APPENDIX D – AGENCY OUTREACH AND COORDINATION

Agency, Group, or Organization	Outreach	Summary of Correspondence
Federal		
U.S. Department of Defense	10/19/2023	The agency has not provided a response to the 2023 notification letter.
U.S. Department of Defense - Siting Clearinghouse	6/20/2024; 9/9/2024	The DoD indicated that the solar project, located in Richland County, North Dakota, as proposed, will have minimal impact on military operations conducted in the area.
Minot Airforce Base	10/19/2023; 6/6/2024	The agency has not provided a response to the 2023 or 2024 notification letter.
Federal Aviation Administration	6/18/2024	FAA Notice Criteria Tool indicated the Project did not exceed Notice Criteria.
Grand Forks Air Force Base	6/6/2024	The agency has not provided a response to the 2024 notification letter.
U.S. Fish and Wildlife Service	10/19/2023; 1/30/2024; 3/5/204; 5/22/2024; 7/15/2024; 9/6/2024	Initial response received on 1/4/2024; call with agency on 1/30/2024; on 9/6/2024, the USFWS indicated that no additional pre-construction surveys would be requested at this time.
United Stated Army Corps of Engineers	10/19/2023	Initial response received on 1/4/2024; additional consultation pending the need for wetland permitting.
USDA - Natural Resources Conversation Service	6/6/2024; 9/27/2024; 10/3/2024; 10/72024	Initial response received on 6/17/2024; seeding and vegetation management guidance provided. Vegetation management plan provided for review on 9/27/2024. On 9/27/2024, the USDA-NRCS provided some additional minor suggestions regarding seed mix composition and species. Tetra Tech responded and noted that the suggestions would be incorporated into an updated vegetation management plan and that the updated plan would be provided as soon as completed. On 10/3/2024, the USDA-NRCS commented they agreed with the tree species comments provided by Richland County Soil Conservation District. On 10/7/2024, the updated vegetation management plan was sent to the USDA-NRCS.
US Department of the Interior - Bureau of Land Management Montana/Dakotas	6/6/2024	The agency has not provided a response to the 2024 notification letter.
State		
Job Service of North Dakota	10/19/2023	The agency has not provided a response to the 2023 notification letter.

Agency, Group, or Organization	Outreach	Summary of Correspondence
North Dakota Aeronautics Commission	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Attorney General	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Department of Agriculture	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Department of Career and Technical Education	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Department of Commerce	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Department of Environmental Quality	6/13/2024; 9/12/2024	In a letter dated July 2, 2024, NDDEQ provided guidance on the Colfax glacial drift aquifer, fugitive dust emissions during construction, solid waste materials, and permit for discharging stormwater runoff. NDDEQ also stated that it owns no land in or adjacent to the proposed Project and has no planned projects in the area. The NDDEQ also stated that it believes the proposed activities are consistent with the State Implementation Plan for the Control of Air Pollution for the State of North Dakota. On September 12, 2024, the NDDEQ sent the same letter provided on July 2, 2024, but with a signature.
North Dakota Department of Human Services	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Department of Labor	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Department of Transportation	10/19/2023	Initial response received on 11/2/2023; Project should have no adverse effect on the NDDOT highways; however, Utility Permit from NDDOT Fargo District Office would be needed before installing any utilities within the Interstate ROW
North Dakota Department of Trust Lands	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Department of Trust Lands - Energy Infrastructure & Impact Office	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Department of Trust Lands - Minerals Management Division	10/19/2023	Initial response received on 10/25/2023; the Project does not affect state trust lands
North Dakota Department of Trust Lands - Surface Management Division	10/19/2023	The agency has not provided a response to the 2023 notification letter.

Agency, Group, or Organization	Outreach	Summary of Correspondence
North Dakota Division of Community Services	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Department of Water Resources	10/19/2023	Initial response received on 11/14/2023; Project needs to work with local floodplain administrator if FEMA floodplains are impacted. Agency requested to be notified regarding 1) proposed Project impacts to water resources (streams, river, ag drain, wetlands, dikes, and levees), 2) if surface or groundwater is needed for Project, and 3) if water observation well is encountered.
North Dakota Economic Development and Finance Division	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Federal Aviation Administration	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Forest Service	6/13/2024	The agency has not provided a response to the 2024 notification letter.
North Dakota Game and Fish Department	10/19/2023; 1/30/2024; 3/6/2024; 3/27/2024; 5/22/2024; 7/9/2024	Initial response received on 1/4/2024; call with agency on 1/30/2024; consultation ongoing.
North Dakota Geological Survey	10/19/2023; 10/25/2023	Initial response received on 10/25/2023; site-specific geotechnical engineering and materials testing in a manner consistent with the current standard-of-care for similar construction projects in the Red River Valley would be recommended given the scope and extent of this project.
North Dakota Governor's Office	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Indian Affairs Commission	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Industrial Commission	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota Parks and Recreation Department	10/19/2023	Initial response received on 10/25/2023; The project does not appear to affect properties NDPRD owns, leases, or manages. The projects does not appear to affect properties protected under Section 6(f) of the LWCF no known plant and animal species of concern or significant ecological communities are documented within or immediately adjacent to the project site.
North Dakota Pipeline Authority	10/19/2023	The agency has not provided a response to the 2023 notification letter.

Agency, Group, or Organization	Outreach	Summary of Correspondence
North Dakota Soil Conservation Committee	10/19/2023; 1/10/2024; 1/18/2024; 1/22/2024	Initial response received on 12/12/2023; follow-up communication requested additional project information, which was provided. On 1/22/2024, an email sent on behalf of the committee notified the project that attendance at the Spring 2024 meeting would not be needed. The committee were pleased to see that the Project was coordinating with the local Weed Mgmt. board, Richland County Board of Commissioners, NRCS, and Richland County SCD. If the committee has future questions, they will reach out to the Project.
North Dakota State Department of Health	10/19/2023	The agency has not provided a response to the 2023 notification letter.
North Dakota State Historical Society	10/19/2023	Initial response received on 11/22/2023; SHSND recommended completing a Class I literature review including discussions on known and unknown historic and prehistoric resources and recommendations as to Class III survey areas. The Project has completed a Class I literature review and Class III survey of the Project Area. These results will be submitted to the SHSND in on September 17, 2024.
North Dakota Transmission Authority	10/19/2023	The agency has not provided a response to the 2023 notification letter.
County		
Richland County Commissioner	1/25/2024	The agency has not provided a response to the 2024 notification letter.
Richland County Noxious Weed Board	11/20/23; 1/25/2024; 7/17/2024; 9/27/2024; 10/7/2024	In November 2023, Richland County Commissioner and Weed Board member Mr. Perry Miller verbally indicated that the biggest concern that the weed board had for this area was leafy spurge. The agency has not provided a response to the January 2024 notification letter, or an email sent in July 2024. Vegetation management plan provided for review on 9/27/2024. On 10/7/2024, the updated vegetation management plan was sent to the Richland County Noxious Weed Board.

Agency, Group, or Organization	Outreach	Summary of Correspondence
Richland County Soil Conservation District	1/25/2024; 6/17/2024; 9/27/2024; 10/3/2024; 10/7/2024	Initial response received on 6/17/2024; this site is a very high salt area, which should be taken into consideration when planning the seed mix. Kochia and leafy spurge most likely will be your weed pressure. Barley nurse crop should be used when seeding. The clover and flowers will probably get taken out with the first pass of chemical spray, so site prep is going to be key. Vegetation management plan provided for review on 9/27/2024. On 9/27, the Richland County Soil Conservation District provided seconded the suggestions regarding seed mix composition and species from the USDA-NRCS. Tetra Tech responded and noted that the suggestions would be incorporated into an updated vegetation management plan and that the updated plan would be provided as soon as completed. On 10/3/2024, the Richland County Soil Conservation District commented on proposed tree species. On 10/7/2024, the updated vegetation management plan was sent to the Richland County Soil Conservation District.
Richland County Floodplain Administrator	1/25/2024; 4/11/2024	Initial response received on 4/11/2024; the FEMA floodplain was updated in the early 2000s and is considered updated. What is shown on the county's GIS system is what is the most updated and accurate.
Red River Joint Water Resource District	1/25/2024	The agency has not provided a response to the 2024 notification letter.
Township		
Abercrombie Township Board Chair	1/25/2024	The agency has not provided a response to the 2024 notification letter.
Abercrombie Fire Department	1/25/2024	The agency has not provided a response to the 2024 notification letter.
Walcott-Colfax Rural Fire Protection District	1/25/2024	The agency has not provided a response to the 2024 notification letter.

FLICKERTAIL
SOLAR PROJECT

Date

To Whom It May Concern,
Agency
Address 1
Address 2

Subject: Requesting Comments on Flickertail Solar in Richland County, North Dakota

Dear To Whom It May Concern,

Tetra Tech has been contracted by Flickertail Solar, LLC to prepare an application for a Certificate of Site Compatibility for the proposed Flickertail Solar project (the Project), in accordance with North Dakota Century Code (NDCC) Section 49-22-07. This proposed Project is located south of Colfax in Abercrombie Township, Richland County and would consist of multiple solar arrays located on approximately 3,500 acres of private, leased land, which is referred to as the Project Study Area (see attached figures and table below).

Civil Township Name	Township	Range	Section
Abercrombie	134	49	3, 5, 8-12, 14-16, 22

The proposed Project would generate up to 300 megawatts (MW) of alternating current (AC) solar energy with a battery energy storage system (BESS) capable of up to 150 MW/600 MWh hours of storage and include the following permanent facilities:

- photovoltaic (PV) solar panels and tracking racking systems;
- inverters;
- transformers;
- underground and aboveground electrical collection lines;
- security fencing and gates and equipment;
- new access roads, ingress/egress points, and improvements to existing roads (as needed);
- an operations and maintenance (O&M) facility;
- a collector substation;
- a 230-kV overhead gen-tie line;
- BESS;
- Supervisory Control and Data Acquisition (SCADA) system;
- control house for protective relay panels and site controllers;

FLICKERTAIL
SOLAR PROJECT

- Meteorological equipment including, but not limited to, up to six (6) anemometer meteorological (MET) monitoring weather stations;
- Stormwater basins and/or other stormwater/drainage measures, as needed; and
- additional temporary facilities, including: laydown yard(s), improvements to public and private roads and driveways for delivery of materials and equipment, as needed.

Construction is anticipated to begin in fall of 2025, with intended completion by the end of 2027.

Per Section 69-06-01-05 of the North Dakota Public Service Commission (PSC)'s administrative rules, we are consulting your agency for assistance in identifying concerns or issues within the boundaries of Project Study Area that would influence a decision regarding the use of the land, as well as applicable permits that may be required from your office.

