJECT AREA
RESIDENTIAL STRUCTURES
N
0
1 Mile
Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729
FIGURE 2-1
PROJECT AREA OVERVIEW
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: JW
Scale: 1" = 1 Mile
Date: 8/12/19
File: Fig2-1_ProjectOverview


26
25
26
25
30
3181
3197
3289
HUMPER
Canyon
SQUAW HUMPER
6S
9E
35
36
35
36
3200
3250
41N
48W
41N
47W
31
CUSTER CO
TABLE
RIVERSIDE RD
BIA 2
T 6 S
7S
9E
40N
48W
R 48 W
R 47 W
2
1
4
3
2
Copyright © 2013 National Geographic Society, i-cubed
EXPLANATION
STATE/FEDERAL HIGHWAY
PROJECT AREA
RESERVATION BOUNDARY
N
0
1,250'
Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729
FIGURE 2-2
SOLAR GENERATING FACILITY OVERVIEW
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: JW
Scale: 1" = 1,250'
Date: 8/12/19
File: Fig2-2_SolarFarmLocation

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the existing environment, as well as the expected environmental consequences of the Proposed Action and the No Action Alternatives. The affected environment is described for each resource based on a review of existing data, and for some resources, field investigations. The Study Area included the 892-acre Project Area buffered by 0.5 miles (for a total of 9,803 acres) to account for indirect impacts to natural resources.

3.1 Soils and Geology

Within the region, Pierre Shale overlays the Niobrara Formation and Carlile Shale. The Carlile Shale and the Niobrara Formation date back to the Late Cretaceous age. These rock units are primarily exposed in the valley of the White River in the PRIR. Table 3-1 provides a summary of these geologic units.

Table 3-1. Geology Summary of the Project Area

Stratigraphic Unit	Age	Rock Composition Description
White River Group	Oligocene	claystone, sandstone
Carlile Shale Formation	Late Cretaceous	shale, sandstone, limestone
Niobrara Formation	Late Cretaceous	limestone
Pierre Shale	Late Cretaceous	shale, evaporite

Source: USGS 2014

There are 26 unique soils within the Project Area (Table 3-2). The five most common soil types are described in Table 3-2.

Table 3-2. Soil Series Characteristics within the Project Area

Soil Series	Landscape Location	Texture	Acres in the Project Area	Percent (%) of the Project Area
Anselmo-Valentine Complex	Stable, uniform slopes. 5-10% slope.	Sandy loam to fine sandy loam	432	48
Pierre Clay	Gently sloping to rolling hillslopes on uplands. 3-9% slope.	Clay to silty clay	140	16
Richfield-Altvan Silt Loams	Uplands and high terraces. 0-3% slope.	Silt loam to silty clay loam	122	14
Valentine Sand	Shorter, steeper slopes and upper ridges and knolls. 3-30% slope.	Loamy fine sand to coarse sand	68	8

Table 3-2. Soil Series Characteristics within the Project Area

Soil Series	Landscape Location	Texture	Acres in the Project Area	Percent (%) of the Project Area
Tuthill-Anselmo Fine Sandy Loams	High terraces and tablelands. 3-9% slope.	Sandy to loamy	34	4

Source: Radeke 1971

3.1.1 Environmental Impacts: Proposed Action

The soils in the area are generally stable and suitable for standard construction techniques. Up to 275 acres of soils would be temporarily impacted. Short-term impacts would occur, primarily, as a result of land clearing and leveling during the site preparation process. Additionally, borrow material (sand and/or gravel), may be required for site grading and foundation construction for the Proposed Action. If borrow material is needed, then these resources would be obtained from off-site sources. The types of short-term impacts are likely mixing of soil layers, soil compaction, and sediment runoff or erosion.

Operation of the facility would have a long-term impact to approximately 250 acres of soils. Permanent impacts are expected at the solar panel support footings, fence post sites, access roads, building and equipment foundations, and parking areas. Routine maintenance activities, such as fence repair, vegetation control, and vehicle inspections, could also disturb soils.

To limit these impacts, the following measures would be implemented:

- Utilize the existing landscape (e.g., slope, drainage, use of existing roads), where feasible, to minimize or eliminate grading work and land disturbance.
- Use appropriate controls (e.g., silt fences, riprap, etc.) to minimize soil exposure and to prevent eroded soil from leaving the disturbed area.
- Stockpile the topsoil separately and redistribute it after grading is complete.
- Work during dry conditions, whenever possible, to minimize rutting, erosion, and runoff.
- Disturbed areas would be regraded to approximate original contours and revegetated with a native plant community in accordance with the guidance of the DENR.
- Develop and implement a Stormwater Pollution Prevention Plan.

The Project would contribute to the Region-wide trend of development, which increases the risk of soil erosion, sedimentation, mixing, and compaction.

3.1.2 Environmental Impacts: No Action Alternative

This Alternative would have no new impact to soil or geology resources. Existing livestock grazing practices are expected to continue. Livestock over-grazing is known to increase erosion and runoff.

3.2 Paleontology

The Badlands in western South Dakota are thought to contain the richest fossil beds in the world. The fossils from the White River Group in South Dakota preserve the entire late Eocene through the middle

Oligocene periods, roughly 30-35 million years ago and more than 30 million years after non-avian dinosaurs became extinct (Benton et al. 2015). The White River Group ranges from 0 to 300 feet in depth. The White River Badlands include Badlands National Park, which is known as the birthplace of "vertebrate paleontology" because of the discovery of fossils of animals with backbones in the area (National Park Service [NPS] n.d.). The White River Badlands are located east/southeast of the Project Area but are within the Study Area.

Oral traditions among the Oglala Lakota Nation note the discovery of fossilized bones, turtle shells, and seashells throughout the area. Although the presence of paleontological resources is unknown within the Study Area, it is assumed that paleontological resources could exist in the area due to the high occurrence of these resources in surrounding areas.

3.2.1 Environmental Impacts: Proposed Action

While the White River Group was identified within the Study Area, it is outside the Project Area where construction activities would occur. Regardless, due to the potential to encounter paleontological resources, Lookout Solar intends to have a qualified construction/archaeologist monitor present during ground disturbing activities. In the event of an inadvertent paleontological discovery during construction and/or operations, the work would halt in the immediate area, and the paleontological resource would be secured and protected. Notification of the inadvertent discovery would be communicated to the WAPA Archeologist, and if on the PRIR, the Oglala Sioux THPO and BIA Great Plains Regional Archaeologist. The Oglala Sioux THPO, BIA, and/or WAPA, would determine the treatment of the paleontological resource, depending on the location of the find. The halted work may continue after proper treatment of the paleontological resources is completed.

3.2.2 Environmental Impacts: No Action Alternative

This Alternative would have no impact to paleontological resources.

3.3 Air Quality and Emissions

The air quality in Oglala Lakota and Custer Counties is generally good. The air quality in both counties meets the federal standards for emissions of certain pollutants (called "criteria pollutants) (EPA 2015). The primary emission sources are agricultural-related equipment and vehicles traveling along roads. Table 3-3 provides more information on the emissions in Oglala Lakota and Custer Counties.

Table 3-3. Emission Sources

Source Type	Emissions (tons / year)				
	CO	NO_x	PM_{10}	SO_2	VOCs
Oglala Lakota County					
Agricultural - Crops, Biogenics, Fires	2,488	893	1,654	<1	9,204
Dust - Paved and Non-paved Road Dust	-	-	806	-	-
Mobile Sources	1,499	371	19	1	149
Other	1,189	24	143	7	468
Total	**5,176**	**1,287**	**2,622**	**9**	**9,820**
Custer County					
Agricultural - Crops, Biogenics, Fires	2,206	535	623	<1	14,190
Dust - Paved and Non-paved Road Dust	-	-	631	-	-
Mobile Sources	2,398	-	28	1	365
Other	-	218	2,093	127	244
Total	**4,604**	**753**	**3,375**	**129**	**14,799**

Source: EPA 2014

3.3.1 Environmental Impacts: Proposed Action

Heavy construction equipment (gas and diesel powered), smaller construction equipment used for clearing and grading activities, and on-site generators would generate air emissions and GHGs. Emissions would be produced from the exhaust of smaller vehicles (i.e., haul trucks and personal vehicles) that are used by workers during the construction phase (approximately 50 to 150) and operation phase (roughly 3 employees) for commuting to and from the job site. Routine operation and maintenance activities would also generate dust and other vehicle and equipment emissions. In order to reduce emissions, the following measurements would be implemented:

- Construction areas and access roads would be wetted to control dust.
- Ensure that all pieces of heavy equipment meet emission standards specified in the State Code of Regulations, and conduct routine preventive maintenance, including tune-ups to manufacturer specification to ensure efficient combustion and minimum emissions. If possible, equipment with more stringent emission controls should be leased or purchased.
- Limit idling of diesel equipment to no more than 10 minutes unless necessary for proper operation.
- Use surface access roads, on-site roads, and parking lots with aggregates that maintain compacted soil conditions to reduce dust generation.

Cumulatively, these emissions would contribute to other emissions on the local scale but are not expected to occur at a measurable level. Solar power could be used in place of traditional generation sources (i.e., fossil fuels), which could reduce emissions.

3.3.2 Environmental Impacts: No Action Alternative

This Alternative would have no impact on air quality. Current emissions are expected to continue at a similar rate.

3.4 Vegetation

The Project is located within the Northwestern Great Plains Ecoregion, which includes most of western South Dakota with the exception of the Black Hills (EPA 2013). A total of 17 ecological systems were mapped in the Study Area. These ecological systems have been grouped into four primary vegetation types: grassland, riparian and wetland, cropland, and developed or disturbed (Table 3-4). Northwestern Great Plains Mixedgrass Prairie and Western Great Plains Shortgrass Prairie were the most common, which together account for approximately 80 percent of the Study Area. A full description and maps of each vegetation type can be found in the Biological Resources Report for the Project (Trihydro Corporation [Trihydro] 2018b, Appendix C).

Table 3-4. Vegetation in the Study Area

Ecological System	Acres	Vegetation Type	Percentage (%) of Study Area
Northwestern Great Plains Mixedgrass Prairie	4,494	Grassland	45.0
Western Great Plains Shortgrass Prairie	3,333	Grassland	34.0
Cultivated Cropland	842	Cropland	8.6
Northwestern Great Plains - Black Hills Ponderosa Pine Woodland and Savanna	246	Other	2.5
Pasture/Hay	221	Cropland	2.3
Introduced Upland Vegetation-Perennial Grassland/ Forbland	180	Grassland	1.8
Developed, High Intensity	128	Developed or Disturbed	1.3
Western Great Plains Floodplain Systems	126	Wetland	1.3
Open Water (Fresh)	65	Wetland	0.7
Developed, Open Space	60	Developed or Disturbed	0.6
Western Great Plains Depressional Wetland Systems	42	Wetland	0.4
Western Great Plains Sand Prairie	30	Grassland	0.3
Western Great Plains Sandhill Steppe	23	Grassland	0.2
Developed, Low Intensity	6	Developed or Disturbed	0.1
Western Great Plains Wooded Draw and Ravine	2	other	0.0
Rocky Mountain Foothill Limber Pine-Juniper Woodland	2	other	0.0
Western Great Plains Badland	1	other	0.0
Grand Total	9,803		
Vegetation Type Totals	**Acres**	**Percentage (%) of Study Area**	
Grassland	8,060	82.2	
Cropland	1,063	10.8	
Wetland and Riparian	234	2.4	

Ecological System	Acres	Vegetation Type	Percentage (%) of Study Area
Developed or Disturbed	195		2.0
Other	251		2.6

Source: USGS 2011

Over 80 percent of the vegetation within the Study Area is grassland. The data source did not differentiate between previously tilled grasslands and untilled native grasslands. Both types of grasslands provide wildlife habitat, but native, untilled grasslands is typically the highest quality habitat for nesting birds. Much of historic grasslands along and to the west of the Cheyenne River have been converted to agricultural use (cropland, pasture/hayland). However, native prairie with interspersed sagebrush occurs at the proposed site of the solar generating facility and some areas along the eastern extent of the proposed transmission line route.

South Dakota Game, Fish, and Parks (SDGFP) has a historic record of a large population of Barr's milkvetch in Oglala Lakota County. Barr's milkvetch is rare throughout its range, but is fairly common in southwestern South Dakota. Based on presence records in other areas of the County, it is likely that the species could be present throughout the entire Project Area.

3.4.1 Environmental Impacts: Proposed Action

Vegetation would be permanently removed due to site preparation (clearing and grading/leveling), construction, and trenching of 250 acres at the following locations:

- O&M building foundation
- Substation
- Parking areas
- Access roads
- Solar panel support posts

The vegetation type in those areas are short- and mid-grass prairie.

Under the solar panels, the existing vegetation type is predominantly Northwestern Great Plains Mixedgrass Prairie grassland. The vegetation would be allowed to reestablish, but productivity and habitat value would be reduced due to shading and continual mowing. Once the transmission cables are trenched and buried, the trench would be backfilled, recontoured and revegetated with native plant species in accordance with guidance from the DENR. The entire transmission line would be trenched in ROW areas previously disturbed as a result of canals, drainages, utility installation, where the primary vegetation type is also Northwestern Great Plains Mixedgrass Prairie grassland.

During all phases of the project, vehicles and equipment could introduce or spread seed from invasive species.

In order to reduce impacts to vegetation, the following environmental commitments would be implemented:

- Rather than removing vegetation entirely, vegetation would be maintained (e.g. mowed) to the lowest height tolerable for plant survival, allowing plants to grow without impeding Project function.
- Construction equipment would be properly cleaned before entry into the Project area, to reduce the spread of noxious weeds.

3.4.2 Environmental Impacts: No Action Alternative

No new impacts to vegetation would be expected, although current land use (i.e., livestock grazing) and the trend towards converting land to developed uses would continue to impact vegetation.

3.5 Water Resources

Within the Project Area, there are a total of 1.2 acres of wetlands, 0.01 acres of open water ponds, and 0.2 acres of open water channel of the Cheyenne River (Figure 3-5 to 3-11). There are also two intermittent drainages (Cottonwood Creek and the Angostura Canal) and seven ephemeral streams or ditches totaling 0.4 miles. The principal uses of surface water are livestock watering and irrigation. The Angostura Canal is under the jurisdiction of the Bureau of Reclamation (BOR). Generally, surface water levels within the area increase during flooding events and after snowmelt and heavy precipitation events. An aquatic resource inventory of the Study Area, completed in 2018, is available as Appendix B (Trihydro 2018a).