We would appreciate a response within 30 days of receiving this letter. If you require further information or have questions regarding this matter, please contact me at 612-643-2237 or at adam.holven@tetratech.com

Sincerely,

Adam Holven
Tetra Tech, Inc
2001 Killebrew Drive, Suite 141
Bloomington, MN 55425

Enclosures: Figure 1: Overview Map
Figure 2: Detailed Map

Project Location in North Dakota



Project Study Area

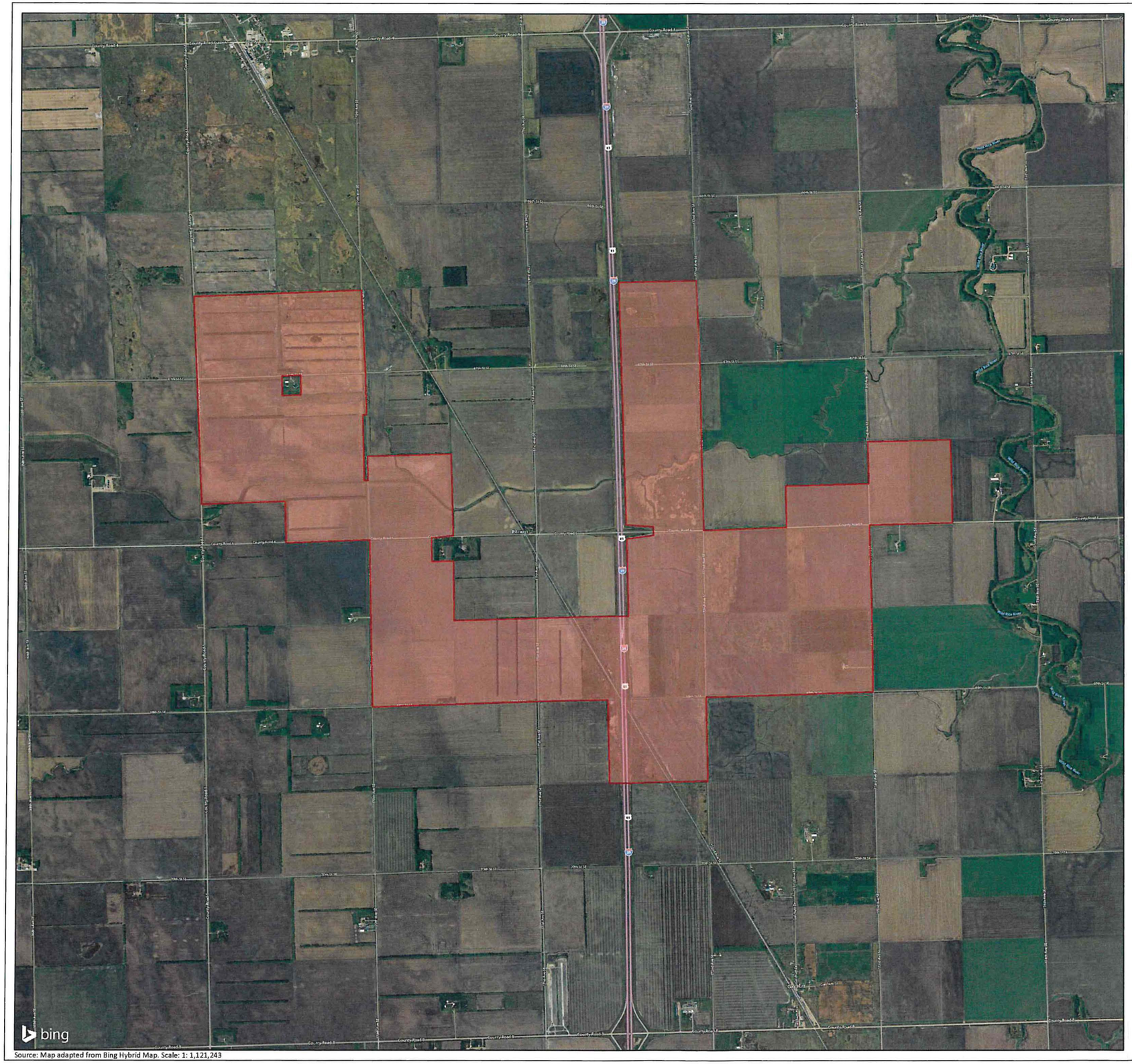
0 0.25 0.5 0.75 1 1.25 1.5 Miles

N

Figure 1: Overview Map
Flickertail Solar
Richland County, North Dakota

TETRA TECH

Source: Map adapted from ArcGIS World Street Maps. Scale: 1: 6,790,068



Source: Map adapted from Bing Hybrid Map. Scale: 1: 1,121,243

Project Location in Richland County



Project Study Area

0 0.25 0.5 0.75 1 Miles

N

Figure 2: Detailed Map
Flickertail Solar
Richland County, North Dakota

TETRA TECH

U.S. Army Corps of Engineers

Holven, Adam

From: Carlberg, Hadden Jorvik CIV USARMY CENWO (USA) <Hadden.J.Carlberg@usace.army.mil>
Sent: Wednesday, November 8, 2023 12:39 PM
To: Holven, Adam
Cc: Nygard, Jeremy S CIV USARMY CENWO (USA)
Subject: SOV Response for NWO-2023-01660 (Flickertail Solar Project)
Attachments: NWO-2023-01660_20231103_SOV-Response.pdf; Eng_Form_6082_Sep 2022.pdf

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Good Afternoon Mr. Holven,

Our office has reviewed the information provided to us by you regarding the abovementioned proposed project and have determined a U.S. Army Corps of Engineers Section 404 permit may be required for your project. Please see attached letter and blank application form. Thank you,

V/R,
Hadden J. Carlberg
DA Fellow, Environmental Resources Specialist
U.S. Army Corps of Engineers
North Dakota Regulatory Office
3319 University Dr
Bismarck, ND 58504
701-255-0015 ext. 2012

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
NORTH DAKOTA REGULATORY OFFICE
3319 UNIVERSITY DRIVE
BISMARCK, NORTH DAKOTA 58504-7565

November 7, 2023

NWO-2023-01660-BIS

Tetra Tech, Inc.
Attn: Mr. Adam Holven
2001 Killebrew Drive, Suite 141
Bloomington, Minnesota 55425

Dear Mr. Holven:

This is in response to your solicitation letter received on October 30, 2023, requesting Department of the Army (DA), United States Army Corps of Engineers (Corps) comments on the proposed Flickertail Solar project. The project is located throughout Sections 3, 5, 8-12, 14-16, and 22 in Township 134 North, Range 49 West, Abercrombie Township, Richland County, North Dakota.

U. S. Army Corps of Engineers Regulatory Offices administer Section 404 of the Clean Water Act (Section 404). A Section 404 permit would be required for the discharge of dredge or fill material (temporarily or permanently) in waters of the United States. Waters of the United States may include, but are not limited to, rivers, streams, ditches, coulees, lakes, ponds, and their adjacent wetlands. Fill material includes, but is not limited to, rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mines or other excavation activities and materials used to create any structure or infrastructure in waters of the United States.

Based on the information contained in your letter, the Corps has determined that your proposed project may need a Clean Water Act Section 404 permit. The permit application and instructions for completing the application are enclosed and may also be found at: http://www.usace.army.mil/Missions/Civil-Works/Regulatory-Program-and-Permits/Obtain-a-Permit. Be sure to accurately describe all proposed work and construction methodology. Once the application is complete, mail it to the letterhead address or to the email address (preferred) below.

The North Dakota Regulatory office prefers that all submissions are sent electronically to the following email address: CENWO-OD-RND@usace.army.mil instead of a hard copy by mail. Please split large attachments (>25 MB) into multiple emails if needed.

Printed on Recycled Paper

Please refer to identification number NWO-2023-01660-BIS in any correspondence concerning this project. If you have any questions, please contact Hadden Carlberg at U.S. Army Corps of Engineers, North Dakota Regulatory Office, 3319 University Drive, Bismarck, North Dakota 58504-7565, by email at Hadden.J.Carlberg@usace.army.mil, or telephone at (701) 255-0015 ext. 2012. For more information regarding our program, please visit our website at http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/NorthDakota.aspx.

Sincerely,



Toni R. Erhardt
Senior Project Manager
North Dakota Section

Enclosure

U.S. Department of Agriculture - Natural Resources Conservation Service

From: Holven, Adam
To: Quast, Jonathan - FPAC-NRCS, ND; Klostreich, Jen - FPAC-NRCS, ND; Christina Martens
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management
Date: Monday, October 7, 2024 1:06:00 PM
Attachments: image001.png
Final_Flickertail_VegetationManagementPlan_2024-10-07.pdf

Hi Jon and Jen,

Please find attached the revised vegetation management plan for Flickertail Solar. After some internal discussion, the Project choose to remove the trees from the pollinator mix (outside array). These were initially included as visual screening, but have been removed and replaced with side oats gamma and little bluestem. Tree planting, if required, will comply with the North Dakota Public Service Commission's tree and shrub mitigation plan. Species composition and placement will be coordinated with the North Dakota Forest Service and participating landowners, and adhere to setbacks outlined by Abercrombie Township. The Project may also explore options within the surrounding community to coordinate on tree/shrub planting or engage in other activities that would provide long-term wildlife habitat and conservation benefits.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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From: Quast, Jonathan - FPAC-NRCS, ND
To: Klostreich, Jen - FPAC-NRCS, ND; Holven, Adam; Christina Martens
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management
Date: Thursday, October 3, 2024 2:13:55 PM
Attachments: image001.png

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I agree with Jen on species and alternating, I would pick a couple and list others as alternatives in your document that way you have as much flexibility as possible.

Jon

Jonathan Quast
NRCS District Conservationist
Wahpeton Field Office
1725 17th Ave N
Wahpeton, ND 58075
Work: (701) 892-3222
Cell: (701) 971-3123
jonathan.quast@usda.gov

From: Klostreich, Jen - FPAC-NRCS, ND <Jen.Klostreich@nd.nacdnet.net>
Sent: Thursday, October 3, 2024 1:29 PM
To: Holven, Adam <adam.holven@tetratech.com>; Quast, Jonathan - FPAC-NRCS, ND <jonathan.quast@usda.gov>; Christina Martens <cmartens@savionenergy.com>
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management

Both of those species would be fine. Ponderosa Pine would be another alternative. I would use several of these species. Black Hills and Colorado Spruce can be alternated... Better to have a little variety. Ponderosa Pine would need to be planted by itself due to growth pattern differences.

Just my thoughts

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Thursday, October 3, 2024 1:02 PM
To: Klostreich, Jen - FPAC-NRCS, ND <Jen.Klostreich@nd.nacdnet.net>; Quast, Jonathan - FPAC-NRCS, ND <jonathan.quast@usda.gov>; Christina Martens <cmartens@savionenergy.com>
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management

Hi Jen and Jon,

We have addressed nearly all your edits and a question regarding a replacement for

Arborvitae. As an alternative, we are considering black hills white spruce (*Picea glauca var. densata*) or Colorado spruce (*Picea pungens*), though the former appears to do better in wetter areas and is resistant to some diseases. Are there any concerns with either of these species?

Jen, you mentioned below other conifer species, where there any that you had in mind?

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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From: Quast, Jonathan - FPAC-NRCS, ND
To: Holven, Adam; Christina Martens; Klostreich, Jen - FPAC-NRCS, ND
Cc: Quast, Jonathan - FPAC-NRCS, ND
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management
Date: Friday, September 27, 2024 8:58:31 AM
Attachments: image001.png

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Morning Adam,

I've finished reviewing your vegetation management plan and overall, I think it looks good, but I do have a few minor suggestions.

First, on your Tall Prairie Grazing Mix, I would maybe reduce the percentage of prairie cord grass just because once mature, you might have avoidance issues and then you'll have selective overgrazing on more desirable species. I think you could slightly raise the percentage of other grass species other than big bluestem.

Second, your Wet Prairie Mixes (grazing & mowing) have smooth brome in them. I would highly recommend not planting smooth brome, as it will inevitably move in on its own and it tends to take over and reduce species composition and move toward monoculture. Due to saline and wet conditions, a possible alternative which you have in another mix is Western Wheatgrass. I would consider adding to the mix and either keeping the same percentage or bring it in at 10 percent and modifying other grass percentages except big bluestem.

Third, more continuity than anything, you have Ratibida columnifera under 2 different common names (prairie coneflower & upright coneflower). I would suggest only using one common name throughout the mix list to avoid confusion.

Lastly, consideration should be given to management of tree seedlings long term as I see Eastern Red Cedar and Arborvitae in the mix. The district would be better suited for comment but from past experience, ERC can be prolific and will need management to keep the pollinator habitat open and functional while also providing the reduction in wind.

Thank you for providing the opportunity for comment.

Jon

Jonathan Quast
NRCS District Conservationist
Wahpeton Field Office

1725 17th Ave N
Wahpeton, ND 58075
Work: (701) 892-3222
Cell: (701) 971-3123
jonathan.quast@usda.gov

From:	Holven, Adam
To:	Quast, Jonathan - FPAC-NRCS, ND; Christina Martens; Klostreich, Jen - FPAC-NRCS, ND
Subject:	RE: [External Email]Re: Flickertail Solar Project Vegetation Management
Date:	Friday, September 27, 2024 7:55:00 AM
Attachments:	image001.png Flickertail Solar Project_Vegetation Management Plan_2024-09-17.pdf

Good morning, Jon

Based on the information provided by the NRCS and the Richland County Soil Conservation District, Flickertail Solar Project has developed a vegetation management plan for the Project (attached). The Project would like to offer the NRCS an opportunity and comment on the document.

The Project is preparing to submit its Certificate of Site Compatibility to the North Dakota Public Service Commission in the upcoming weeks. The Project will continue to work with the NRCS and submit any additional comments from your office to the North Dakota Public Service Commission.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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See Appendix K – Vegetation Management Plan

From:	Quast, Jonathan - FPAC-NRCS, ND
To:	Christina Martens; Klostreich, Jen - FPAC-NRCS, ND
Cc:	Holven, Adam; Quast, Jonathan - FPAC-NRCS, ND
Subject:	RE: [External Email]Re: Flickertail Solar Project Vegetation Management
Date:	Monday, June 17, 2024 9:15:47 AM
Attachments:	image001.png 512_ND_PS_Pasture_and_Hay_Planting_2020.pdf 550_ND_PS_Range_Planting_2022.pdf

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Good morning,

Coordination and site prep are going to be key players in a successful vegetation establishment and management strategy. The "native" mix will most likely be mixed between native and introduced as a large portion of the soils designated for this project are saline or have potential for saline issues which will necessitate that if you want a healthy full stand, incorporating introduced species will be required. You also have quite a few acres of sands which may limit the species available to grow well in that environment.

I've attached a couple of NRCS's seeding specifications. In the 512 attachment pages 17-18 and in the 550 attachment pages 13-17 show species suitability in our MLRA 56. If you choose to use clovers and other broadleaves, you may be limited in the weed control as spraying for weeds will be near impossible if want anything other than grasses. Leafy spurge, kochia, and thistles will be your largest weed problems.

I'm not sure on how your construction timeline would work but I would recommend that a couple of years of soybeans to help control initial weed pressure then once infrastructure in installed, maybe think about working the land to break up the compaction from the construction vehicles and seed a temporary cover such as barley all depending on the time of year. Weed management in the first 2-3 years is crucial and will need to be done multiple times throughout establishment period, so I would plan on at least 2-3 clippings per year for 3 years at minimum. I would also seed at a slightly heavier rate (1.5x) due to seedling loss from saline.

If you have any other follow-up questions or would like more specific information, we would be happy to assist if we can.

Thanks,

Jon

Jonathan Quast
NRCS District Conservationist

Wahpeton Field Office
1687 Bypass Road
Wahpeton, ND 58075
Work: (701) 892-3222
Cell: (701) 971-3123
jonathan.quast@usda.gov

From: Christina Martens <cmartens@savionenergy.com>
Sent: Monday, June 17, 2024 8:14 AM
To: Quast, Jonathan - FPAC-NRCS, ND <jonathan.quast@usda.gov>; Klostreich, Jen - FPAC-NRCS, ND <Jen.Klostreich@nd.nacdnet.net>
Cc: Holven, Adam <adam.holven@tetratech.com>
Subject: [External Email]Re: Flickertail Solar Project Vegetation Management

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[External Email]
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Trying a resend as Jan was kicked back to me....

Jon and Jan,

I am reaching out on behalf of Savion and the Flickertail Solar Project (attached is the Abercrombie Township approved draft site plan). I have talked to Jon previously regarding this upcoming PSC application. I just wanted to reach out again and introduce myself and Adam Holven from Tetra Tech.

I am the permitting and environmental lead for the Flickertail Solar project here at Savion, and we are working with Tetra Tech to gather all the field data and create the required application pieces for our PSC application. Adam is our contact there and cc'd on this email.

We are anticipating a mid-July application and wanted to reach out to see if there was any input or thoughts that either of you had when it comes to the Vegetation Management Plan, seed mixes, management, weed control, or anything else. The plan is to seed the solar array with a "native" type seed mix that contains clover, low growing grasses, and flowers. There will then be trees planted for screening and replacements in strategic places outside the perimeter fence along with pollinator habitat. The weed board has already indicated the weed they are most concerned about is leafy spurge. Any other insight you may have on these aspects would be appreciated as we draft the plan.

Once the plan is drafted, we plan to send it to you for review and comment. However, given the

short timeframe before the planned submission, if you know of any concerns or requests we can incorporate up front, please let us know.

I appreciate your time in this manner.

Christina Martens | Director of Permitting & Environmental

Future PTO June 17 - July 12, 2024 - Limited availability

M: 816.266.6384 | Savion, LLC



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CONSERVATION PRACTICE SPECIFICATION

Range Planting - 550

Range Planting – 550 shall be planned and applied in accordance with the standard detailed in the Field Office Technical Guide (FOTG) - Section IV – Conservation Practices. This document provides additional parameters, recommendations, references, and requirements for developing site-specific plans for this practice.

1. **Refer to Herbaceous Vegetation Establishment Guide (FOTG, Section I- Reference Subjects) for:**
   - Seeding dates (Part 1)
   - Seedbed preparation (Part 2)
   - Seeding equipment (Part 3)
   - Drill Calibration (Part 4)
   - Seed requirements (Part 5)
   - Seeding depth (Part 6)
   - Cover and companion crops (Part 7)
   - Management and protection during establishment (Part 8)
   - Procedure for stand evaluation (Part 9)

2. **Seed Mix Requirements**
   a. All 550 Range Planting seed mixes must contain a minimum of 5% forbs.
   b. Total forb percentage cannot exceed 25%.
   c. Individual forb species cannot exceed 5% (however there are selected forb species that cannot exceed 2% due to their competitiveness, please see the tables below).

3. **Selecting Species and Varieties**
   a. Determine the Ecological Sites from the soils information located in either the Web Soil Survey or the county specific Interpretive Table in FOTG – Section II – Soil Information subsection.
   b. Refer to Table 1 of this guide for recommended species and percent minimums and maximums for the Ecological Site(s).
   c. Refer to Herbaceous Vegetation Establishment Guide for approved named varieties and full seeding rates of native grasses, forbs and shrubs. Use named varieties when available.

4. **Planning Considerations**
   a. Where water erosion is a concern, all tillage and seeding operations should be performed across the general slope of the fields where appropriate. When seeding into light textured soils, adequate cover is required to prevent excessive erosion.
   b. For improved germination, scarification of legumes with hard seed coats is recommended. Scarification is especially important with the following species: purple prairie clover, white prairie clover, leadplant and Canada milkvetch.
   c. Slender wheatgrass and Canada Wildrye are short-lived species but establish rapidly and provides quick cover.

5. Guidelines for stand evaluation

a. Stand must have a minimum density of two rhizomatous grass plants per square foot, or four plants per square foot for bunchgrasses or mixtures of bunch and rhizomatous type grasses; or in the case of grass/legume/forb mixtures, two grass plants and one legume or forb plant per square foot.

b. See Part 9 of Herbaceous Vegetation Establishment Guide for additional guidance on stand evaluation.

c. All stands must go through at least one winter before making final stand evaluation.

6. Established stand management

a. Grazing - Refer to Prescribed Grazing-528 Specification for management after establishment. All conservation practices are located in FOTG – Section IV – Conservation Practices.

b. Other management practices that may apply after establishment: Herbaceous Weed Management-315, Prescribed Burning-338, Upland Wildlife Habitat Management-645.

7. Documentation

a. Use ND-CPA-9 (electronic or hardcopy) to document practice planning and installation. All forms are located in FOTG – Section IV – Forms.