There are mapped flood zones including floodplains of the Cheyenne River, Cottonwood Creek, and an unnamed tributary to Cottonwood Creek (Figure 3-12). All three flood zones are located in Custer County and are designated as Zone A flood zones. Zone A flood zones are areas with a 1% annual chance of flooding (FEMA 2018).

The Project is located between the Ogallala Aquifer and Arikaree Aquifers, and the Madison and Minnelusa Aquifers (USGS 2001, NRCS 2016). The Arikaree Aquifer serves as the predominant source of public and domestic water supply on the Reservation (USGS 2013). The Ogallala Aquifer overlaps much of the Reservation, but does not reach the Project Area. The Maddison and Minnelusa Aquifers are located northeast of the Project. Due to the Project's unique location between two aquifers, the general area has groundwater from both aquifers.

Residential and commercial water needs on the Reservation are provided by the Oglala Sioux Rural Water System, also known as, "Mni Wiconi Rural Water Supply." Stock wells are commonly used to supply water to livestock. Water needs for the off-Reservation Project Area are met by the Southern Black Hills Water Systems (SBHWS). The SBHWS service area encompasses approximately 2,000 square miles and services more than 350 customers (SBHWS 2017). The Madison Aquifer is the primary water source for the SBHWS service area.

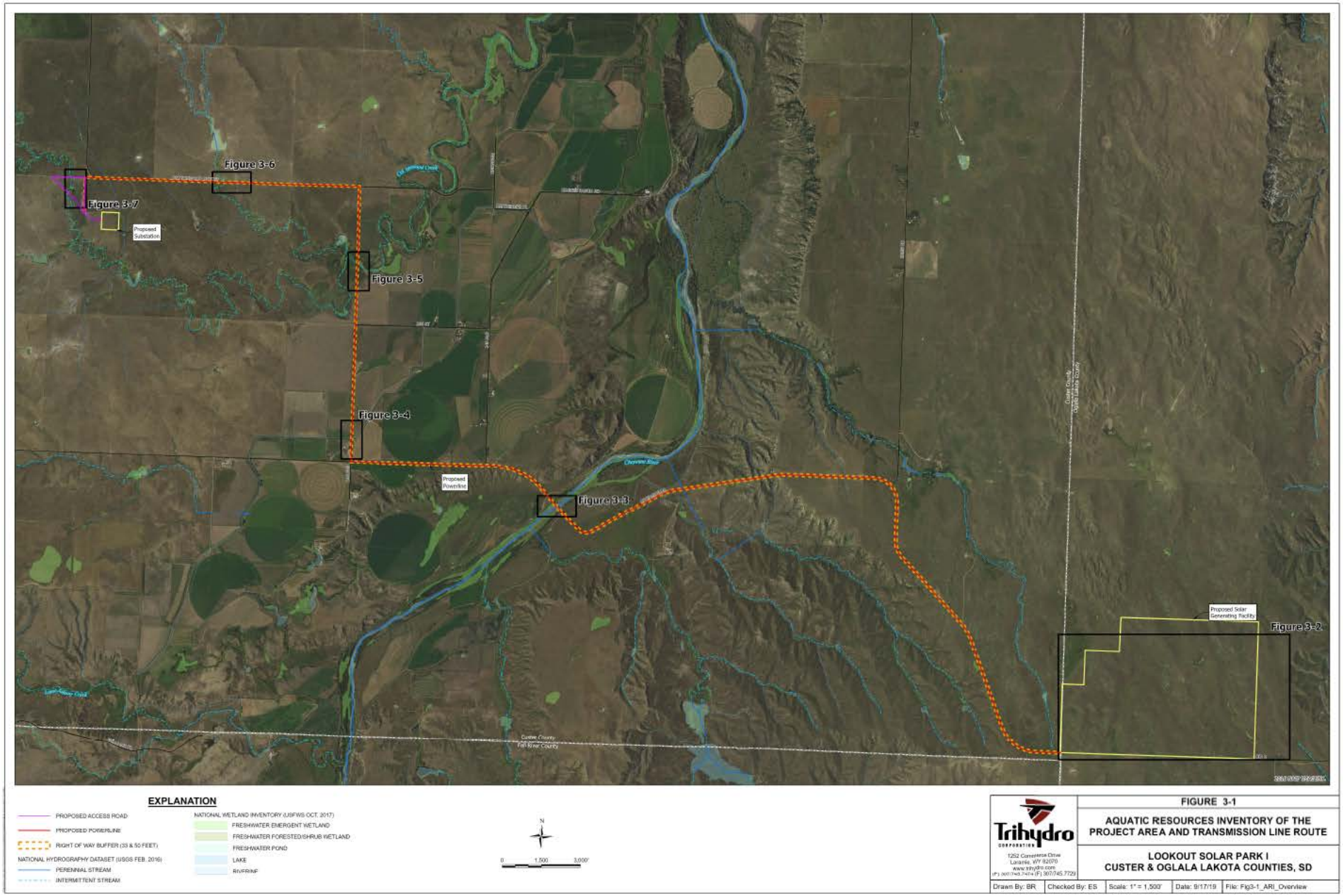
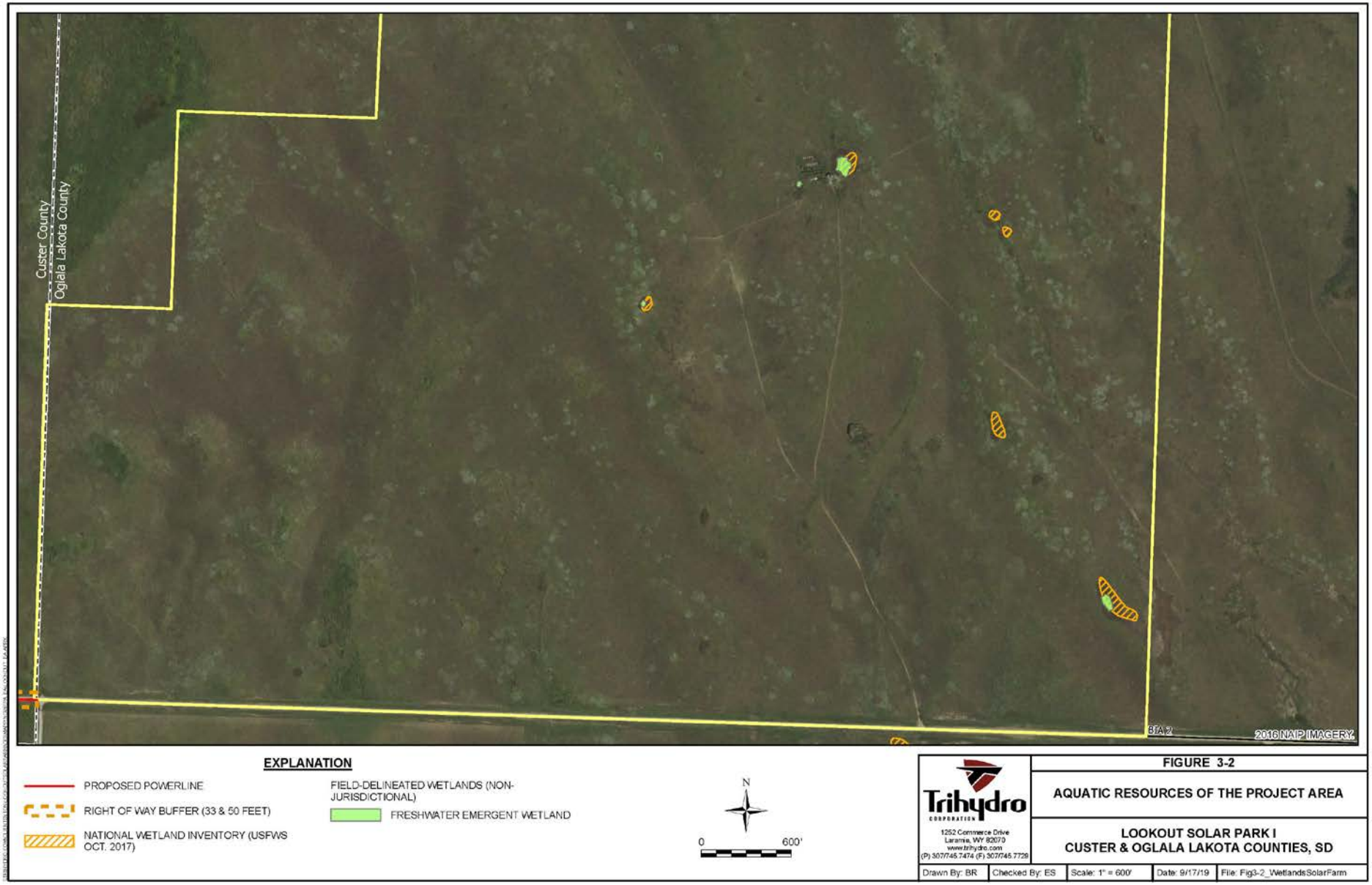
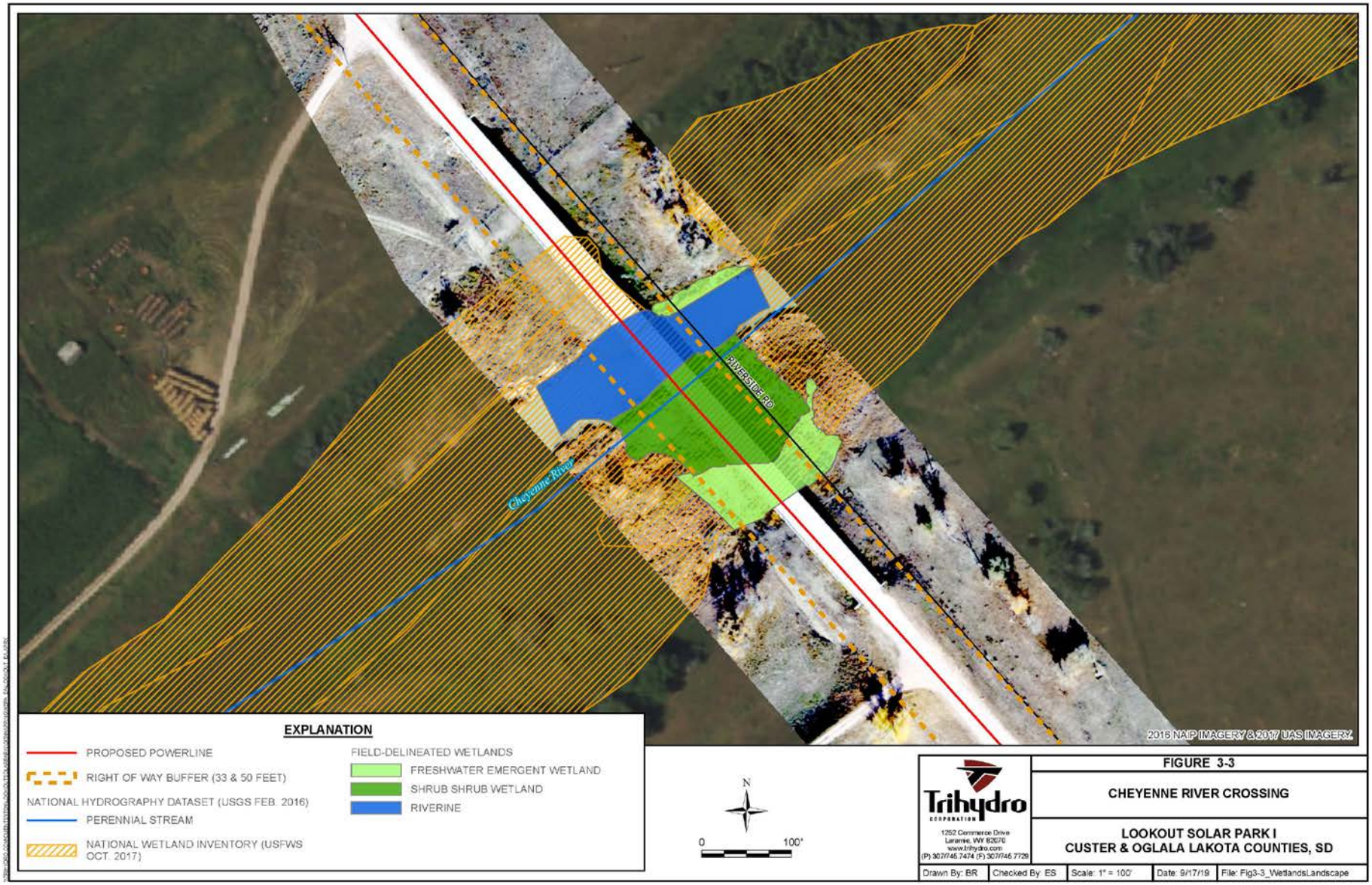
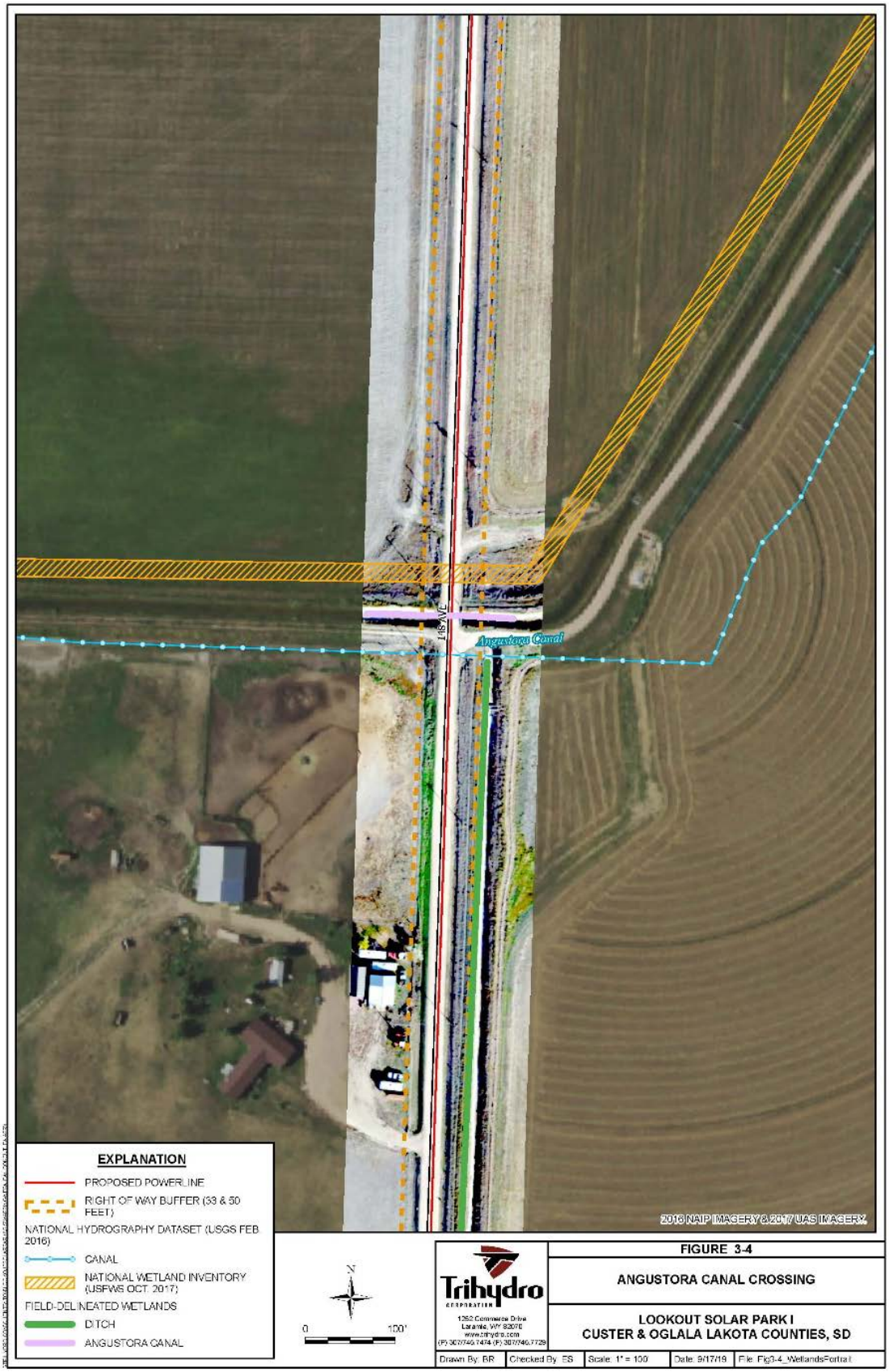