Ecological Site Description Abbreviations

Badlands Fan (BF)	Saline Overflow (SOv)	Shallow Marsh (SwM)
Choppy Sands (CS)	Saline Lowland (SL)	Stony Hills (SH)
Clayey (Cy)	Saline Subirrigated (SSb)	Subirrigated (Sb)
Clayey Terrace (CyT)	Sands (Sa)	Subirrigated Sands (SbSa)
Claypan (Cp)	Sandy (Sy)	Thin Clayey (TCy)
Closed Depression (CD)	Sandy Claypan (SyCp)	Thin Claypan (TCp)
Limy Sands (LSa)	Sandy Terrace (SyT)	Thin Loamy (TLy)
Limy Subirrigated (LSb)	Savannah (Sv)	Thin sands (TSa)
Limy Residual (LR)	Shallow Clayey (SwCy)	Very Shallow (VS)
Linear Meadow (LrM)	Shallow Loamy (SwLy)	Wet Land (WL)
Loamy (Ly)	Shallow Sandy (SwSy)	Wet Meadow (WM)
Loamy Overflow (LyOv)	Shallow Gravel (SwG)	
Loamy Terrace (LyT)		

Table 1. Recommended Species by Ecological Site for MLRA 53A & 53B

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). **5/** Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	Cp & TCp	CS / Tsa	Cy	LSb	Ly / LyS	LyOv/Ov	Sa	Sb	SL / SOv	SM / WL	SwG & VS	SwLy/SwCy	Sy	SyCp	Tly / TCy	WM / LrM
Grasses 1/																	
Alkali sacaton (SPAI)	5-10	5-10								5-10					5-10		
American managrass (GLGR)											5-20						
American sloughgrass (BESY)	5-10										5-10						5-10
Big bluestem (ANGE)				5-10	5-30	5-20	5-30		5-30	5-30				5-10			
*Bluebunch wheatgrass (PSSP6)																	
Blue joint grass (CACA4)	5-10				5-10		5-10		5-10		5-10						5-10
Blue grama (BOGR2)		5-20	5-20	5-10	5-10	5-10	5-10	5-10	5-10			5-20	5-20	5-10	5-10	5-10	
Buffalograss (BODA2)		5-20													5-10		
Canada wildrye (ELCA4)	5-10	5-10	5-20	5-10	5-10	5-10	5-10	5-20	5-10	5-10		5-10	5-10	5-10	5-10	5-10	5-10
Fowl bluegrass (POPA2)	5-10			5-10	5-10				5-10	5-10	5-10			5-10		5-10	5-20
Fowl manna grass (GLST)	5-10						5-10		5-10	5-10	5-10						5-10
Green needlegrass (NAVI4)		5-20		5-30	5-10	5-30	5-20	5-10	5-20			5-10	5-10	5-20	5-20	5-20	
Indiangrass (SONU2)					5-10		5-10		5-10								
*Indian ricegrass (ACHY)																	
Inland Saltgrass (DISP)		5-10		5-10	5-10					5-10						5-10	5-10
Little bluestem (SCSC)		5-10	5-30	5-10	5-30	5-10	5-20	5-20	5-20			5-30	5-30	5-10	5-20	5-30	
Needleandthread (HECO26)		5-20	5-20	5-10		5-10	5-10	5-20				5-20	5-20	5-10	5-20	5-10	
Northern reedgrass (CASTI3)																	5-30
Nuttall alkaligrass (PUNU2)	5-20	5-10								5-10							
Porcupinegrass (HESP11)				5-10	5-20	5-10	5-10	5-10	5-20					5-20		5-20	
Prairie cordgrass (SPPE)	5-10				5-10				5-10	5-20	5-30						5-30
Prairie dropseed (SPHE)					5-10	5-10	5-10		5-10								
Prairie junegrass (KOMA)		5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10			5-10	5-10	5-10	5-10	5-10	
Prairie sandreed (CALO)			5-30					5-30				5-10	5-10	5-20	5-30	5-10	

Table 1. Recommended Species by Ecological Site for MLRA 53A & 53B

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). **5/** Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	Cp & TCp	CS / Tsa	Cy	LSb	Ly / LyS	LyOv/Ov	Sa	Sb	SL / SOv	SM / WL	SwG & VS	SwLy/SwCy	Sy	SyCp	Tly / TCy	WM / LrM
Sand bluestem (ANHA)			5-30					5-30				5-10		5-20	5-20		
Sand dropseed (SPCR)			5-10					5-10				5-10		5-10	5-10		
Sideoats grama (BOCU)		5-10	5-20	5-20	5-20	5-20	5-20	5-20	5-20			5-20	5-20	5-10	5-20	5-20	
Slender wheatgrass (ELTR7)	5-20	5-20		5-10	5-10	5-10	5-10	5-10	5-10	5-20	5-10	5-20	5-10	5-10	5-20	5-10	
Switchgrass (PAVI2)	5-10	5-10		5-10	5-20	5-10	5-10		5-20	5-10				5-10			5-10
Thickspike Wheatgrass (ELLAP)	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10		5-10	5-10	5-10	5-10	5-10	5-10
Western wheatgrass (PASM)	5-30	5-30	5-10	5-20	5-20	5-20	5-20	5-10	5-20	5-40		5-20	5-20	5-30	5-30	5-20	5-20
Whitetop (SCFE)	5-20										5-30						5-20
Slough sedge (CAOB3)	5-20										5-30						5-10
Forbs 2/																	
Alexander																	
Golden (ZIAU)							*		*								*
Heart-Leaved (ZIAP)							*		*								*
American vetch (VIAM)				*	*	*	*	*	*					*	*	*	
Aster																	
Blue (SYLA3)					*	*	*		*					*			
Heath (SYER)		*		*	*	*	*		*					*			
New England (SYNO2)							*		*								*
Black-eyed susan **3/** (RUHI2)			*	*	*	*	*	*	*			*		*		*	*
Blanketflower (GAILL)		*		*		*						*		*	*	*	
Blue vervain (VEHA2)									*								*
Canada anenome (ANCA8)					*	*	*		*			*				*	*
Canada tickclover (DECA7)					*		*		*								
Columbine, red (AQCA)							*		*								

Table 1. Recommended Species by Ecological Site for MLRA 53A & 53B

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). **5/** Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	Cp & TCp	CS / Tsa	Cy	LSb	Ly / LyS	LyOv/Ov	Sa	Sb	SL / SOv	SM / WL	SwG & VS	SwLy/SwCy	Sy	SyCp	Tly / TCy	WM / LrM
Coneflower																	
Black samson (ECAN2)			*	*		*		*				*	*	*	*	*	
Greyhead (RAPI)		*	*	*		*		*				*	*	*	*	*	
Prairie (yellow) **3/** (RACO3)		*	*	*		*		*				*	*	*	*	*	
Cudweed sagewort **3/** (ARLU)		*	*			*	*	*				*		*			
Culver's root (VEVI4)					*		*		*								
Cup plant (SIPE2)							*		*								*
Evening primrose (OEBI)				*	*	*	*	*	*					*			*
False boneset (BREU)					*				*								*
False sunflower **3/** (HEHE5)			*			*		*	*					*			
Gayfeather																	
Dotted (LIPU)		*	*	*		*		*				*	*	*		*	
Meadow (LILI)	*					*	*										*
Thickspike (LIPY)	*						*										*
Giant blue hyssop (AGFO)				*		*	*							*			
Goldenrod																	
Canada (SOCA6)				*		*								*			
Missouri (SOMI2)			*	*		*		*				*	*	*		*	
Stiff (SORI2)			*					*						*		*	
Tall Smooth (SOGI)	*			*	*		*		*	*				*			*
Harebell (CARO2)			*	*	*			*				*	*	*		*	
Hoary vervain (VEST)						*	*	*						*			
Illinois bundleflower (DEIL)				*		*	*		*					*			*
Indian breadroot (PEES)				*		*		*				*	*	*		*	
Ironweed (VEFA2)					*	*	*		*								*
Joe Pye weed (EUMA9)					*				*								*
Lewis flax (LILE3)				*	*	*		*	*					*		*	

Table 1. Recommended Species by Ecological Site for MLRA 53A & 53B

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). **5/** Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	Cp & TCp	CS / Tsa	Cy	LSb	Ly / LyS	LyOv/Ov	Sa	Sb	SL / SOv	SM / WL	SwG & VS	SwLy/SwCy	Sy	SyCp	Tly / TCy	WM / LrM
Milkvetch																	
Canada (ASCA11)		*	*	*	*	*	*	*	*					*			
Groundplum (ASCR2)						*		*				*	*	*		*	
Milkweed **6/**																	
Butterfly (ASTU)							*	*						*			
Showy (ASSP)	*		*		*		*		*					*		*	*
Swamp (ASIN)	*																*
Partridge pea **6/** (CHFA2)						*								*			
Pasqueflower (PUPAP2)			*			*		*				*	*	*		*	
Plains Coreopsis (COTI3)				*	*	*	*		*					*			*
Prairie clover																	
Purple (DAPU5)		*	*	*		*	*	*				*	*	*	*	*	
Silky (DAVI)			*					*				*		*			
White (DAAL)		*		*	*	*	*		*			*		*		*	
Prairie onion (ALST)				*		*		*						*		*	
Prairie Phlox (PHAN4)							*		*								*
Prairie Smoke (GETR)			*	*				*				*	*	*		*	
Purple meadow rue (THDA)					*				*								*
Rocky mountain bee plant (CLSE)					*	*	*	*	*					*			
Scarlet globemallow (SPCO)		*		*		*						*	*			*	
Shell-leaf penstemon (PEGR7)			*					*						*			
Silvery lupine **6/** (LUAR3)				*		*										*	
Sneezeweed (HEAU)	*				*				*								*
Spiderwort																	
Long Bract (TRBR)		*	*	*	*	*	*		*	*							*
Pairie (TROCO)			*					*						*			

Table 1. Recommended Species by Ecological Site for MLRA 53A & 53B

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). **5/** Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	Cp & TCp	CS / Tsa	Cy	LSb	Ly / LyS	LyOv/Ov	Sa	Sb	SL / SOv	SM / WL	SwG & VS	SwLy/SwCy	Sy	SyCp	Tly / TCy	WM / LrM
Sunflower																	
Maximillian (HEMA2)				*	*	*	*	*	*					*			*
Sawtooth (HEGR4)																	
Stiff **3/** (HEPA19)		*	*	*	*	*	*	*	*			*	*	*	*	*	
Western yarrow **3/** (ACMIO)	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	
Wild bergamot (MOFI)						*	*		*					*			
Shrubs 2/																	
Buffaloberry (SHEPH)							*			*			*			*	
Chokecherry **6/** (PRMA9)						*	*										
False indigo (AMNA)					*	*	*		*								*
Fourwing Saltbush (ATCA2)																	
Gardner saltbush (ATGA)																	
Golden Currant **4/** (RIAU)		*		*	*	*	*		*					*	*	*	
Juneberry (AMAL2)						*	*									*	
Leadplant (AMCA6)			*	*		*	*	*				*		*	*	*	
Prairie rose (ROAR3)		*	*	*	*	*		*	*			*	*	*	*	*	
Western snowberry (SYOC)				*	*	*	*	*	*			*		*		*	
*Winterfat (KRASC)																	
*WY big sagebrush (ARTRW8)																	

1/ Minimum of four grass species including at least one warm and/or cool season species.
2/ Forbs and shrubs will be limited to a maximum of 25% of the total mixture. Except those species noted in footnote #3, individual forb and shrub species will be limited to 5% of the mixture.
3/ These species will be limited to no more than 2% of the mixture.
4/ Golden currant is not rated for Thin Claypan
5/ For ESD's not listed in the table please consult your area specialist
6/ Research indicates partridge pea, milkweeds, lupines, and chockcherry can be toxic to livestock

Table 2. Recommended Species by Ecological Site for MLRA 54, 58C, & 58D

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). **5/** Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	Cp / TCp	CS / Tsa	Cy	CyT	LSa	Ly	LyT	LyOv	Sa	Sb	SL	SwCy	SwG / VS	SwLy	SwM / WL	SwSy	Sy	SyCp	SyT	Tly / LiR	WM
Grasses 1/																						
Alkali sacaton (SPAI)	5-10	5-10									5-10							5-10				
American managrass (GLGR)															5-20							
American sloughgrass (BESY)	5-10														5-10							5-10
Big bluestem (ANGE)				5-10	5-15		5-20	5-15	5-30		5-30							5-10		5-10		
Bluebunch wheatgrass (PSSP6)												5-20	5-20	5-20	5-20	5-20						
Blue joint grass (CACA4)	5-10								5-10		5-10	5-10			5-10							5-10
Blue grama (BOGR2)		5-30	5-20	5-20	5-10	5-10	5-10	5-10	5-10	5-10	5-10		5-10	5-20	5-20		5-20	5-10	5-10	5-15	5-10	
Buffalograss (BODA2)		5-30		5-10			5-10											5-10		5-10		
Canada wildrye (ELCA4)	5-10	5-10	5-20	5-10	5-10	5-10	5-10	5-10	5-10	5-20	5-10	5-10		5-10	5-10		5-20	5-10	5-10	5-10	5-10	5-10
Fowl bluegrass (POPA2)	5-10																					5-20
Fowl manna grass (GLST)	5-10								5-10		5-10	5-10			5-10							5-10
Green needlegrass (NAVI4)		5-20		5-30	5-30	5-10	5-30	5-20	5-20	5-10	5-20		5-20	5-10	5-10		5-10	5-20	5-20	5-20	5-20	
*Indiangrass (SONU2)																						
Indian ricegrass (ACHY)			5-10											5-10								
Inland Saltgrass (DISP)	5-10	5-10		5-10	5-10						5-10										5-10	5-10
Little bluestem (SCSC)		5-10	5-30	5-10	5-10	5-30	5-10		5-20	5-20	5-20		5-20	5-30	5-30		5-30	5-10	5-20	5-10	5-30	
Needleandthread (HECO26)		5-20	5-20	5-10	5-10	5-20	5-10	5-10	5-10	5-20			5-20	5-20	5-20		5-20	5-10	5-20	5-10	5-10	
Northern reedgrass (CASTI3)																						5-30
Nuttall alkaligrass (PUNU2)	5-20	5-10									5-10											
Porcupinegrass (HESP11)				5-10	5-10		5-10	5-20	5-10		5-20							5-10		5-10	5-20	
Prairie cordgrass (SPPE)	5-10										5-10	5-20				5-30						5-30
Prairie dropseed (SPHE)									5-10		5-10											
Prairie junegrass (KOMA)		5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10		5-10	5-10	5-10		5-10	5-10	5-10	5-10	5-10	

Table 2. Recommended Species by Ecological Site for MLRA 54, 58C, & 58D

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). **5/** Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	Cp / TCp	CS / Tsa	Cy	CyT	LSa	Ly	LyT	LyOv	Sa	Sb	SL	SwCy	SwG / VS	SwLy	SwM / WL	SwSy	Sy	SyCp	SyT	Tly / LiR	WM
Prairie sandreed (CALO)			5-30			5-30				5-30				5-10	5-10		5-30	5-20	5-30	5-30	5-10	
Sand bluestem (ANHA)			5-30			5-30				5-30				5-10			5-30	5-20	5-20	5-30		
Sand dropseed (SPCR)			5-10			5-10				5-10				5-10			5-10	5-10	5-10	5-10		
Sideoats grama (BOCU)		5-10	5-20	5-20	5-20	5-20	5-20	5-20	5-20	5-20	5-20		5-20	5-20	5-20		5-20	5-10	5-20	5-10	5-20	
Slender wheatgrass (ELTR7)	5-20	5-20		5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-20	5-10	5-20	5-10	5-10	5-10	5-10	5-20	5-10	5-10	5-10
Switchgrass (PAVI2)					5-10		5-10	5-10	5-10		5-20	5-10						5-10		5-10		5-10
Thickspike Wheatgrass (ELLAP)	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10	5-10		5-10	5-10	5-10	5-10	5-10	5-10
Western wheatgrass (PASM)	5-30	5-30	5-10	5-20	5-30	5-20	5-20	5-30	5-20	5-10	5-20	5-40	5-30	5-20	5-20		5-10	5-30	5-30	5-20	5-20	5-30
Whitetop (SCFE)	5-20															5-20						5-20
Slough sedge (CAOB3)	5-20															5-30						5-10
Forbs 2/																						
Alexander																						
Golden (ZIAU)									*		*											*
*Heart-Leaved (ZIAP)																						
American vetch (VIAM)				*			*		*	*	*							*	*		*	
Aster																						
Blue (SYLA3)							*		*		*							*				
Heath (SYER)		*		*			*		*		*							*				
New England (SYNO2)									*		*											*
Black-eyed susan 3/ (RUHI2)									*	*				*				*				*
Blanketflower (GAILL)		*		*			*	*					*	*			*	*	*		*	
Blue vervain (VEHA2)											*											*
Canada anenome (ANCA8)						*	*		*	*	*										*	*
Canada tickclover (DECA7)									*		*											
Coneflower																						
Black samson (ECAN2)		*	*	*		*	*	*		*		*	*	*	*		*	*			*	

Table 2. Recommended Species by Ecological Site for MLRA 54, 58C, & 58D

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). **5/** Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	Cp / TCp	CS / Tsa	Cy	CyT	LSa	Ly	LyT	LyOv	Sa	Sb	SL	SwCy	SwG / VS	SwLy	SwM / WL	SwSy	Sy	SyCp	SyT	Tly / LiR	WM
Greyhead (RAPI)		*	*	*	*		*	*		*			*	*	*		*		*	*	*	
Prairie (Yellow) **3/** (RACO3)		*	*	*	*	*	*	*	*	*			*	*	*		*	*	*	*	*	
Columbine, red (AQCA)									*		*											
Cudweed sagewort **3/** (ARLU)		*		*	*		*	*	*	*	*			*				*	*	*		
Culver's root (VEVI4)									*		*											
*Cup plant (SIPE2)																						
Evening primrose (OEBI)			*	*			*		*	*								*		*		
False boneset (BREU)											*											*
False sunflower **3/** (HEHE5)			*				*	*		*	*							*		*		
Gayfeather																						
Dotted (LIPU)			*	*	*	*	*	*		*			*	*	*		*	*	*	*	*	
Meadow (LILI)																						
Thickspike (LIPY)	*								*													*
*Giant blue hyssop (AGFO)																						
Goldenrod																						
Canada (SOCA6)				*			*										*					
Missouri (SOMI2)			*	*	*	*	*	*		*			*	*	*		*	*		*	*	
Stiff (SORI2)			*			*				*							*	*		*		
Tall Smooth (SOGI)	*			*	*		*	*	*		*	*									*	*
Harebell (CARO2)			*	*			*			*				*			*	*			*	
Hoary vervain (VEST)							*		*	*								*				
Illinois bundleflower (DEIL)																						
Indian breadroot (PEES)				*			*			*			*	*	*		*	*			*	
Ironweed (VEFA2)							*		*		*											*
Joe Pye weed (EUMA9)											*											*
Lewis flax (LILE3)		*	*	*	*	*	*	*	*	*	*		*	*	*		*	*	*	*	*	

Table 2. Recommended Species by Ecological Site for MLRA 54, 58C, & 58D

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). **5/** Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	Cp / TCp	CS / Tsa	Cy	CyT	LSa	Ly	LyT	LyOv	Sa	Sb	SL	SwCy	SwG / VS	SwLy	SwM / WL	SwSy	Sy	SyCp	SyT	Tly / LiR	WM
Milkvetch																						
Canada (ASCA11)				*	*		*	*	*		*									*		
Groundplum (ASCR2)							*	*		*				*	*		*	*		*	*	
Milkweed **6/**																						
Butterfly (ASTU)									*	*								*				
Showy (ASSP)	*		*			*			*		*											*
Swamp (ASIN)																*						*
Partridge pea **6/**(CHFA2)							*											*				
Pasqueflower (PUPAP2)			*				*			*			*	*	*		*	*			*	
Plains Coreopsis (COTI3)									*		*											*
Prairie clover																						
Purple (DAPU5)			*	*	*	*	*	*	*	*	*		*	*	*		*	*	*	*	*	*
Silky (DAVI)			*							*				*			*	*		*		
White (DAAL)				*	*		*	*	*		*				*			*		*	*	
Prairie onion (ALST)				*						*				*			*	*				
Prairie Phlox (PHAN4)									*		*											*
Prairie Smoke (GETR)			*	*			*			*			*	*	*		*	*			*	
Purple meadow rue (THDA)											*											*
Rocky mountain bee plant (CLSE)							*		*	*	*							*				
Scarlet globemallow (SPCO)		*		*	*		*	*					*	*	*						*	
Shell-leaf penstemon (PEGR7)			*							*								*	*	*		
Silvery lupine **6/** (LUAR3)				*			*											*			*	
Sneezeweed (HEAU)	*										*											*
Spiderwort																						
Long Bract (TRBR)		*		*	*		*	*	*			*										*
Pairie (TROCO)			*			*				*								*		*		