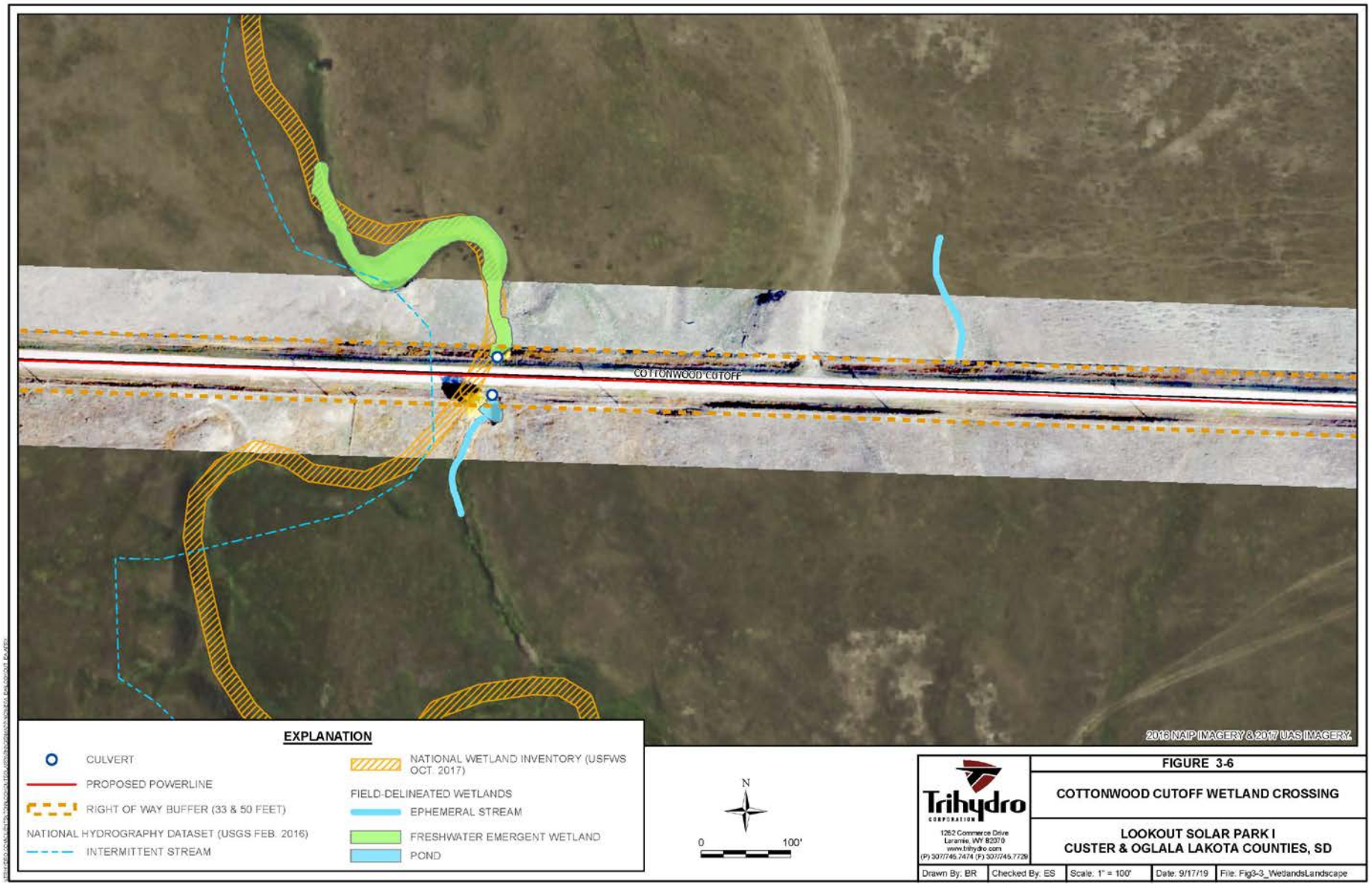
Figure 3-6
Figure 3-7
Proposed Substation
Figure 3-5
Figure 3-4
Proposed Powerline
Figure 3-3
Proposed Solar Generating Facility
Figure 3-2
Custer County
Fall River County
EXPLANATION
PROPOSED ACCESS ROAD
PROPOSED POWERLINE
RIGHT OF WAY BUFFER (33 & 50 FEET)
NATIONAL HYDROGRAPHY DATASET (USGS FEB. 2016)
PERENNIAL STREAM
INTERMITTENT STREAM
NATIONAL WETLAND INVENTORY (USFWS OCT. 2017)
FRESHWATER EMERGENT WETLAND
FRESHWATER FORESTED/SHRUB WETLAND
FRESHWATER POND
LAKE
RIVERINE
N
0
1,500
3,000'
Trihydro
CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307.745.7474 (F) 307.745.7729
FIGURE 3-1
AQUATIC RESOURCES INVENTORY OF THE PROJECT AREA AND TRANSMISSION LINE ROUTE
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: ES
Scale: 1" = 1,500'
Date: 9/17/19
File: Fig3-1_ARI_Overview

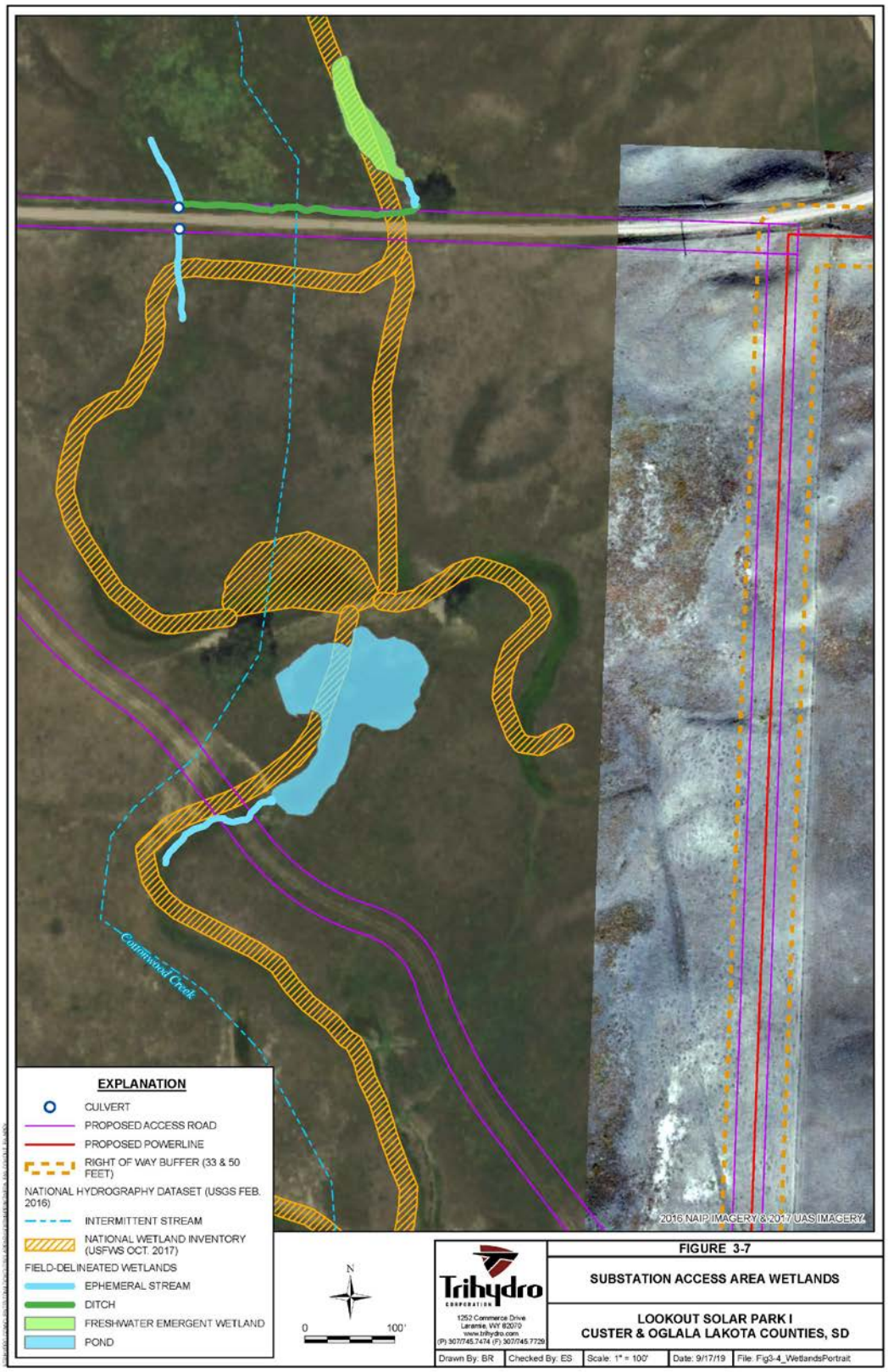

Custer County
Oglala Lakota County
87A 2
2016 NAIP IMAGERY
EXPLANATION
PROPOSED POWERLINE
RIGHT OF WAY BUFFER (33 & 50 FEET)
NATIONAL WETLAND INVENTORY (USFWS OCT. 2017)
FIELD-DELINEATED WETLANDS (NON-JURISDICTIONAL)
FRESHWATER EMERGENT WETLAND
N
0
600'
Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307.745.7474 (F) 307.745.7729
FIGURE 3-2
AQUATIC RESOURCES OF THE PROJECT AREA
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: ES
Scale: 1" = 600'
Date: 9/17/19
File: Fig3-2_WetlandsSolarFarm

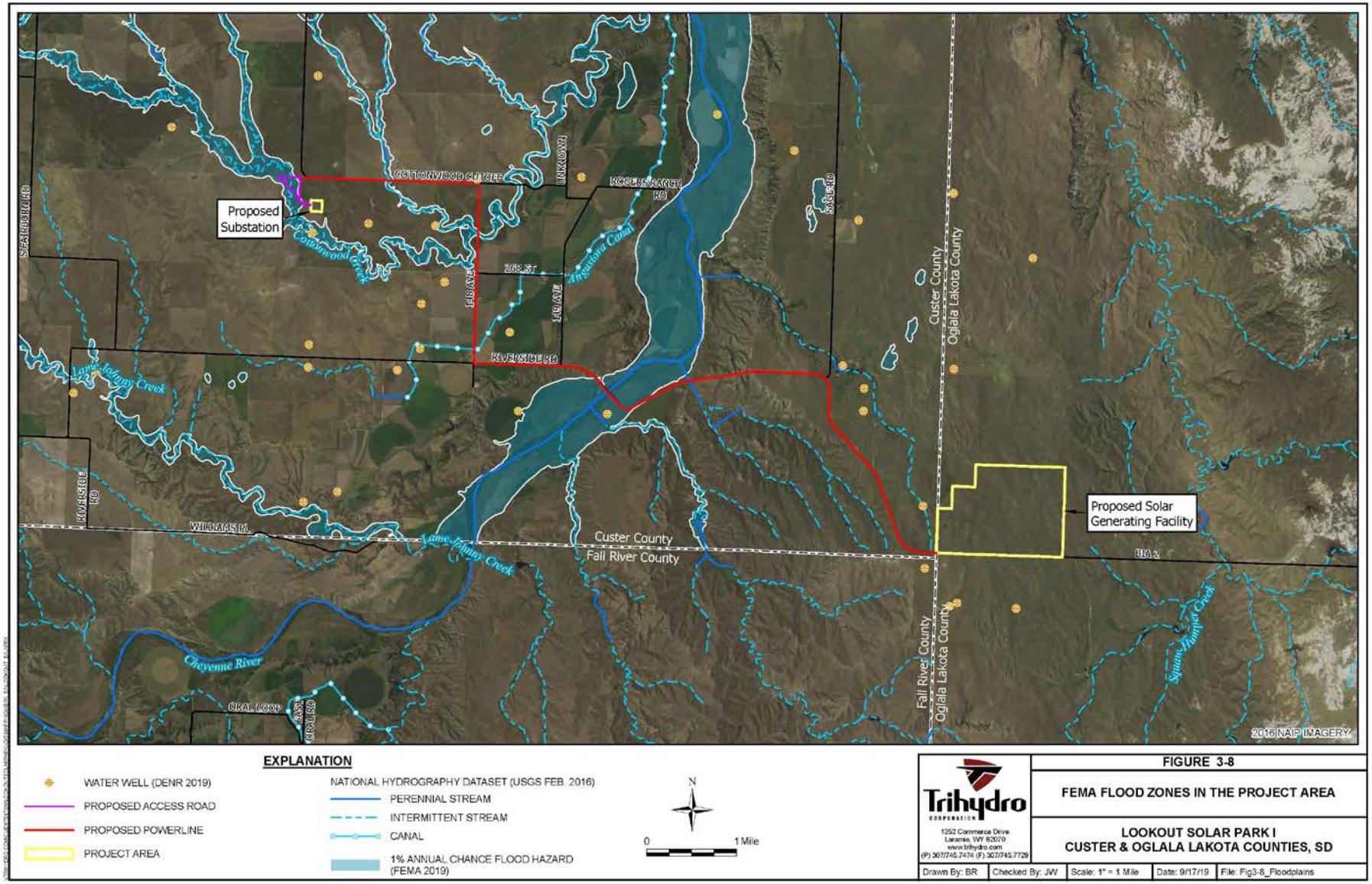

RIVERSIDE RD
Cheyenne River
2016 NAIP IMAGERY & 2017 UAS IMAGERY
EXPLANATION
PROPOSED POWERLINE
RIGHT OF WAY BUFFER (33 & 50 FEET)
NATIONAL HYDROGRAPHY DATASET (USGS FEB. 2016)
PERENNIAL STREAM
NATIONAL WETLAND INVENTORY (USFWS OCT. 2017)
FIELD-DELINEATED WETLANDS
FRESHWATER EMERGENT WETLAND
SHRUB SHRUB WETLAND
RIVERINE
N
0
100'
Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729
FIGURE 3-3
CHEYENNE RIVER CROSSING
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: ES
Scale: 1" = 100'
Date: 9/17/19
File: Fig3-3_WetlandsLandscape