Table 2. Recommended Species by Ecological Site for MLRA 54, 58C, & 58D

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). **5/** Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	Cp / TCp	CS / Tsa	Cy	CyT	LSa	Ly	LyT	LyOv	Sa	Sb	SL	SwCy	SwG / VS	SwLy	SwM / WL	SwSy	Sy	SyCp	SyT	Tly / LiR	WM
Sunflower																						
Maximillian (HEMA2)					*		*	*	*		*									*		*
*Sawtooth (HEGR4)																						
Stiff **3/** (HEPA19)		*	*	*	*	*	*	*	*	*	*		*	*	*		*	*	*	*	*	
Western yarrow **3/** (ACMIO)	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*	
Wild bergamot (MOFI)					*		*	*	*		*									*		
Shrubs 2/																						
Buffaloberry (SHEPH)					*			*	*			*			*					*	*	
Chokecherry **6/** (PRMA9)					*		*	*	*											*		
False indigo (AMNA)						*		*	*		*					*						*
Fourwing Saltbush (ATCA2)		*										*	*									
Gardner saltbush (ATGA)		*										*										
Golden Currant **4/** (RIAU)				*			*	*	*		*		*	*	*			*			*	
Juneberry (AMAL2)							*		*												*	
Leadplant (AMCA6)			*		*		*	*	*	*								*	*	*		
Prairie rose (ROAR3)		*	*	*	*	*	*	*		*	*		*	*	*		*	*	*	*	*	
Western snowberry (SYOC)				*	*		*	*	*	*	*							*		*		
Winterfat (KRASC)		*		*	*		*	*					*		*						*	
WY big sagebrush (ARTRW8)				*									*		*		*					

1/ Minimum of four grass species including at least one warm and/or cool season species.
2/ Forbs and shrubs will be limited to a maximum of 25% of the total mixture. Except those species noted in footnote #3, individual forb and shrub species will be limited to 5% of the mixture.
3/ These species will be limited to no more than 2% of the mixture.
4/ Golden currant is not rated for Thin Claypan
5/ For ESD's not listed in the table please consult your area specialist
6/ Research indicates partridge pea, milkweeds, lupines, and chockcherry can be toxic to livestock

Table 3. Recommended Species by Ecological Site for MLRA 56 and 55A&B

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). 5/ Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	CP & TCp	CS (TSa)	Cy	LSb	Ly	LyOv	LySv	Sa	Sb	SbSa	SL	SwCy / SwLy	SwG	SwM	Sy	SyCp	TLy	WM / LrM
Grasses 1/																			
Alkali sacaton (SPAI)	5-10	5-10									5-10					5-10		
American managrass (GLGR)														5-20				
American sloughgrass (BESY)	5-10													5-10				5-10
Big bluestem (ANGE)				5-10	5-30	5-20	5-30			5-30	5-30				5-20			
*Bluebunch wheatgrass (PSSP6)																		
Blue joint grass (CACA4)	5-10				5-10		5-10			5-10				5-10				5-10
Blue grama (BOGR2)		5-20	5-20	5-10	5-10	5-10	5-10		5-10		5-20		5-10	5-20		5-10	5-10	5-10	
Buffalograss (BODA2)		5-20														5-11		
Canada wildrye (ELCA4)	5-10	5-10	5-20	5-10	5-10	5-10	5-10		5-20	5-10	5-10	5-10		5-10		5-10	5-10	5-10	5-10
Fowl bluegrass (POPA2)	5-10																		5-20
Fowl manna grass (GLST)	5-10						5-10			5-10		5-10			5-10				5-10
Green needlegrass (NAVI4)		5-20		5-30	5-10	5-30	5-20		5-10	5-20			5-20	5-10		5-20	5-20	5-20	
Indiangrass (SONU2)					5-20	5-10	5-20			5-25									
Indian ricegrass (ACHY)																			
Inland Saltgrass (DISP)		5-10		5-10	5-10							5-10						5-10	5-10
Little bluestem (SCSC)		5-10	5-30	5-10	5-30	5-10	5-20		5-20	5-20	5-20		5-20	5-30		5-10	5-20	5-30	
Needleandthread (HECO26)		5-20	5-20	5-10		5-10	5-10		5-20		5-10		5-20	5-20		5-10	5-20	5-10	
Northern reedgrass (CASTI3)																			5-30
Nuttall alkaligrass (PUNU2)	5-20	5-10										5-10							
Porcupinegrass (HESP11)				5-10	5-20	5-10	5-10		5-10	5-20	5-20					5-20		5-20	
Prairie cordgrass (SPPE)	5-10				5-10					5-10		5-20		5-30					5-30
Prairie dropseed (SPHE)					5-10	5-10	5-10			5-10	5-10							5-10	
Prairie junegrass (KOMA)		5-10	5-10	5-10	5-10	5-10	5-10		5-10	5-10	5-10		5-10	5-10		5-10	5-10	5-10	
Prairie sandreed (CALO)			5-30						5-30		5-10			5-10		5-20	5-30	5-10	
Sand bluestem (ANHA)			5-30						5-30		5-10			5-10		5-20	5-20		

Table 3. Recommended Species by Ecological Site for MLRA 56 and 55A&B

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). 5/ Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	CP & TCp	CS (TSa)	Cy	LSb	Ly	LyOv	LySv	Sa	Sb	SbSa	SL	SwCy / SwLy	SwG	SwM	Sy	SyCp	TLy	WM / LrM
Sand dropseed (SPCR)			5-10						5-10		5-10			5-10		5-10	5-10	5-10	
Sideoats grama (BOCU)		5-10	5-20	5-20	5-20	5-20	5-20		5-20	5-20	5-20		5-20	5-20		5-10	5-20	5-20	
Slender wheatgrass (ELTR7)	5-20	5-20		5-10	5-10	5-10	5-10		5-10	5-10	5-10	5-20	5-10	5-20	5-10	5-10	5-20	5-10	
Switchgrass (PAVI2)	5-10	5-10		5-20	5-20	5-20	5-20			5-20	5-20	5-10				5-10			5-10
*Thickspike Wheatgrass (ELLAP)																			
Western wheatgrass (PASM)	5-30	5-30	5-10	5-20	5-20	5-20	5-20		5-10	5-20	5-10	5-40	5-20	5-20		5-30	5-30	5-20	5-20
Whitetop (SCFE)	5-20														5-30				5-20
Slough sedge (CAOB3)	5-20														5-30				5-10
Forbs 2/																			
Alexander																			
Golden (ZIAU)								*											*
Heart-Leaved (ZIAP)						*	*			*									*
American vetch (VIAM)				*	*	*	*		*	*	*					*	*	*	
Aster																			
Blue (SYLA3)					*	*	*			*	*					*			
Heath (SYER)		*		*	*	*	*			*						*			
New England (SYNO2)							*			*									*
Black-eyed susan 3/ (RUHI2)			*	*	*	*	*		*	*	*			*		*		*	*
Blanketflower (GAILL)		*		*		*							*	*		*	*	*	
Blue vervain (VEHA2)										*									*
Canada anenome (ANCA8)		*			*	*	*			*					*			*	*
Canada tickclover (DECA7)					*		*			*	*								
Columbine, red (AQCA)							*			*									
Coneflower																			
Black samson (ECAN2)			*	*		*			*					*		*	*	*	
Greyhead (RAPI)		*	*	*		*			*		*			*		*	*	*	

Table 3. Recommended Species by Ecological Site for MLRA 56 and 55A&B

Minimum and maximum percentage of species per site (All mixtures will have a minimum of 100% and a maximum of 150% for pollinator plantings). 5/ Consult appropriate ecological site description for information on reference plant community composition.

Species/Ecological Site *indicates species not compatible in MLRA	CD	CP & TCp	CS (TSa)	Cy	LSb	Ly	LyOv	LySv	Sa	Sb	SbSa	SL	SwCy / SwLy	SwG	SwM	Sy	SyCp	TLy	WM / LrM
Prairie (yellow) **3/** (RACO3)		*	*	*		*			*		*		*	*		*	*	*	
Cudweed sagewort **3/** (ARLU)		*	*			*	*		*		*			*		*			
Culver's root (VEVI4)					*		*			*	*								
Cup plant (SIPE2)							*			*									*
Evening primrose (OEBI)				*	*	*	*			*	*					*			
False boneset (BREU)					*					*	*								*
False sunflower **3/** (HEHE5)			*			*			*	*	*					*			
Gayfeather																			
Dotted (LIPU)		*	*	*		*			*				*	*		*		*	
Meadow (LILI)						*	*												*
Thickspike (LIPY)	*						*												*
Giant blue hyssop (AGFO)				*		*	*									*			
Goldenrod																			
Canada (SOCA6)				*		*										*			
Missouri (SOMI2)			*	*		*			*				*	*		*		*	
Stiff (SORI2)			*						*		*			*		*			
Tall Smooth (SOGI)	*			*	*		*			*		*				*			*
Harebell (CARO2)			*	*		*			*				*	*		*	*		
Hoary vervain (VEST)						*	*		*		*					*			
Illinois bundleflower (DEIL)				*		*	*			*						*			*
Indian breadroot (PEES)				*		*			*				*	*		*		*	
Ironweed (VEFA2)					*	*	*			*									*
Joe Pye weed (EUMA9)					*					*									*
Lewis flax (LILE3)				*	*	*	*		*	*	*					*		*	
Milkvetch																			
Canada (ASCA11)		*	*	*	*	*	*		*	*						*			

Table 3. Recommended Species by Ecological Site for MLRA 56 and 55A&B

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Groundplum (ASCR2)						*			*				*	*		*		*	
Milkweed **6/**																			
Butterfly (ASTU)							*		*							*			
Showy (ASSP)	*		*		*		*			*									*
Swamp (ASIN)															*				*
Partridge pea **6/**(CHFA2)						*										*			
Pasqueflower (PUPAP2)			*			*			*				*	*		*		*	
Plains Coreopsis (COTI3)				*	*	*	*			*						*			*
Prairieclover																			
Purple (DAPU5)		*	*	*		*	*		*		*			*		*	*	*	
Silky (DAVI)			*						*					*		*			
White (DACA7)		*		*	*	*	*			*				*		*		*	
Prairie onion (ALST)				*		*			*		*					*		*	
Prairie Phlox (PHAN4)							*			*									*
Prairie Smoke (GETR)			*	*		*		*	*				*	*		*		*	
Purple meadow rue (THDA)					*					*									*
Rocky mountain bee plant (CLSE)					*	*	*			*						*			
Scarlet globemallow (SPCO)		*		*		*							*	*				*	
Shell-leaf penstemon (PEGR7)			*						*		*					*			
Silvery lupine **6/** (LUAR3)																			
Sneezeweed (HEAU)	*			*	*					*		*							*
Spiderwort																			
Long Bract (TRBR)		*	*	*	*	*	*			*		*							*
Prairie (TROCO)			*						*		*					*			
Sunflower																			
Maximillian (HEMA2)		*		*	*	*	*		*	*	*					*			*

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Sawtooth (HEGR4)			*	*	*	*			*		*		*	*		*	*	*	
Stiff **3/** (HEPA19)		*	*	*	*	*	*		*	*				*		*	*	*	
Western yarrow **3/** (ACMIO)	*	*	*	*	*	*	*		*	*	*	*	*	*		*	*	*	
Wild bergamot (MOFI)						*	*			*						*			
Shrubs 2/																			
Buffaloberry (SHEPH)												*							
Chokecherry **6/** (PRMA9)						*	*												
False indigo (AMNA)				*	*	*	*			*					*				*
*Fourwing Saltbush (ATCA2)																			
*Gardner saltbush (ATGA)																			
Golden Currant **4/** (RIAU)				*	*	*	*			*						*	*	*	
Juneberry (AMAL2)						*	*											*	
Leadplant (AMCA6)			*	*		*	*		*		*			*		*	*	*	
Prairie rose (ROAR3)		*	*	*	*	*			*	*	*		*	*		*	*	*	
Western snowberry (SYOC)				*	*	*	*		*	*	*			*		*		*	
*Winterfat (KRASC)																			
*WY big sagebrush (ARTRW8)																			

1/ Minimum of four grass species including at least one warm and/or cool season species.
2/ Forbs and shrubs will be limited to a maximum of 25% of the total mixture. Except those species noted in footnote #3, individual forb and shrub species will be limited to 5% of the mixture.
3/ These species will be limited to no more than 2% of the mixture.
4/ Golden currant is not rated for Thin Claypan
5/ For ESD's not listed in the table please consult your area specialist
6/ Research indicates partridge pea, milkweeds, lupines, and chockcherry can be toxic to livestock

From: Quast, Jonathan - FPAC-NRCS, ND
To: Holven, Adam
Subject: RE: Flickertail Solar - Request for Comment Letter
Date: Friday, June 7, 2024 8:25:17 AM

CAUTION: This email originated from an external sender. Verify the source before opening links or attachments.

Morning Adam,

Letter received, we will review request and respond accordingly.

Thanks,

Jon

Jonathan Quast
NRCS District Conservationist
Wahpeton Field Office
1687 Bypass Road
Wahpeton, ND 58075
Work: (701) 892-3222
Cell: (701) 971-3123
jonathan.quast@usda.gov

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Thursday, June 6, 2024 1:58 PM
To: Quast, Jonathan - FPAC-NRCS, ND <jonathan.quast@usda.gov>
Cc: Christina Martens <cmartens@savionenergy.com>
Subject: Flickertail Solar - Request for Comment Letter

Dear Mr. Quast,

Please find attached an introduction/request for comment letter for the proposed Flickertail Solar Project located in Abercrombie Township in Richland County.

Thank you for your time and please us know if you have any questions or comments, or if you would like to set up a call to discuss the proposed Project.

Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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U.S. Department of Defense

From:	Townes, Daniel W CTR OSD OUSD A-S (USA)
To:	Holven, Adam
Cc:	Beard, Robbin E CIV OSD OUSD A-S (USA)
Subject:	Response Letter for the Flickertail Solar Project, LLCt
Date:	Monday, September 9, 2024 10:34:01 AM
Attachments:	IR - Flickertail Solar Project, LLC - Response Letter.pdf

Good morning Mr. Holven,

Attached is the Informal Review Response Letter for the Flickertail Solar Project, LLC.

Thank you for the opportunity to review your project.

Respectfully,

Dan Townes
Military Aviation and Installation Assurance Siting Clearinghouse
Office of the Assistant Secretary of Defense (Energy, Installations and Environment)
Desk: 571-372-8414 *(limited access)*
NIPR: daniel.w.townes.ctr@mail.mil

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
3400 DEFENSE PENTAGON
WASHINGTON, DC 20301-3400

ENERGY, INSTALLATIONS
AND ENVIRONMENT

September 6, 2024

Adam Holven
Tetra Tech
2001 Killebrew Drive; Suite 141
Bloomington, IN 55425

Dear Mr. Holven,

As requested, the Military Aviation and Installation Assurance Siting Clearinghouse coordinated within the Department of Defense (DoD) an informal review of the Flickertail Solar Project, LLC. The results of our review indicated that the solar project, located in Richland County, North Dakota, as proposed, will have minimal impact on military operations conducted in the area.

Please note that this informal review by the DoD Military Aviation and Installation Assurance Siting Clearinghouse does not constitute an action under 49 United States Code Section 44718 and that the DoD is not bound by the conclusion arrived at under this informal review. To expedite our review in the Obstruction Evaluation Airport Airspace Analysis (OE/AAA) process, please add the project number 2024-06-S-DEV-21 in the comments section of the filing. If you have any questions, please contact me at robbin.e.beard.civ@mail.mil.

Sincerely,

Robbin Beard
Deputy Director
Military Aviation and Installation
Assurance Siting Clearinghouse

U.S. Fish and Wildlife Service

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

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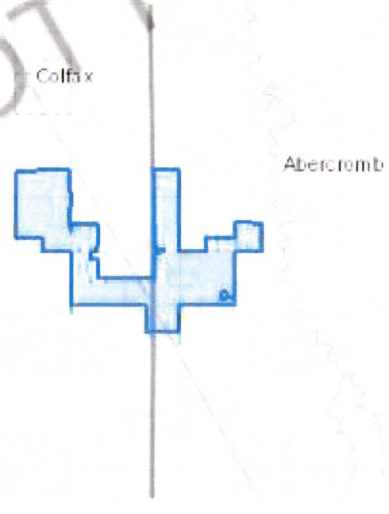
Project information

NAME

Flickertail Solar Project

LOCATION

Richland County, North Dakota



DESCRIPTION

Some(Utility-scale solar project)

Local office

North Dakota Ecological Services Field Office

(701) 250-4481
(701) 355-8513

3425 Miriam Avenue
Bismarck, ND 58501-7926

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Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of

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Commerce.

The following species are potentially affected by activities in this location:

Insects

NAME	STATUS
Dakota Skipper Hesperia dacotae Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1028	Threatened
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate
Western Regal Fritillary Argynnis idalia occidentalis Wherever found No critical habitat has been designated for this species.	Proposed Threatened

Flowering Plants

NAME	STATUS
Western Prairie Fringed Orchid Platanthera praeclara Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1669	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

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Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read

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"Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)

Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)

A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

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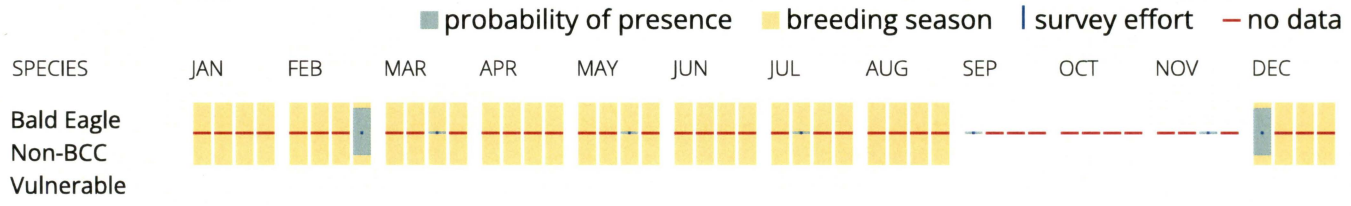
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

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Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON

Bald Eagle Haliaeetus leucocephalus — Breeds Dec 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Grasshopper Sparrow Ammodramus savannarum perpallidus — Breeds Jun 1 to Aug 20

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/8329

Northern Harrier Circus hudsonius — Breeds Apr 1 to Sep 15

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/8350

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum

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probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

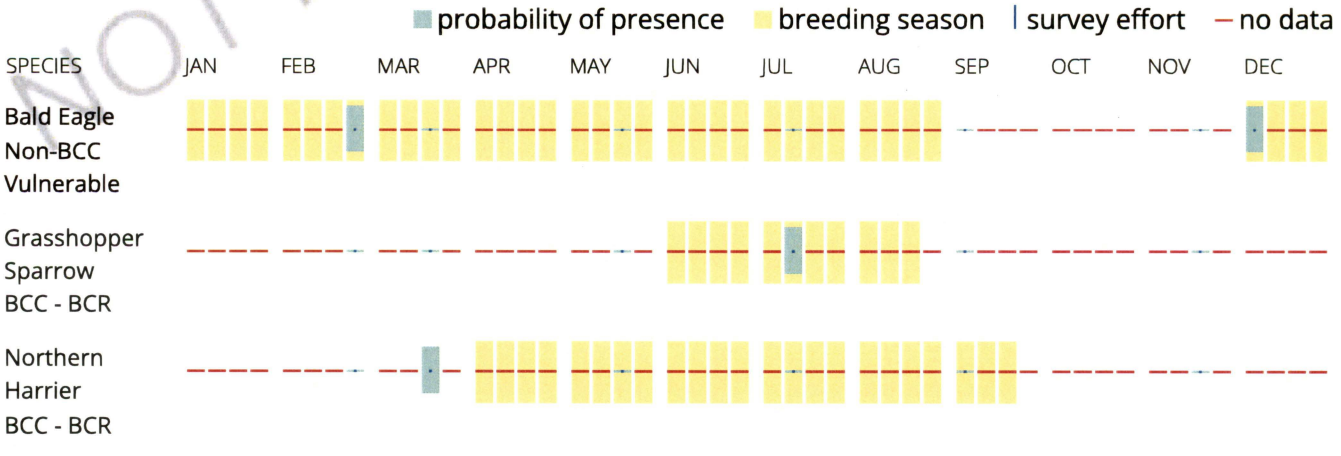
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the

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locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and

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3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1C
- PEM1Cx
- PEM1A
- PEM1E
- PEM1Cd
- PEM1B
- PEM1Ad

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FRESHWATER POND

PABFx

PABF

RIVERINE

R4SBCx

R4SBC

R4SBA

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should

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seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
North Dakota Ecological Services Field Office
3425 Miriam Avenue
Bismarck, ND 58501-7926
Phone: (701) 250-4481 Fax: (701) 355-8513

In Reply Refer To: 09/06/2024 18:19:00 UTC
Project code: 2024-0140819
Project Name: Flickertail Solar Project

Subject: Consistency letter for 'Flickertail Solar Project' for specified federally threatened and endangered species and designated critical habitat that may occur in your proposed project area consistent with the North Dakota Determination Key (DKey) for project review and guidance for federally listed species.