EXPLANATION
PROPOSED POWERLINE
RIGHT OF WAY BUFFER (33 & 50 FEET)
NATIONAL HYDROGRAPHY DATASET (USGS FEB 2016)
CANAL
NATIONAL WETLAND INVENTORY (USFWS OCT 2017)
FIELD-DELINEATED WETLANDS
DITCH
ANGUSTORA CANAL
Angustora Canal
2016 NAIP IMAGERY & 2017 UAS IMAGERY
N
0
100'
Trihydro
FIGURE 3-4
ANGUSTORA CANAL CROSSING
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD


148 AVE
Cottonwood Creek
2016 NAIP IMAGERY & 2017 UAS IMAGERY.
EXPLANATION
CULVERT
PROPOSED POWERLINE
RIGHT OF WAY BUFFER (33 & 50 FEET)
NATIONAL HYDROGRAPHY DATASET (USGS FEB. 2016)
INTERMITTENT STREAM
NATIONAL WETLAND INVENTORY (USFWS OCT. 2017)
FIELD-DELINEATED WETLANDS
INTERMITTENT STREAM
DITCH
FRESHWATER EMERGENT WETLAND
N
0
100'
Trihydro
CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729
FIGURE 3-5
COTTONWOOD CREEK CROSSING
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: ES
Scale: 1" = 100'
Date: 9/17/19
File: Fig3-4_WetlandsPortrait


COTTONWOOD CUTOFF
2016 NAIP IMAGERY & 2017 UAS IMAGERY.
EXPLANATION
CULVERT
PROPOSED POWERLINE
RIGHT OF WAY BUFFER (33 & 50 FEET)
NATIONAL HYDROGRAPHY DATASET (USGS FEB. 2016)
INTERMITTENT STREAM
NATIONAL WETLAND INVENTORY (USFWS OCT. 2017)
FIELD-DELINEATED WETLANDS
EPHEMERAL STREAM
FRESHWATER EMERGENT WETLAND
POND
N
0
100'
Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307.745.7474 (F) 307.745.7729
FIGURE 3-6
COTTONWOOD CUTOFF WETLAND CROSSING
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: ES
Scale: 1" = 100'
Date: 9/17/19
File: Fig3-3_WetlandsLandscape


EXPLANATION
CULVERT
PROPOSED ACCESS ROAD
PROPOSED POWERLINE
RIGHT OF WAY BUFFER (33 & 50 FEET)
NATIONAL HYDROGRAPHY DATASET (USGS FEB. 2016)
INTERMITTENT STREAM
NATIONAL WETLAND INVENTORY (USFWS OCT. 2017)
FIELD-DELINEATED WETLANDS
EPHEMERAL STREAM
DITCH
FRESHWATER EMERGENT WETLAND
POND
Cottonwood Creek
2016 NAIP IMAGERY & 2017 UAS IMAGERY
N
0
100'
Trihydro
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729
FIGURE 3-7
SUBSTATION ACCESS AREA WETLANDS
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: ES
Scale: 1" = 100'
Date: 9/17/19
File: Fig3-4_WetlandsPortrait


Proposed Substation
COTTONWOOD CUTOFF
ROGERS RANCH RD
268.5T
148 AVE
150 AVE
RIVERSIDE RD
Cottonwood Creek
Angostura Canal
Lame Johnny Creek
Custer County
Oglala Lakota County
Fall River County
Proposed Solar Generating Facility
BIA 2
WILLIAMS RL
RIVERSIDE RD
ORAL LOOP
ORAL RD
Cheyenne River
Squaw Humper Creek
2016 NAIP IMAGERY
EXPLANATION
WATER WELL (DENR 2019)
PROPOSED ACCESS ROAD
PROPOSED POWERLINE
PROJECT AREA
NATIONAL HYDROGRAPHY DATASET (USGS FEB. 2016)
PERENNIAL STREAM
INTERMITTENT STREAM
CANAL
1% ANNUAL CHANCE FLOOD HAZARD (FEMA 2019)
N
0
1 Mile
Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307.745.7474 (F) 307.745.7729
FIGURE 3-8
FEMA FLOOD ZONES IN THE PROJECT AREA
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: JW
Scale: 1" = 1 Mile
Date: 9/17/19
File: Fig3-8_Floodplains

3.5.1 Environmental Impacts: Proposed Action

All water resources in the area could be impacted by an accidental release of pollutants, such as fuel spills and/or runoff. Petroleum, oil, and lubricants would be used in the operation and maintenance of heavy construction equipment and vehicles, and there would also be some use of paints, solvents, and cleaners. Otherwise, only nonhazardous waste would be generated from construction activities. The PV panels in the solar array may contain hazardous materials and, although the panels are sealed under normal operating conditions, there is the potential for environmental contamination if damaged or improperly disposed of during decommissioning. Spills could occur from equipment fuel used to power equipment during construction, or damaged and leaking solar energy storing systems. To reduce the chance of accidental releases, the Project would develop and implement a Spill Prevention Control and Countermeasure (SPCC) Plan, which would contain measures to control runoff and discharge of pollutants. The plan would also outline measures for cleanup and management of any potential spills.

Direct impacts to the Cheyenne River and the Angostura Canal would be avoided by using HDD to bore the transmission line underneath the streambed. Lookout Solar received a special use permit from the BOR to allow for crossing the Angostura Canal and would comply with all crossing permit conditions. Physical impacts to wetlands within the solar generation area would be avoided by establishing a 150-foot non-disturbance buffer. Direct impacts to 0.3 acres of wetlands and drainages would occur during installation of the transmission line. Once the transmission line is constructed, the trenches would be backfilled and restored to pre-construction contours, as best as possible. Temporary disturbance to wetlands and drainages along the transmission line is allowable under U.S. Army Corps of Engineers Nationwide Permit (NWP) 12 for Utility Line Activities. NWP 12 authorizes utility line activities and construction of associated facilities in waters of the U.S., provided the activity does not result in a loss of greater than 0.5 acres of jurisdictional wetlands and Waters of the U.S., for each single and complete project. Although temporary wetlands impacts would occur, no wetland losses are expected as a result of the Project.

The transmission line ROW intersects three flood zone areas and the substation temporary access road would cross the Cottonwood Creek flood zone. Impacts within the flood zone areas would be short-term and occur during the construction phase. Lookout Solar obtained a floodplain development permit from Custer County for the transmission line and the substation in May 2019. Impacts from the burial of the transmission line and temporary access road are authorized under the permit. The ROW approval from Custer County requires that the ROW be restored to pre-construction condition or better after the completion of construction of the Project. Custer County also has required that the Project obtain a permit from DENR for stormwater discharge during construction, which requires the development of a Stormwater Pollution Prevention Plan and the implementation of best management practices to mitigate the impact of stormwater.

The Project would need a water source for yearly cleaning of the solar panels and other operational uses. The Oglala Sioux Tribe Department of Water Maintenance and Conservation issued a letter stating its intent to authorize an estimated 200,000 to 400,000 gallons per year for the Project. However, the actual anticipated water use is less than this amount. The Project will continue to consult with the Oglala Sioux Tribe Department of Water Maintenance and Conservation to obtain any necessary approvals for the supply of potable water. If the Tribe chose not to authorize the water use, then Lookout Solar would

truck in the required water for the Project. Indirect impacts may occur in the form of water withdrawals from groundwater resources, if the supply could not meet the anticipated demand. To minimize the volume of water needed, Lookout Solar has committed to washing solar modules during early morning hours or late in the day to avoid periods of greatest sun intensity and peak daytime temperatures when evaporative demand is highest.

3.5.2 Environmental Impacts: No Action Alternative

No new impacts to water resources are anticipated under this alternative.

3.6 Threatened and Endangered Species

The federal Endangered Species Act provides protection for federally listed threatened and endangered (T&E) plant and animal species and their habitat. The five federally-listed T&E species that may occur in Custer and/or Oglala Lakota County are included in Table 3-5 (See Appendix C for USFWS official species list).

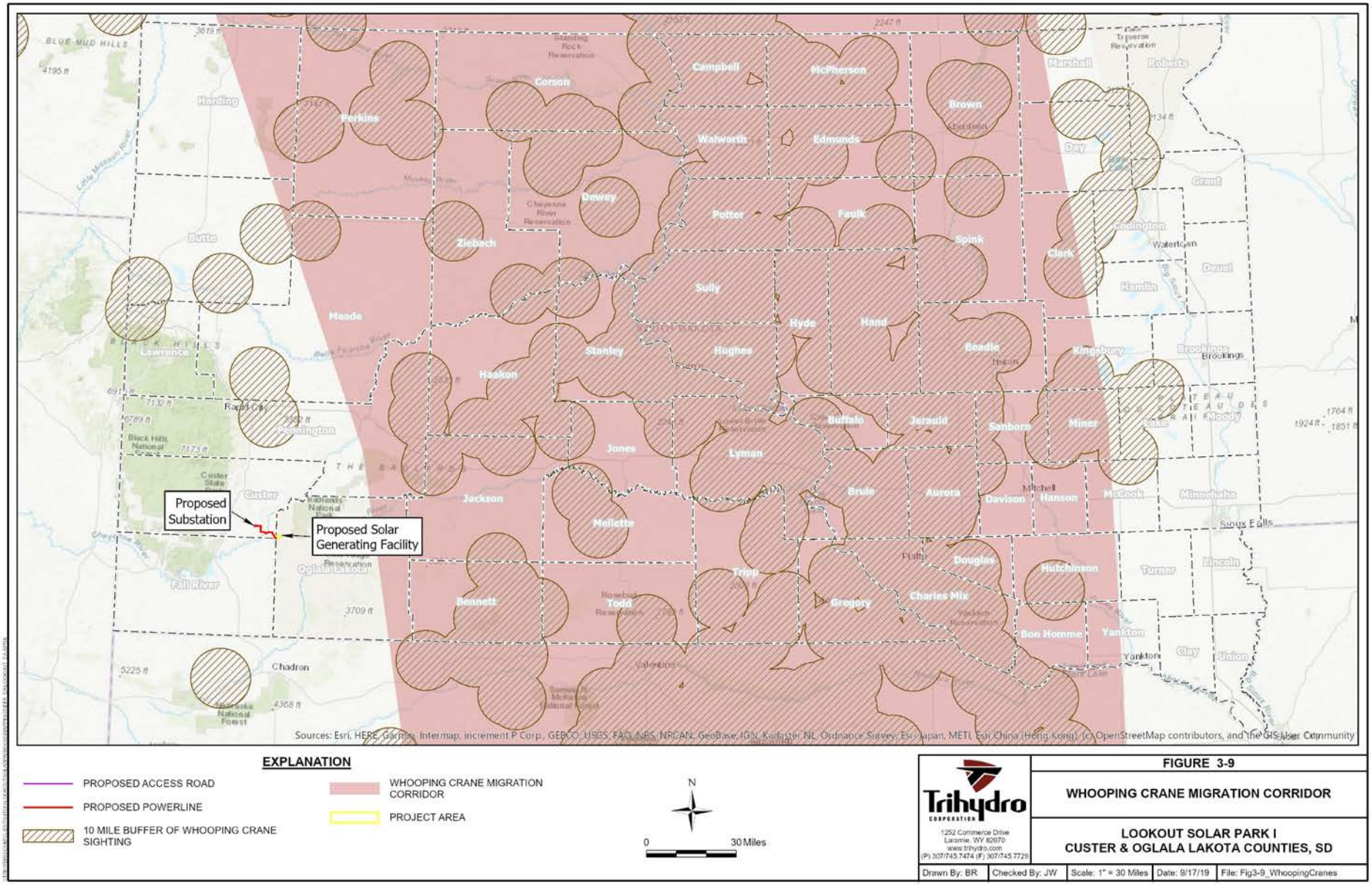
Table 3-5. Federal T&E Species

Common Name	Federal Status
Black-footed ferret	Endangered
Northern long-eared bat	Threatened
Red knot	Threatened
Western prairie fringed orchid	Threatened
Whooping crane	Endangered

Whooping Crane

Whooping cranes undertake an annual 5,000-mile round-trip migration from their breeding area in Canada to their wintering area along the Texas Gulf Coast. Approximately 95 percent of all observations during migration occur within a 200-mile wide corridor (Figure 3-13, Tacha n.d., CWS and USFWS 2007). Whooping cranes are found on various sizes of wetlands and croplands during both spring and fall migration, but wetlands less than 2 acres are seldom used as roost sites (Stahlecker 1992). Cranes typically take off and land in upland habitats such as crop fields or adjacent to wetlands and are not "water-dependent" for take-off and landing.

The Project is located over 30 miles to the west of the national whooping crane migration route, or corridor, and well outside the South Dakota specific migratory path (approximately 200 miles east). No whooping crane have been documented in the Study Area and the nearest occurrence is 35 miles to the north (USFWS 2018a). There is an abundance of cropland that could be potential foraging habitat surrounding the Project, especially along the Cheyenne River. However, the Study Area has fewer than 2 acres of wetlands, which are likely too small to serve as suitable stopover sites.


Proposed Substation
Proposed Solar Generating Facility
Campbell
McPherson
Corson
Brown
Perkins
Walworth
Edmunds
Dewey
Potter
Faulk
Ziebach
Spink
Clark
Sully
Meade
Hyde
Hand
Stanley
Hughes
Beadle
Haakon
Buffalo
Jerauld
Sanborn
Minnehaha
Jones
Lyman
Brule
Aurora
Davison
Hanson
Mellette
Douglas
Hutchinson
Tripp
Charles Mix
Bennett
Gregory
Bon Homme
Yankton
Chadron
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
EXPLANATION
PROPOSED ACCESS ROAD
PROPOSED POWERLINE
10 MILE BUFFER OF WHOOPING CRANE SIGHTING
WHOOPING CRANE MIGRATION CORRIDOR
PROJECT AREA
N
0
30 Miles
Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307/745.7474 (F) 307/745.7729
FIGURE 3-9
WHOOPING CRANE MIGRATION CORRIDOR
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: JW
Scale: 1" = 30 Miles
Date: 9/17/19
File: Fig3-9_WhoopingCranes

Northern Long-eared Bat

The northern long-eared bat can be found in the eastern and north-central U.S., including the entire state of South Dakota (Amelon and Burhans 2006). Northern long-eared bats spend winter hibernating in caves or mines with constant temperatures and high humidity, and summer roosting singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees (USFWS 2018b). Northern long-eared bats may travel long distances to winter hibernacula; however, summer home range of northern long-eared bats are typically 150 to 250 acres in size (Owen et al. 2003, Yates et al. 2014) and individuals typically travel between 0.2 and 1.5 miles from roost locations to foraging areas (Schmidt 2003).

Potential winter hibernacula, such as caves or mines, were not identified in the Study Area during a habitat assessment (Trihydro 2018b, Appendix C). In addition, no summertime roosting habitat (i.e. woodlands, riparian forests) is present in the Study Area. The nearest potential roosting and foraging habitat is along the Cheyenne River and Cottonwood Creek riparian woodlands; which is located four miles outside of the proposed solar generating facility. No northern long-eared bats were detected during acoustic surveys for the Project. The nearest known occurrence is over 15 miles from the Study Area, in the Black Hills (SDGFP 2014), beyond the known summer home range and foraging area distances.

Rufa Red Knot

The rufa red knot breeds in the Canadian Arctic and migrates approximately 19,000 miles (round-trip) to winter on the U.S. Gulf Coast and in South America (Harrington 2001). During migration, rufa red knots utilize intertidal, marine habitats near coastal inlets, estuaries, and bays as stopover habitat. Some rufa red knots winter along the northwest Gulf Coast migrate through the interior of the U.S. in both spring and fall (Newstead et al. 2013). However, these migrations are typically non-stop flights. The species is considered a rare migrant through South Dakota during northward (May and June) and southward (August and September) migrations (Baker et al. 2013). There is no suitable stopover habitat within or in the vicinity of the Project. The nearest detection records are over 50 miles to the east of the Project at La Creek National Wildlife Refuge.

Western Prairie Fringed Orchid

The western prairie fringed orchid is a perennial that occurs in mesic to wet tallgrass prairie and is found most often on unplowed, calcareous prairie and sedge meadows (USFWS 1996). It is commonly found with sedges, reedgrass, and rushes or where those plants merge with upland grasses, such as big blue stem, little bluestem, and switchgrass (USFWS 2013a). Western prairie fringed orchid could potentially occur in Custer County; however, there are currently no known populations of the species in South Dakota (SDGFP 2016). In addition, an onsite survey and habitat assessment found no suitable habitat, as described above, within the Study Area (Trihydro 2018a, Appendix C).

Black-footed Ferret

The black-footed ferret historic range extended throughout western North America's prairie grasslands and coincided with that of the black-tailed prairie dog, Gunnison's prairie dog, and the white-tailed prairie dog (USFWS 2015). Prairie dogs are the primary prey of the black-footed ferret, and prairie dog

complexes provide habitat for the species. Black-footed ferret habitat is limited to grasslands containing large (minimum of 75 acres) prairie dog complexes, which provide them with burrows for shelter and dens (USFWS 2013b and 2015). Field surveys documented one black-tailed prairie dog colony within the Study Area (Figure 3-14). However, the colony size is roughly 3 acres, so it is too small to support black-footed ferrets, and no suitable habitat is present.

3.6.1 Environmental Impacts: Proposed Action and No Action Alternative

Whooping Crane

Impacts to whooping crane would not occur because the Study Area contains no observation records, no stopover habitat, and is well outside the species' established migratory range. Further, there are no records of cranes colliding with solar panels and the buried transmission line is not a collision risk. Thus, WAPA has determined both the Project's Proposed Action and No Action Alternatives would have **no effect** on whooping crane.

Northern Long-eared Bat

Lack of northern long-eared bat habitat in the Study Area supports the conclusion that there is no risk of disturbance to individuals. Further, no caves or mines would be disturbed and no trees would be cut, so there is no risk of impacts to potential hibernating or roosting habitat areas. Therefore, WAPA has determined both the Proposed Action and No Action Alternatives would have **no effect** on northern long-eared bat.

Rufa Red Knot

Due to a lack of suitable habitat and sightings in and near the Study Area, WAPA has determined both the Proposed Action and No Action Alternatives would have **no effect** on rufa red knot.

Western Prairie Fringed Orchid

Due to a lack of known populations and suitable habitat in the Study Area, WAPA has determined both the Proposed Action and No Action Alternatives would have **no effect** on western prairie fringed orchid.

Black Footed Ferret

There are no known ferret populations within the Study Area and there is no suitable habitat to support a future ferret population, therefore, WAPA has determined both the Proposed Action and No Action Alternatives would have **no effect** on black-footed ferrets.

3.7 Fish and Wildlife

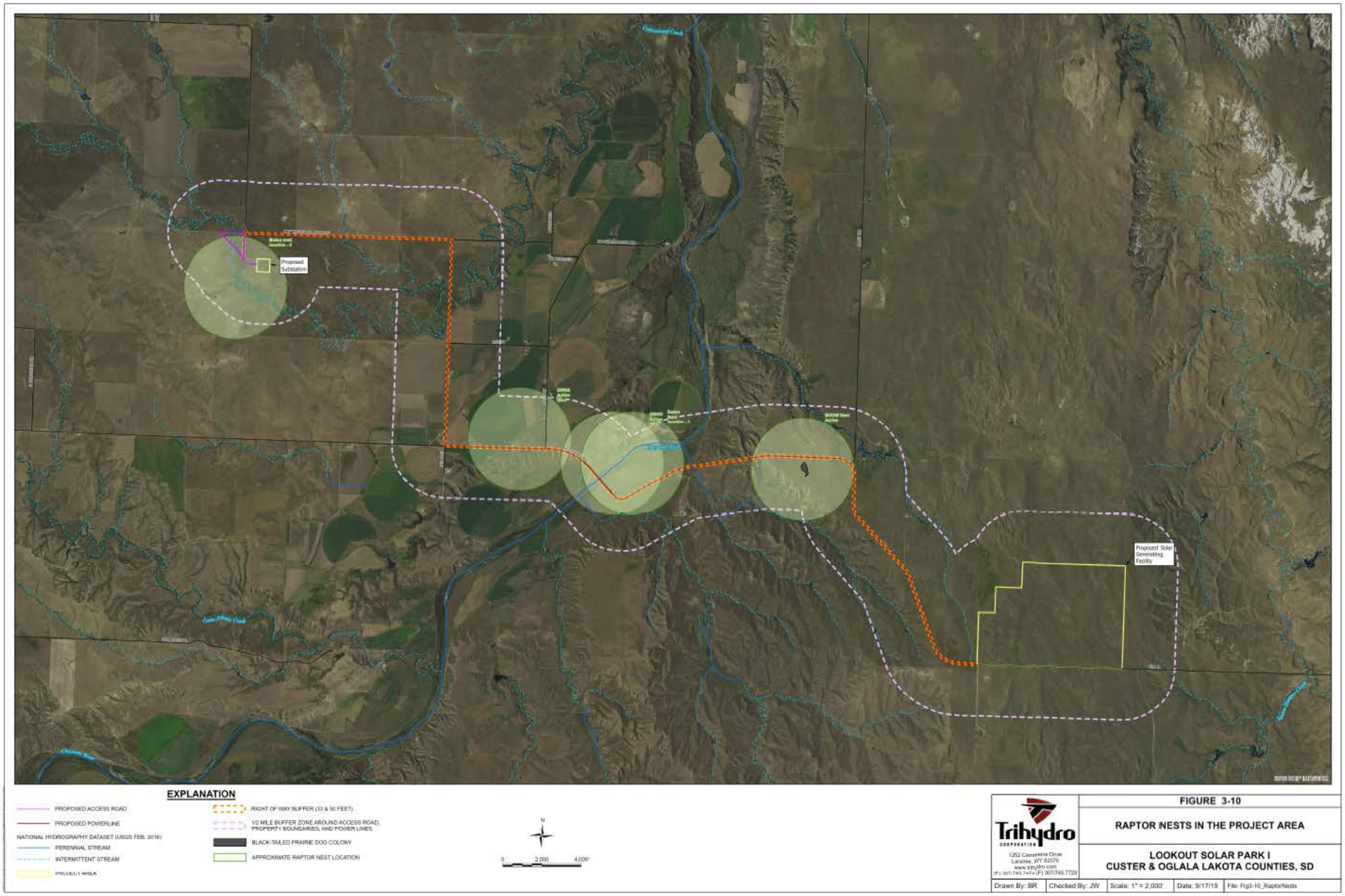
The Study Area provides suitable habitat for wide array of wildlife species including sensitive birds, fish and mammals. There are approximately 8,060 acres of grasslands, primarily mixed grass prairie and shortgrass prairie, and 234 acres of riparian and wetland habitats (USGS 2011). These areas provide wildlife habitat (feeding and sheltering areas). The remaining 1,258 acres in the Study Area are cropland, hay, developed, or disturbed areas, which can still provide wildlife habitat. Large mammals observed during wildlife surveys include pronghorn antelope, mule deer, and white-tailed deer. The

presence of reptiles and amphibians within the Study Area is low due to limited surface water, but the prairie rattlesnake and snapping turtle were documented during surveys.

One year of bat pre-construction acoustic monitoring indicated the area is home to several species of bats, including Townsend's big-eared bat, big brown bat, silver-haired bat, western small-footed myotis, little brown bat, fringed myotis, and long-legged myotis (Appendix C). There is a historic record of a fringe-tailed myotis approximately 5 miles northwest of the proposed substation location. In addition, a number of other bat species were recorded in the northern portion of Badlands National Park, approximately 10 miles north of the Project, so the Project's close proximity and similar terrain could indicate a high use area of bat activity in southwestern South Dakota. The fringed myotis, silver-haired bat, and Townsend's big-eared bat are classified as a species of greatest conservation need in South Dakota.

Of the 43 bird species documented during one year of grassland bird studies conducted in the Study Area, 7 are considered sensitive species, including: burrowing owl, upland sandpiper, long-billed curlew, western meadowlark, sharp-tailed grouse, grasshopper sparrow, and yellow-billed cuckoo (Trihydro 2018b, Appendix C). No sharp-tailed grouse leks have been documented near the Project (SDGFP 2018), but three sharp-tailed grouse hens were observed within the Project Area (Trihydro 2018b, Appendix C). Additionally, based on SDGFP habitat modeling, the Study Area supports an abundance of above-average sharp-tailed grouse habitat (SDGFP 2018). Field surveys indicate the eastern edge of the Project (in and around the proposed solar generating facility) has the highest potential for lek sites and/or breeding areas. This area is primarily native grassland with interspersed sagebrush; sagebrush provides escape cover from predators and is often found near leks (NRCS 2007).

Several raptor species were documented in the Study Area including the golden eagle and northern harrier. Five nests were documented in the Study Area, including: burrowing owl, great-horned owl, Swainson's hawk, and two inactive hawk nests (either red-tailed hawk or Swainson's hawk) (Figure 3-14). The burrowing owl was observed nesting in a 3-acre prairie dog colony which is located south of the transmission line. In addition to this observation, there is a 2011 record of a nesting burrowing owl located in a prairie dog town in the US Forest Service allotment adjacent to the Project. Field surveys did not identify a prairie dog town on the Forest Service allotment (Thiele et al. 2013). Burrowing owls nest in grasslands with few trees, and generally inhabit prairie dog towns larger than 25 acres (Griebel and Savidge 2007, Thiele et al. 2013). The breeding season in South Dakota is mid-May to early August.


Proposed Substation
Proposed Solar Generating Facility
EXPLANATION
PROPOSED ACCESS ROAD
PROPOSED POWERLINE
NATIONAL HYDROGRAPHY DATASET (USGS FEB. 2016)
PERENNIAL STREAM
INTERMITTENT STREAM
PROJECT AREA
RIGHT OF WAY BUFFER (33 & 50 FEET)
1/2 MILE BUFFER ZONE AROUND ACCESS ROAD, PROPERTY BOUNDARIES, AND POWER LINES
BLACK-TAILED PRAIRIE DOG COLONY
APPROXIMATE RAPTOR NEST LOCATION
N
0 2,000 4,000'
Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307.745.7474 (F) 307.745.7729
FIGURE 3-10
RAPTOR NESTS IN THE PROJECT AREA
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: JW
Scale: 1" = 2,000'
Date: 9/17/19
File: Fig3-10_RaptorNests

State-Listed T&E Species

The State of South Dakota maintains a list of state T&E species which are protected under state law from harm or harassment. The nine state-listed T&E species that may occur in Custer and/or Oglala Lakota County are included Table 3-6 (See Appendix C for SDGFPs County T&E Species List). In addition to the whooping crane and black-footed ferret, described in the previous sections, there are seven state-listed T&E species within Custer and/or Oglala Lakota counties: swift fox, osprey, American dipper, northern river otter, blacknose shiner, longnose sucker, and sturgeon chub.

Table 3-6. State T&E Species

Common Name	State Status
Black-footed ferret	Endangered
Whooping crane	Endangered
American dipper	Threatened
Blacknose shiner	Endangered
Longnose sucker	Threatened
Northern river otter	Threatened
Osprey	Threatened
Sturgeon chub	Threatened
Swift Fox	Threatened

No state-listed T&E species were documented during the 2018 surveys (Trihydro 2018b, Appendix C). However, the Study Area includes aquatic habitat suitable for fishes, river otters, and American dippers; riparian woodland suitable for ospreys; and short-and mid-grass prairie suitable for swift foxes. No osprey or osprey nests were documented during field surveys. The nearest confirmed breeding record in South Dakota is in the Black Hills approximately 15 miles to the west. Ospreys are known to maintain relatively small nesting territories with nests located between 50 and 410 meters in the continental U.S., with larger territories occurring in northern latitudes (Bierregaard et al. 2016). Ospreys typically stay close to their nest; however, some individuals have been reported traveling up to 6 miles from breeding areas (Bierregaard et al. 2016).

Swift foxes have been documented in both Custer County (prior to 2000) and Oglala Lakota County (after 2000). In 2009 and 2010, the Oglala Sioux Parks and Recreation Authority released 79 wild-caught swift fox onto the PRIR. Four dens and six individuals were documented via camera and live trapping efforts on the PRIR in 2013 and 2014. The Study Area is not within the mapped range of the species (SDGFP 2014). Pedestrian-based surveys and camera trap surveys found no signs of swift fox (live animals, scat, or den sites) (Trihydro 2018b, Appendix C). Despite these survey results, swift foxes are elusive animals and undetected individuals may inhabit and utilize the area wherever suitable grassland habitat is present. Approximately 730 acres of potential suitable grassland habitat has been mapped in the Study Area, including the solar generating facility, substation, and along the transmission ROW. Habitat loss is considered the greatest threat to swift fox populations throughout its range. Swift fox are known to forage in prairie dog colonies.

3.7.1 Environmental Impacts: Proposed Action

Construction of the Proposed Action would result in habitat modification and could subject individuals to disturbance, injury, or mortality. Some small and less-mobile wildlife, such as amphibians and reptiles, could be crushed or buried by construction equipment. During transmission line trenching, small mammals, amphibians, and reptiles may become entrapped in open trenches; however, this impact would be reduced by the measures described below. In addition, vehicle use along highways and access roads could increase the potential for vehicle-wildlife collisions, especially during construction activities when the volume of traffic would be higher. There would be no risk of removal of bird nests or bat roosts from tree clearing during construction or operation because no trees would be removed.

The use of directional drilling below the Cheyenne River would eliminate potential habitat disturbance for northern river otter, American dipper, blacknose shiner, longnose shiner, and sturgeon chub.

Construction would temporarily disturb 15 acres of general wildlife habitat located along the existing ROW. Burrowing owl could be impacted if they are present at the two known nesting sites adjacent to the Project Area during construction, but impacts would be limited through implementation of construction buffers and timing restrictions.

A total of 250 acres of grasslands would be impacted throughout the long-term operational duration of the Project. Although grass and forb cover beneath solar panels is anticipated to reestablish following construction, the presence of the panels would reduce the productivity of the habitat and fragment habitat for some species. Some species, such as mice, voles, rabbits, birds such as mourning dove, and some reptiles may be able to use the ground beneath the solar panels for nesting, shelter, or foraging habitat, so the area could continue to support a prey base for other nearby species. In addition to the actual footprint of the panels, wildlife movement may change or be restricted due to fences around the substation and solar generating facility that further fragment the area through the creation of a barrier. The burrowing owl, upland sandpiper, long-billed curlew, western meadowlark, sharp-tailed grouse, grasshopper sparrow, and yellow-billed cuckoo are the sensitive species associated with grasslands and, as such, the most likely to be affected by this project's reduction of available grasslands. Effects of fragmentation include avoidance of the area and could result in decreased density, survival, and/or reproduction. Sharp-tailed grouse are most likely to be impacted at the eastern edge of the project where the solar facility would remove above-average habitat.

Potential swift fox habitat would be temporarily disturbed due to vegetation removal and construction activities across 15 acres where transmission line installation would occur along county roads. The proposed powerline adjacent to the 3-acre prairie dog colony, is the most likely area where disturbance to individuals or their habitat could occur. Collisions with vehicles associated with increased traffic from construction, operation, and maintenance activities could occur if swift fox are in the area. This risk would be reduced through the reduction of speed limits within the project during construction and operation and maintenance activities.

Construction of the proposed solar generating facility and substation would disturb 250 acres of grassland habitat that could be used by swift foxes. In addition to removal of habitat, fencing at the solar generating facility and substation could result in increased habitat fragmentation and potential barriers to movement. Disturbance to individuals could occur if they are in the vicinity during solar panel

placement, ground clearing, road construction, and other infrastructure establishment activities, including increased human presence during operations of the Lookout Solar generating facility.

There would be no operational risk of avian collisions or electrocutions with above-ground power lines because the transmission line would be buried. There is a risk of bird death, injury, or electrocution through collision with solar panels which would be highest during times of poor visibility. However, this risk is reduced by the fact that the solar generating facility is not located near a water body, known roost site, or concentrated food source, so birds are not expected to take off or land near the solar panels in large numbers. Some migrating birds and bats may mistake the solar arrays for bodies of water and attempt to land, resulting in bird deaths by collision or electrocution (Kagan et al. 2014, Walston et al. 2016). Additionally, there is some concern regarding the potential for solar panels to attract insects, which may confuse panels for water. This in turn, may attract insectivorous birds and/or bats, which could elevate the risk of collision with panels (Harrison et al. 2016). Carcass searches around solar developments suggests that bird collision risk from solar panels is low (Harrison et al. 2016). However, limited research has been done to evaluate the attraction of solar arrays to birds or bats (Walston et al. 2015).

The following environmental commitments would reduce impacts to wildlife:

- No construction would occur within a 150-foot buffer of the Angostura Canal, as required by the Bureau of Reclamation around wetlands in the Project Area.
- No construction would occur within the Cheyenne River; the river would be crossed using HDD.
- Speed limits would be reduced within the Project area during construction and operation and maintenance activities.
- Ground clearing activities would not occur during the migratory bird nesting season (typically May 1 to August 15, unless: 1) surveys are performed prior to construction to identify and mark nests for avoidance or 2) potential nesting habitat is removed outside of the breeding season (i.e. mowing).
- Occupied raptor nests would be avoided during construction, following spatial buffer and timing recommendations by the USFWS. The USFWS recommends:
    - 0.25-mile buffer for Swainson's hawk between April 1st to August 31st
    - 0.25-mile buffer for Burrowing owl between April 1st to September 15th
    - If osprey nests are discovered, they would be reported to the SDGFD to determine if construction activity timing restriction buffers are warranted.
- If swift fox dens are discovered, construction activities would cease within 0.25 miles of the den during spring and summer.
- No trees would be removed within the Project Area.
- The solar generating facility and substation would be fenced using wildlife-friendly fencing techniques, as described herein. Specifically, a barbed wire fence or a woven wire fence would be used with the following specifications that would minimize impacts to mule deer, whitetail deer, and antelope. Where woven fence exclusions are used, they would be 7-8' tall and SDGFP would be contacted to conduct a site visit to assure big game animals are excluded from the fenced-in facility. Where barbed wire fence is used, the height would be 40" or less, the top two wires would be no less

than 12" apart, and the bottom wire or rail would be at least 18" from the ground. Further, barbless wire would be used for the top and bottom strands and the fence would be highly visible through use of location, marking, or materials.

- Open trenches would be backfilled, covered, or adequate wildlife escape ramps would be installed at the end of each shift to minimize entrapment of wildlife.
- Any incidental bird and bat mortality would be documented by Lookout Solar personnel and reported annually to the SDGFP and WAPA for a period of two years.

3.7.2 Environmental Impacts: No Action Alternative

No new impacts to wildlife are expected as a result of the No Action Alternative, although continued wildlife habitat loss, habitat fragmentation, and human disturbance is expected.

The No Action Alternative does not have potential to impact river otter, American dipper, blacknose shiner, longnose sturgeon, sturgeon chub, osprey, or swift fox.

3.8 Cultural Resources

A records search indicated that 33 sites have been previously documented within 3 miles of the Project Area (SWCA 2018). These include 21 Native American–affiliated sites that consist of artifact scatters, isolated finds, a quarry, and a site containing a stone circle and cairn; 11 historic-aged sites consisting of artifact scatters, farmsteads, an earthwork, a depression, a school, a well/cistern, a dam, and nonfarm ruins; and a cairn of unknown affiliation. All of the sites are either not eligible, recommended not eligible, or unevaluated for the National Register of Historic Places (NRHP) and all of the previously recorded sites fall outside the Project Area.

Field surveys were conducted in 2015 and 2018. BIA personnel and a Tribal Archaeologist inventoried the Lookout Solar generating facility, on the PRIR, in June of 2015 (LeBeau 2015). A second cultural resource inventory was completed in 2018 for the transmission line ROW and the substation, including a 200-foot buffer on these areas, where permission was granted by landowners (SWCA 2018).

Two new cultural sites and portions of the Angostura Canal, all of which are considered historic (SWCA 2018), were recorded during the 2018 inventory along the transmission line route. The first site consists of two related earthen dams determined by WAPA to be not eligible for the NRHP. The second site is a historic grave site recommended eligible for the NRHP. According to South Dakota State Historic Preservation Office (SHPO) standards, the Angostura Canal does not meet the definition of a site.

3.8.1 Environmental Impacts: Proposed Action

The Project may result in impacts to cultural resources. The historic grave site is situated approximately 15 feet from the edge of the transmission line/temporary access road ROW. Because of the grave site's proximity, the Project would implement a protective buffer of 25 feet surrounding the site. Similarly, the historic dam directly abuts the proposed substation access road and could be affected. A protective 25-foot buffer also would be implemented to protect the historic dam. The Angostura Canal, a historic cultural resource, constructed in the 1950s, would be crossed by the transmission line. Horizontal Directional Drilling would be used to cross the Canal, and the lateral ditch lies outside the transmission line ROW, so neither feature would be directly affected.

Potential impacts to cultural resources would be mitigated through the presence of a qualified construction/archaeologist monitor during ground disturbing activities. In the event of an inadvertent discovery during construction or operations, the work would be halted in the immediate area, and the cultural property would be secured and protected. Notification of inadvertent discovery would be communicated to the WAPA. If the discovery occurred on the PRIR, BIA and the THPO would also be notified. Also, the THPO would be contacted if any tribal artifacts are encountered and a tribal monitor would be present at further construction if requested by the Tribe. If the discovery occurred off-Reservation, the SHPO would be notified. WAPA, THPO, SHPO, and/or BIA, in consultation, would determine the treatment of the cultural property.

WAPA determined the Project would have no adverse impact on historic properties. The SHPO concurred with WAPA's determination on April 24, 2019. The THPO concurred with WAPA's determination on May 2, 2019. The BIA previously reached a determination of no historic properties affected for the generating facility when it completed its NEPA review in 2016. The BIA's determination was communicated to the THPO on June 18, 2015, and the THPO concurred on August 10, 2015.

3.8.2 Environmental Impacts: No Action Alternative

No new impacts to cultural resources are expected as a result of this alternative.

3.9 Land Use

Current land use in and around the area includes cattle grazing and farming. Grazing occurs within the bounds of the parcels of individually-owned trust land on the PRIR and on privately owned lands along the transmission line route and substation in Custer County. The proposed solar generating facility and substation locations are currently managed as rangeland and grazed by livestock. Farms located along the Cheyenne River receive water through the Angostura Irrigation District water delivery system, formed in 1951. Surface water from the Angostura Dam is received via the Angostura Canal and laterals. Hay is the primary agricultural crop in the area, although other commodities, such as corn, are grown in some areas along the Cheyenne River corridor. Of the 892 acres of land within the Project Area, approximately 526 acres (59%) are considered Not Prime Farmland, 187 acres (21%) are classified as Prime Farmland if Irrigated, and 178 acres (20%) are classified as Farmland of Statewide Importance (Soil Survey Staff 2017). The Prime Farmland if Irrigated lands are within the generating facility and substation sites. These lands are not currently irrigated and there is no reliable irrigation water supply source nearby, so it is unlikely that irrigation would occur in the near-term future.

Isolated rural homes occur near the Project. The highest concentration of homes in the area occurs near the irrigated crop fields along the Cheyenne River corridor. The nearest house is located approximately 130 feet west of the proposed transmission line route, on 148th Avenue, near the Angostura Canal crossing.

3.9.1 Environmental Impacts: Proposed Action

Approximately 250 acres at the solar generating facility would change from agricultural to commercial land use. In 2016, the change in land use from grazing to solar farm use was approved, as described in the Resolution (No. 16-50) of the Oglala Sioux Tribal Council of the Oglala Sioux Tribe (Trihydro

2016). This change would remove approximately 0.06% of the total land from the PRIR grazing units. Following decommissioning of the Lookout Solar Project, the land would be placed back in the tribal grazing unit.

The primary land use at the substation site is livestock grazing and therefore 10 acres of privately-owned rangeland would be converted from agricultural to commercial use. The transmission line would be located within existing County ROWs and roads; therefore, no change in land use would occur.

During the life of the Project, approximately 187 acres of Prime Farmland if Irrigated and 178 acres of Farmland of Statewide importance would be unavailable for farming. These lands are not currently irrigated and are not currently used for farming, so there would be no loss of existing farmlands. During the agency scoping phase of this EA, the NRCS reviewed the Project and concluded that no impact would occur to prime or important farmland (Appendix A). As no important farmland is anticipated to be impacted, no further assessment of farmland (e.g. Farmland Rating Impact Forms) is necessary.

3.9.2 Environmental Impacts: No Action Alternative

There would be no changes to land use. It is expected that cattle grazing and farming would continue to occur in and around the area.

3.10 Socioeconomic Conditions

The Oglala Lakota County population (14,354) comprises approximately 2% of South Dakota's total population (883,235) and the Custer County population (4,203) comprises approximately 0.5% of South Dakota's total population (883,235) (U.S. Census Bureau 2017).

Between 2013 and 2017, approximately 93% of the Oglala Lakota County residents were American Indian or Alaska Natives. In comparison, American Indian and Alaska Native populations comprised approximately 4% of all residents in Custer County, while the State of South Dakota was comprised of approximately 9% American Indian and Alaska Native Populations as a whole. An estimated 38,332 people are enrolled Oglala Lakota tribal members, of whom, approximately 19,639 reside on the PRIR (South Dakota 2016). Table 3-7 summarizes minority population characteristics for Oglala Lakota and Custer Counties, the PRIR, and the State of South Dakota.

Table 3-7. Minority Population Characteristics

	Total Population	American Indian or Alaska Native Population	Approximate Percent (%) American Indian or Alaska Native
Oglala Lakota County	14,354	13,292	92.6
Custer County	8,691	339	3.9
PRIR	19,779	16,501	83.4
South Dakota	869,666	78,270	9

Source: U.S. Census Bureau 2017

Note: Oglala Lakota County is completely encompassed within the boundaries of the Reservation. Because of this, demographic and economic characteristics of Oglala Lakota County closely reflect those of the Reservation.

With respect to low-income populations, the incidence of poverty in Oglala Lakota County (located entirely within the PRIR) is much higher than Custer County and the State of South Dakota as a whole. Table 3-8 illustrates the per capita income and poverty rates for Oglala Lakota County, Custer County, and the State of South Dakota. Over the 2013 to 2017 period, the average per capita income for Oglala Lakota County ($9,334) was approximately 70 percent lower than the per capita income for Custer County ($31,015) and approximately 67 percent lower than the per capita income for South Dakota ($28,761). Further, the proportion of residents in Oglala Lakota County living in poverty was approximately three times as high as statewide.

Table 3-8. Average Income and Poverty Rates (2010-2017)

Location	Per Capita Income ($)	Poverty Rate (%)[1]
Oglala Lakota County[2]	9,334	41.5
Custer County	31,015	11.3
South Dakota	28,761	13.0

Source: U.S. Census Bureau 2017
[1]Percentage of families and people whose income in the past 12 months was below the poverty level
[2]Per Capita income is not available for the PRIR, therefore, only Oglala Lakota County, which is completely encompassed within the boundaries of the Reservation, is included.

With approximately 41.5 percent of its population living below the poverty line and 93 percent of its population identifying themselves as American Indian or Alaska Native, Oglala Lakota County contains both low income and minority communities.

Over the 2015 to 2017 period, Oglala Lakota County had a civilian labor force of between 44% (2017) and 47% (2015), with an approximately 29% unemployment rate in 2017. Over the same period, the PRIR had an unemployment rate of approximately 19.8%, and the State of South Dakota had an unemployment rate of approximately 4% (U.S. Census Bureau 2017). However, it is important to note that the unemployment rate on the Reservation varies according to the source. For example, the American Indian Relief Council reports an 80% unemployment rate on the Reservation, and the State of South Dakota reports an 89% unemployment rate for the Reservation (American Indian Relief Council 2016, South Dakota 2010), both of which considerably differ from the 24% unemployment rate reported from the U.S. Census Bureau (2017).

Over the 2013 to 2017 period, approximately 25% of residents in Oglala Lakota County age 25 years and over were high school graduates (or equivalent) and 9.5% had a bachelor's degree or higher. Over the same period, approximately 30% of South Dakota residents age 25 years and over were high school graduates (or equivalent) and 19.5% had a bachelor's degree or higher (U.S. Census Bureau 2017).

Jobs in educational services, health care, and social assistance accounted for the largest share of those employed in Oglala Lakota County (48%) and Custer County (22%), followed by public administration, construction, and arts, entertainment, recreation, and accommodation and food services (U.S. Census Bureau 2017). The tribe and the federal government supply the majority of employment on the Reservation (America Indian Relief Council 2016).

3.10.1 Environmental Impacts: Proposed Action

The Project would cause beneficial short-term and long-term socioeconomic impacts as a result of increased employment and income. Increased jobs and income for the local community and clean energy would likely benefit minority and low-income populations in Oglala and Custer counties. Construction of the Lookout Solar Project would take approximately 12 to 18 months and would employ approximately 150 people during the construction phase. It is assumed that parts of the workforce would originate primarily from local communities, which would be a short-term beneficial impact. Once the Lookout Solar Project is constructed, it is expected to operate for approximately 30 to 40 years. During that time, up to three full-time employees would be needed for operation and maintenance activities. Furthermore, contractors would need to be used for routine maintenance activities. While this would likely not involve hiring new employees, it would be a new source of business for those contractors.

In addition to the direct benefits associated with increased employment opportunities, businesses in the communities could indirectly benefit from the workforce spending their wages (e.g. restaurants, grocery stores, hotels, gas stations, hardware stores, etc.). Overall, socioeconomic impacts from the Proposed Action are anticipated to be positive, although small in comparison to the relative economy of the two counties and the Reservation.

There would also be long-term impacts to owners of the individually-owned trust land on the PRIR. One potential adverse impact would be the landowners' loss of grazing income due to the change in land use within the Project Area. However, a beneficial impact associated with the change in land use would be the annual payments to the landowners per the lease agreement for the Project. The lease payments, while not publicly disclosed, are greater than the grazing income payments.

Cumulatively, the Project would beneficially contribute to the socioeconomic condition. This Project, along with the Red Cloud Renewable Energy Center, could promote renewable energy facility development elsewhere, increase employment opportunities on the PRIR, increase tourism, and increase revenues for the Tribe, county, and/or state.

3.10.2 Environmental Impacts: No Action Alternative

There would be no impacts to the socioeconomic conditions of Oglala Lakota or Custer Counties, or the Reservation; population and employment rates would be expected to stay the same.

3.11 Visual Resources

The visual resources of the Project area are characterized by smooth hills and ridges, with rounded tops and a series of buttes and benches (Malo 1997). Wide panoramic vistas with a prevailing sky dominate the area. Attributes of the Project Area and vicinity include cattle grazing, agricultural improvements such as stock tanks and fences, dispersed rural residential homes, and single lane roads; however, despite these man-made attributes, the area is predominantly barren. Figures 3-15 through 3-17 provide an example of the visual resources that are typical of the Project and surrounding area.

In addition to the rural agriculture and dispersed homes common throughout the area, the Stronghold South Unit of Badlands National Park is located approximately 5 miles northeast of the Project. Further, a lookout location in Badlands National Park (i.e., Red Shirt Table Overlook), is located approximately

6.5 miles from the Project; however, the lookout faces away from the Project. The topography of the area between the Project and the Badlands National Park, Stronghold South Unit, is dominated by smooth hills and ridges, with mixedgrass prairie. The relief of the region is about 3,000 feet; the highest elevation reaches approximately 3,300 feet.

3.11.1 Environmental Impacts: Proposed Action

The Project would create adverse or beneficial long-term impacts to the visual environment, depending on the opinion of the observer (as suggested in Tsoutsos et al. 2005). Construction of the Project would convert grazing land to commercial use. The new construction and man-made attributes (e.g., the O&M building, solar array, and substation) would add new colors and texture to the viewshed. The Lookout Solar generating facility would be visible from the immediate surrounding area, including from BIA Route 2 (located to the south of the Project) and possibly from Red Shirt Table Overlook in the Badlands National Park. However, since the overlook is positioned to face the opposite direction of the Project and the topography of the area between the Project and Badlands National Park is dominated by a series of smooth hills and ridges with mixedgrass prairie, the Project is not likely to impact the viewshed from the overlook. In addition, the proposed Lookout Solar generating facility could be observed from the highest buttes in the Badlands National Park Stronghold South Unit (South Unit).

Overall, potential impacts to visual resources immediately surrounding the Project (whether they are adverse or beneficial) would be limited because of the area's sparse population, low volume of travelers along the roadways, and limited number of visitors (i.e. 9,500) the South Unit receives each year (NPS and Oglala Sioux Tribe 2012).

3.11.2 Environmental Impacts: No Action Alternative

Under the No Action Alternative, there would be no new impacts to visual resources.

Figure 3-11: View of the Southern Boundary of the Solar Generating Facility from BIA Route 2 (Facing North)

Figure 3-12: View of the Approximate middle of the Solar Generating Facility (Facing South)

Figure 3-13: View of the Northern Boundary of the Solar Generating Facility (Facing Southwest)

3.12 Roads and Traffic

Roads in the Project Area are limited to BIA Route 2 and four roads: Riverside Road, 148th Avenue, Cottonwood Cutoff, and a single no-name two-track road. BIA Route 41 is located approximately 5 miles east of the Project and runs north to south along the west boundary of Badlands National Park. BIA 2, which makes up the southern boundary of the Project, runs east to west and parallels the southern boundary of Badlands National Park to the east. BIA Route 2 has typical traffic volumes of less than 10 vehicles per day, while BIA Route 41 has typical traffic volumes of less than 100 vehicles per day. An overview of the road network in and around the Project is shown on Figure 3-16.

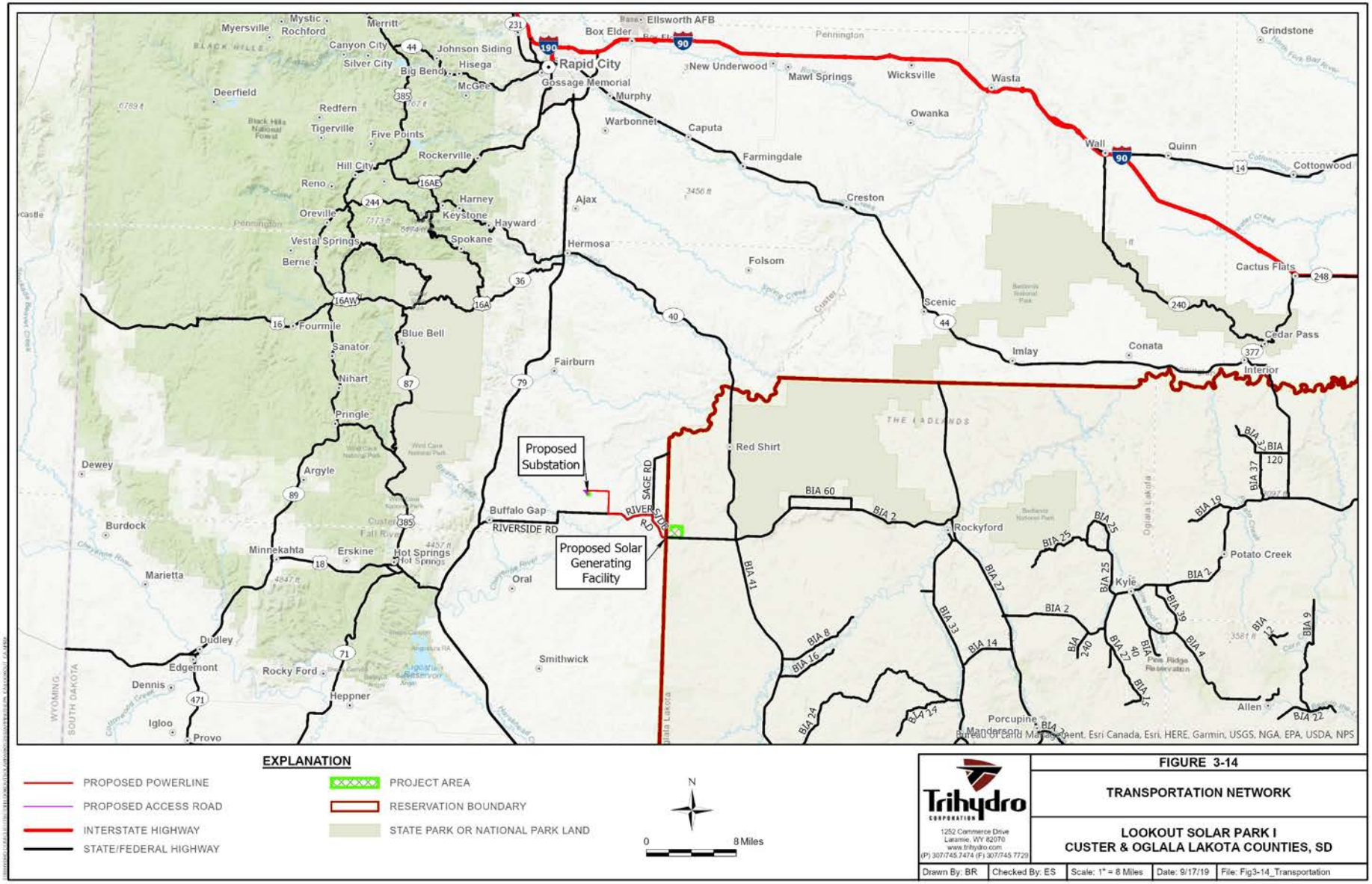
3.12.1 Environmental Impacts: Proposed Action

Approximately 50 workers would travel to and from the Project daily during the 12- to 18-month construction period. Up to 150 workers may travel to the site during peak construction, when solar panel installation would occur. In addition, haul truck traffic would increase during construction due to the transport of building materials and solar panels. However, the increase in traffic would only occur during the construction period. Although construction activities associated with the Proposed Action would result in an adverse impact to roads and traffic, primarily, to rural and nearly vacant roads. In addition, these impacts would be temporary due to the limited period for the construction phase.

In addition, it is expected that there will be up to 150 visitors to the Lookout Solar generating facility each year. It is assumed that the majority of these visitors would be transported via bus from local schools. Similar to the impacts from construction traffic, impacts from traffic during operations would cause negligible impacts to roads and traffic. For example, the addition of 10 vehicles to BIA Route 2 would double the daily traffic; however, it is not known which routes employees would utilize for travel to and from the Project, including how long they would drive on BIA Route 2. When the location and rural setting of the Project is considered with the additional traffic, impacts are expected to be long-term but minimal.

3.12.2 Environmental Impacts: No Action Alternative

There would be no new or additional impacts to roads and traffic.


Proposed Substation
Proposed Solar Generating Facility
RIVERSIDE RD
SAGE RD
Rapid City
Ellsworth AFB
Box Elder
Gossage Memorial
New Underwood
Mawl Springs
Wicksville
Wasta
Grindstone
Pennington
Murphy
Owanka
Warbonnet
Caputa
Farmingdale
Wall
Quinn
Cottonwood
Creston
Ajax
Hermosa
Folsom
Scenic
Cactus Flats
Cedar Pass
Imlay
Conata
Interior
Fairburn
Red Shirt
Rockyford
Potato Creek
Kyle
Porcupine
Allen
Smithwick
Oral
Buffalo Gap
Hot Springs
Erskine
Minnekahta
Marietta
Burdock
Dewey
Argyle
Pringle
Nihart
Sanator
Fourmile
Blue Bell
Berne
Vestal Springs
Spokane
Keystone
Harney
Hayward
Oreville
Reno
Hill City
Rockerville
Five Points
Tigerville
Redfern
Deerfield
Mystic
Rochford
Merritt
Myersville
Canyon City
Silver City
Big Bend
Hisega
McGee
Johnson Siding
Dudley
Edgemont
Dennis
Igloo
Provo
Rocky Ford
Heppner
Bureau of Land Management, Esri Canada, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS
EXPLANATION
PROPOSED POWERLINE
PROPOSED ACCESS ROAD
INTERSTATE HIGHWAY
STATE/FEDERAL HIGHWAY
PROJECT AREA
RESERVATION BOUNDARY
STATE PARK OR NATIONAL PARK LAND
N
0
8 Miles
Trihydro CORPORATION
1252 Commerce Drive
Laramie, WY 82070
www.trihydro.com
(P) 307.745.7474 (F) 307.745.7729
FIGURE 3-14
TRANSPORTATION NETWORK
LOOKOUT SOLAR PARK I
CUSTER & OGLALA LAKOTA COUNTIES, SD
Drawn By: BR
Checked By: ES
Scale: 1" = 8 Miles
Date: 9/17/19
File: Fig3-14_Transportation

3.13 Cumulative Impacts

A cumulative impact is the impact on the environment that results from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The cumulative impacts to each resource area were described in the sections above.

Past and present actions that were considered in the cumulative impacts assessment include the construction and operation of the Red Cloud Renewable Energy Center, which is located approximately 30 miles southeast of the Project. The center provides hands-on training in renewable energy applications for Native American students and builds solar air furnaces. Construction and operation of renewable energy facilities across the State of South Dakota is also occurring. In 2015, approximately 50-70% of the state's net electricity was supplied by wind and hydroelectric power (U.S. EIA 2018). Recent road projects in the area include the replacement of the Buffalo Gap Cheyenne River Bridge (Riverside Road) in 2014 and widening of South Dakota State Highway 79 from two to four lanes in late 2015. This highway is located approximately 20 miles west of the Project, and it serves as a major transportation corridor through the state.

Reasonably foreseeable actions include potential development of additional solar power facilities in Custer and Oglala Lakota Counties, on the Reservation, and across the state, as well as the continued promotion of renewable energy at the Red Cloud Renewable Energy Center. The U.S. EIA (2018) indicates the PRIR has some of the greatest solar power potential in the state. There are no other known major projects in the area that should be evaluated in conjunction with this project for cumulative effects.

4. LIST OF PREPARERS

An interdisciplinary team of natural resource specialists employed by Trihydro assisted in the preparation of this EA under the supervision of WAPA. The team that prepared this EA is provided below in Table 4-1.

Table 4-1. Preparers of the EA

Name	Role/Section Prepared
Jana White	Project Director; Quality Assurance
Erik Schmude	Project Manager, Chapters 1 and 2, Vegetation; Threatened, Endangered, and Candidate Species; Paleontology; Cultural Resources; Land Use; Visual Resources; Cumulative Effects
Katherin White	Quality Assurance; document formatting
Ted Koller	Air Quality; Climate Change and Greenhouse Gases; Socioeconomic Conditions
Brian Robeson	GIS Mapping
Sam Joseph	Wetlands; Soils; Water Resources
Taylor Berge	Wildlife; Environmental Justice
Parker Coit	Geology cross-sections, surficial geology figure

Table 4-2 includes the names of individuals who were consulted with and who provided input on the development of the EA.

Table 4-2. Individuals Who Provided Technical Support, Management, and/or Review of the EA

Name	Affiliation
Christina Gomer	NEPA Project Management, WAPA
David Kluth	Regional Archeologist, WAPA
Alyssa Fellow	Biologist, WAPA
Christian Bohn	Lookout Solar Park I, LLC
Steffen Steinel	Lookout Solar Park I, LLC
Shani Harmon	Lookout Solar Park I, LLC

5. REFERENCES

Amelon, S., and Burhans, D. 2006. Conservation assessment: *Myotis septentrionalis* (northern long-eared bat) in the eastern United States. Pages 69-82 in Conservation assessments for five forest bat species in the eastern United States, Thompson, F. R., III, editor. U.S. Department of Agriculture, Forest Service, North Central Research Station, General Technical Report NC-260. St. Paul, Minnesota. 82pp.

American Indian Relief Council. 2016. South Dakota: Pine Ridge Reservation. Available from: http://www.nrcprograms.org/site/PageServer?pagename=airc_res_sd_pineridge.

Baker, A., P. Gonzalez, R.I.G. Morrison, and B.A. Harrington (2013). Red Knot (*Calidris canutus*), version 2.0. In The Birds of North America (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.563

Benton, R.C., Terry, D.O., Evanoff, E., and McDonald, H.G. 2015. The White River Badlands. Bloomington, Indiana: Indiana University Press.

Bierregaard, R.O., A.F. Poole, M.S. Martell, P.Pyle, and M.A. Patten (2016). Osprey (*Pandion haliaetus*), version 2.0. In The Birds of North America (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.683

Canadian Wildlife Service and U.S. Fish and Wildlife Service (CWS and USFWS). 2007. International recovery plan for the whooping crane (*Grus americana*). Ottawa: Recovery of Nationally Endangered Wildlife (RENEW), and U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 162 pp.

Federal Emergency Management Agency (FEMA). 2018. Flood zone A. Available from: https://www.fema.gov/zone.

Harrington. B.A. 2001. Red knot (*Calidris canutus*). *In* A. Poole, and F. Gill eds. The Birds of North America, Inc., Philadelphia, PA.

Harrison, C., L. Huw, and C. Field. 2016. Evidence review of the impact of solar farms on birds, bats, and general ecology. Manchester Metropolitan University.

Kagan, R. A., T. C. Viner, P. W. Trail, and E. O. Espinoza. 2014. Avian mortality at solar energy facilities in Southern California: A preliminary analysis. National Fish and Wildlife Forensics Laboratory. Ashland, Oregon. 28 pp.

LeBeau, S.C., II. 2015. Surface reconnaissance survey proposed solar energy farm, Renewable Alternative Power Productions Inc. (RAPP), Oglala Lakota County, South Dakota. BIA, Aberdeen, South Dakota.

Malo, D. 1997. South Dakota's physiographic regions. Aberdeen, SD. Available from: http://www3.northern.edu/natsource/EARTH/Physio1.htm.

National Park Service (NPS). n.d. Paleontology in the White River Badlands. National Park Service, Badlands National Park. Paleontology-Bulletin.

National Park Service (NPS). 2016. Badlands animals. Available from: http://www.nps.gov/badl/learn/nature/_animals.htm.

National Park Service (NPS) and Oglala Sioux Tribe. 2012. South Unit Badlands National Park. Final General Management Plan and Environmental Impact Statement. Available from: https://parkplanning.nps.gov/document.cfm?parkID=117&projectID=17543&documentID=47117

Natural Resources Conservation Service (NRCS). 2007. Sharp-tailed grouse (*Typanuchus phasianellus*). Fish and Wildlife Habitat Management Leaflet. Number 40. Available online at: https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_010110.pdf.

Natural Resources Conservation Service (NRCS). 2016. Oglala Aquifer Initiative. Available online at: https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/sd/home/?cid=stelprdb1048809.

Newstead, D.J., L.J. Niles, R.R. Porter, A.D. Dey, J. Burger, and O.N. Fitzsimmons. 2013 . Geolocation Reveals mid-continent migratory routes and Texas wintering areas of Red Knots *Calidris canutus rufa*. Wader Study Group Bulletin 120: 53–59.

Owen, S.F., M. Menzel, W.M. Ford, B.R. Chapman, K.V. Miller, J.W. Edwards, P.B. Wood. 2003. Home-range size and habitat used by the northern Myotis (*Myotis septentrionalis*). American Midland Naturalist 150:352-359.

Radeke, R.E. 1971. Soil survey of Shannon County, South Dakota. USDA Soil Conservation Service and U.S. Department of the Interior Bureau of Indian Affairs, in cooperation with SD Agricultural Experiment Station.

Schmidt, C.A. 2003. Conservation assessment for the northern myotis in the Black Hills National Forest South Dakota and Wyoming. U.S. Department of Agriculture, Forest Service.

Southern Black Hills Water System (SBHWS). 2017. SBHWS article: The value of water on tap. Available online at: http://www.southernblackhillswater.com/sbhws-artricle.html.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture (NRCS and USDA). 2017. Web Soil Survey. Available online at the following link: https://websoilsurvey.sc.egov.usda.gov/.

South Dakota. 2010. Oglala Sioux Tribe's 2010 Statistical Profile.

South Dakota. 2016. Oglala Sioux Tribe. South Dakota Department of Tribal Relations. Available from: http://www.sdtribalrelations.com/oglala.aspx.

South Dakota Department of Game, Fish, and Parks (SDGFP). 2014. South Dakota wildlife action plan and data explorer. 583 pp. Available from: https://gfp.sd.gov/wildlife-action-plan/.

South Dakota Department of Game, Fish, and Parks (SDGFP). 2016. State and federally listed threatened, endangered, and candidate species documented in South Dakota by county. Available from: https://gfp.sd.gov/userdocs/docs/ThreatenedCountyList.pdf.

South Dakota Department of Game, Fish, and Parks (SDGFP). 2018. Email correspondence between Trihydro and SDGFP on August 8, 2018.

Stahlecker, D. W. 1992. Using National Wetlands Inventory maps to quantify whooping crane stopover habitat in Oklahoma. Proceedings North American Crane Workshop 6:62-68.

SWCA. 2018. A Level III cultural resource inventory of the proposed Lookout Solar Project, Custer and Oglala Lakota Counties, South Dakota. Prepared for Trihydro. 68pp.

Tacha, M. n.d. USFWS unpublished data. Whooping crane sightings along the migration route.

Theile, Jason; Bakker, K.; Dieter, C. 2013. Multiscale nest Site Selection by Burrowing Owls in Western South Dakota. The Wilson Journal of Ornithology. 763–774 pp.

Tisza, K. 2014. GIS-based suitability modeling and multi-criteria decision analysis for utility scale solar plants in four states in the Southeast U.S. All Theses. Paper 2005. Available from: http://tigerprints.clemson.edu/all_theses/2005/.

Trihydro. 2016. Solar Farm Environmental Assessment Pine Ridge Indian Reservation. Tribal Council of The Oglala Sioux Tribe Resolution No. 16-50

Trihydro. 2018a. Aquatic Resource Inventory Report: Lookout Solar Project, Custer and Oglala Lakota Counties, South Dakota. Laramie, WY. 108 pp.

Trihydro. 2018b. Biological Resource Report: Lookout Solar Project, Custer and Oglala Lakota Counties, South Dakota. Laramie, WY. 65 pp.

Tsoutsos, T., Frantzeskakib, N., and Gekas, V. 2005. Environmental impacts from the solar energy technologies. Energy Policy 33 (2005) 289–296.

U.S. Census Bureau. 2017. 2010-2017 American community survey 5-year estimates. Available from: http://factfinder.census.gov/faces/nav/jsf/pages/guided_search.xhtml.

U.S. Energy Information Administration (EIA). 2018. South Dakota state energy profile. February 15, 2018. Available from: https://www.eia.gov/state/analysis.cfm?sid=SD.

U.S. Environmental Protection Agency (EPA). 2013. Level III ecoregions of the continental United States. Corvallis, Oregon, U.S. EPA – National Health and Environmental Effects Research Laboratory, map scale 1:7,500,000, https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states.

U.S. Environmental Protection Agency (EPA). 2014. 2014 National Emissions Inventory. Available from: https://www3.epa.gov/ttn/chief/net/2014inventory.html.

U.S. Environmental Protection Agency (EPA). 2015. Current nonattainment counties for all criteria pollutants. Available from: https://www3.epa.gov/airquality/greenbook/ancl.html.

U.S. Fish and Wildlife Service (USFWS). 1996. Western prairie fringed orchid recovery plan (*Platanthera praeclara*). U.S. Department of Interior. 101 pp. Available at: https://www.fws.gov/southdakotafieldoffice/WPFO%20recovery%20plan.pdf.

U.S. Fish and Wildlife Service (USFWS). 2013a. Western prairie fringed orchid (*Platanthera praeclara*). Available from: http://www.fws.gov/northdakotafieldoffice/endspecies/species/western_prairie_fringed_orchid.htm.

U.S. Fish and Wildlife Service (USFWS). 2013b. Recovery plan for the black-footed ferret (*Mustela nigripes*). U.S. Fish and Wildlife Service, Denver, Colorado. 157 pp.

U.S. Fish and Wildlife Service (USFWS). 2015. Black-footed Ferret (*Mustela nigripes*). Denver, Colorado: U.S. Fish and Wildlife Service Mountain-Prairie Region 6.

U.S. Fish and Wildlife Service (USFWS). 2018a. Central flyway whooping crane sightings through spring 2018. GIS shapefiles provided by the U.S. Fish and Wildlife Service Nebraska Ecological Services Field Office.

U.S. Fish and Wildlife Service (USFWS). 2018b. Range-wide Indiana bat survey guidelines. April 2018. Available from: https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2018RangewideIBatSurveyGuidelines.pdf.

U.S. Geological Survey (USGS). 2001. Geochemistry of the Madison and Minnelusa Aquifers in the Black Hills Area, South Dakota. Water-Resources Investigations Report 01-4129. 118 pp.

U.S. Geological Survey (USGS). 2011. Gap Analysis existing vegetation type [shapefile]. Wildland Fire Science, Earth Resources Observation and Science Center, U.S. Geological Survey.

U.S. Geological Survey (USGS). 2013. Potentiometric surface mapping of the Arikaree Aquifer, Pine Ridge Indian Reservation, and Bennett County, South Dakota. Available from: http://sd.water.usgs.gov/projects/PineRidgePotentio/PineRidgePotentio.html.

U.S. Geological Survey (USGS). 2014. Geologic units in Shannon County, SD: Pierre Shale, Carlile Shale, and Niobrara Formation. Available from: U.S. Department of the Interior-USGS geology query facility via the internet: (http://mrdata.usgs.gov/geology/state/fips-unit.php?code=f46113).

Walston, L.J., K.E Rollins, K.P. Smith, K.E. LaGory, K. Sinclair, C. Turchi, T. Wendelin, and H. Souder. 2015. A Review of Avian Monitoring and Mitigation Information at Existing Utility-Scale Solar Facilities. Prepared for the U.S. Department of Energy. April 2015. Available online at: http://www.evs.anl.gov/downloads/ANL-EVS_15-2.pdf.

Walston, L.J., Rollins, K.E., LaGory, K.E, Smith, K.P, Meyers, S.A. 2016. A preliminary assessment of avian mortality at utility-scale solar energy facilities in the United States. Renewable Energy 92. 405-414. Available at: https://ac.els-cdn.com/S0960148116301422/1-s2.0-S0960148116301422-main.pdf?_tid=4a547b64-cb80-4a5f-b4f4-5b1eeae69bb5&acdnat=1547586806_4ccc1d12ebaccf7fe3b373ec90057bc9.

Yates, D., M. Ingalls, L. Eaton, and N. Pau. 2014. Home range analysis and roost tree selection of northern long-eared (*Myotis septentrionalis*) and eastern small-footed bats (*Myotis leibii)* at Great Bay NWR, NH. [Poster]. Northeastern Bat Working Group Meeting, Clinton, New Jersey.

Appendix A: Public Involvement Information

Appendix B: Aquatic Resource Inventory Report

Appendix C: Biological Resources Inventory Report