Adam Holven:

The U.S. Fish and Wildlife Service (Service) received on **September 06, 2024** your effects determination for the 'Flickertail Solar Project' (the Action) using the North Dakota DKey for project review and guidance for federally-listed species within the Information for Planning and Consultation (IPaC) system. The Service developed this system in accordance with the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

Based on your answers and the assistance of the Service's North Dakota DKey, you made the following effect determination(s) for the proposed Action:

Species	**Listing Status**	**Determination**
Dakota Skipper (*Hesperia dacotae*)	Threatened	No effect
Western Prairie Fringed Orchid (*Platanthera praeclara*)	Threatened	May affect

Further coordination with the North Dakota Ecological Services Field Office is recommended for those species with a determination of "may affect" listed above. Please contact our office at (701) 250-4481 or your Service point of contact in the North Dakota Ecological Services Field Office to discuss methods to avoid or minimize potential adverse effects to those species.

In addition to the species listed above, the following species and/or critical habitats may also occur in your project area and **are not** covered by this conclusion:

- Monarch Butterfly *Danaus plexippus* Candidate
- Western Regal Fritillary *Argynnis idalia occidentalis* Proposed Threatened

Bald and Golden Eagle Protection Act(BGEPA): The following resources are provided to project proponents and consulting agencies as additional information. Bald and golden eagles are not included in this section 7(a)(2) consultation and this information does not constitute a determination of effects by the Service.

The Service developed the National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with Bald Eagles when and under what circumstances the protective provisions of the BGEPA may apply to their activities. The guidelines should be consulted prior to conducting new or intermittent activity near an eagle nest. This document may be downloaded from the following site: https://www.fws.gov/media/national-bald-eagle-management-guidelines-0

To determine if your proposed activity is likely to take or disturb Golden or Bald Eagles, please call our office at 701-250-4481 for further review.

If the recommendations detailed in the National Bald Eagle Management Guidelines cannot be followed, you may apply for a permit to authorize removal or relocation of an eagle nest in certain instances. The application form is located at http://www.fws.gov/forms/3-200-72.pdf.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

Flickertail Solar Project

2. Description

The following description was provided for the project 'Flickertail Solar Project':

Utility-scale solar project

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.427414299999995,-96.86286359601618,14z



QUALIFICATION INTERVIEW

1. Is your project a federal project or have a federal nexus (funded, permitted or other authorization by a federal agency)?

   No

2. Does your project consist solely of interior or exterior rehabilitation and renovations of existing residential, commercial buildings and public facilities?

   Note: These activities may involve exterior painting, replacement of doors, windows, siding or roofing.

   No

3. Does your project consist solely of work done within the existing footprint of a building such as electrical, heating plumbing, basement and foundation repairs?

   No

4. Does your project consist solely of additions onto an existing structure?

   No

5. Does your project consist solely of renting or purchasing existing buildings?

   No

6. Does your project consist solely of demolition of structures within Incorporated City Boundaries?

   No

7. Does your project consist solely of repair or replacement of existing parking lots, sidewalks, roads or other paved or graveled surfaces?

   No

8. Does your project consist solely of repair or replacement or upgrading playground equipment?

   No

9. Is your project a wind farm?

   No

10. Is your project a new construction on an existing residential infill lot within Incorporated City Boundaries?

    No

11. [Semantic] Does the action area intersect the Dakota Skipper area of influence?

    Automatically answered
    Yes

12. Is the project area on disturbed land (e.g. urban areas, previously cropped areas, non-native haylands, pasture or other grassland that is dominated by non-native species, or in areas where trees or shrubs predominate)?

    Yes

13. [Semantic] Does the action area intersect the Western Prairie Fringed Orchid area of infuence?

    Automatically answered

    Yes

14. Will your project include any ground disturbance in prairie/grass habitat?

    Note: This could include pasture, both grazed or ungrazed, and also areas that are hayed.

    Yes

IPAC USER CONTACT INFORMATION

Agency:	Private Entity
Name:	Adam Holven
Address:	2001 Killebrew Drive
Address Line 2:	Suite 141
City:	Bloomington
State:	MN
Zip:	55425
Email	adam.holven@tetratech.com
Phone:	6126432237

From: Holven, Adam
To: Edens, Hanna K; cmartens@savionenergy.com; Gorman, Kim
Cc: Toso, Luke B; Mueller, Elisha K.
Subject: RE: [EXTERNAL] Flickertail Solar - Lek Survey Results
Date: Friday, September 6, 2024 2:53:00 PM

Hi Hanna,

No problem, we understand that everyone is pretty busy these days. Thanks for the confirmation that no additional pre-construction surveys are required at this time.

Thanks for the reminder on the western regal fritillary as proposed threatened. The Project's current schedule is completion of construction in the 4th quarter of 2028, so we'll keep an eye on that.

In regard to grassland quality in the Project Area, we conducted a natural resource inventory in June 2024 to document the extent and dominant species composition of non-cultivated lands in the Project Area. Many grassland areas were dominated by Kentucky bluegrass, Canada bluegrass, smooth brome, quack grass, and foxtail. We would consider these species characteristic of a highly manipulated grassland. Our current draft application has this information presented.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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I will be out of the office on PTO during the following dates: Monday, September 9 through Friday, September 13.

From: Edens, Hanna K <hanna_edens@fws.gov>
Sent: Friday, September 6, 2024 11:48 AM
To: Holven, Adam <adam.holven@tetratech.com>; cmartens@savionenergy.com; Gorman, Kim <Kim.Gorman@tetratech.com>
Cc: Toso, Luke B <luke_toso@fws.gov>; Mueller, Elisha K. <ekmueller@nd.gov>
Subject: RE: [EXTERNAL] Flickertail Solar - Lek Survey Results

You don't often get email from hanna_edens@fws.gov. Learn why this is important

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Hi Adam,

We appreciate your patience with us as we reviewed the provided information.

Regarding your IPaC, please be aware that the Service is in the process of updating the NLEB Dkey and, depending on the construction timeline, this Project may need to be rerun when the New NLEB Dkey is released. I don't foresee a change to the effect determination it produced for this specific Project already. If you have questions about this, please reach out.

The Service at this time is not going to request any other additional pre-construction surveys. However, our main question following review is, What is the grassland quality within the Project area? Again, I am not aware of this Projects intended construction timeline, but I would like to make sure you are up to date on the proposed ESA listing of Western Regal Fritillary as threatened with a Section 4(d) rule. While this species is still proposed, it may be listed within the next year. If the project hasn't started construction at that time, re-consultation may be necessary. Having a grassland quality assessment, specifically documenting the plant communities present, would be good data to have on hand as we feel stating what the grassland quality within the Project area is upfront in the PSC application would be valuable and could help with navigating through a potential future listing change.

Federal Register Link:
https://www.federalregister.gov/documents/2024/08/06/2024-16982/endangered-and-threatened-wildlife-and-plants-endangered-status-for-the-eastern-regal-fritillary-and

Lastly, I did not see an effect determination made for this project regarding the Dakota skipper and Western Prairie Fringed Orchid. We welcome you to use the North Dakota Dkey, found in the same area as the NLEB Dkey in IPaC, to help you with these determinations. If you have chosen to make a "no effect" determination for these species, that is fine, just make sure that is retain within your documentation somewhere.

Hanna Edens, MSc, AWB® (She/Her)
Fish and Wildlife Biologist | North Dakota Field Office
Ecological Services | U.S. Fish and Wildlife Service
3425 Miriam Avenue | Bismarck ND 58501
Main Office: (701) 355-8500
Cell Phone: (701) 954-0312
Email: hanna_edens@fws.gov

From: Toso, Luke B
To: Holven, Adam
Cc: Christina Martens; Gorman, Kim
Subject: Re: [EXTERNAL] Flickertail Solar - Lek Survey Results
Date: Thursday, July 18, 2024 2:08:38 PM

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Thanks Adam, project received. We will get this reviewed and provide a response back soon.

Luke

Luke Toso
Deputy Field Supervisor
North Dakota Ecological Services
U.S. Fish and Wildlife Service
Cell: 720-793-6797

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Monday, July 15, 2024 4:43 PM
To: Toso, Luke B <luke_toso@fws.gov>
Cc: Christina Martens <cmartens@savionenergy.com>; Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: [EXTERNAL] Flickertail Solar - Lek Survey Results

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Hi Luke,

I am the Tetra Tech Project Manager for Flickertail Solar, located in Richland County. We had been coordinating with Heidi earlier this year, but Kim mentioned that you have taken over for Heidi on the review of renewable energy Projects in ND. Currently, the Project is seeking confirmation from the USFWS (and separately from the NDGF) on the need for pre-construction wildlife surveys. Per the request of NDGF, the Project completed a lek survey this spring – those results are attached.

The Project has also completed an IPAC and completed the NLEB dkey (Project Code: 2023-0133254), which indicated the Action is not likely to result in unauthorized take of the northern long-eared bat (attached). The Project also conducted a ground-based bald eagle stick next survey in November 2023 – no eagle nests were identified.

The attached email contains the correspondence and meeting notes between the USFWS,

NDGF, the Project, and Tetra Tech from late January 2024. These may provide some additional context.

Feel free to reach out if you have any questions.

Thank you for your time.

Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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See Appendix N – Lek Survey

From:	Holven, Adam
To:	Mueller, Elisha K.; Link, Greg W.; Kreft, Bruce L.; Francis, Curtis V.; Dinges, Andrew J.; Riddle, Heidi L
Cc:	Nick Schuler; Christina Martens; Gorman, Kim
Subject:	RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND
Date:	Wednesday, May 22, 2024 1:47:00 PM
Attachments:	20240130_USFWS_NDGF_FlickertailSolar Meeting Minutes_20240306.pdf

Hi folks,

Sorry about the delay in distributing the final notes that include Elisha's comments. It has been a busy spring.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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Flickertail Solar

Agency Consultation – Biological Discussion

Teleconference

January 30, 2024

USFWS Review of the Meeting Notes: 3/5/2024

NDGF Review of the Meeting Notes: 3/6/2024

Attendees:
USFWS: Heidi Riddle
NDGF: Elisha Mueller, Greg Link, Bruce Kreft, Curt Francis, Andy Dinges
Savion: Christina Martens, Nick Schuler
Tetra Tech: Kimberely Gorman, Adam Holven, Nick Alex

Location: Microsoft Teams call

Date / Time: January 30, 2024, 2:00 PM Central

Discussion Summary

- Introductions were completed and a project overview was provided.
- The Project has shifted south from Colfax Township to Abercrombie Township since the last discussion with NDGF and USFWS in October 2021.
- The Project is actively working with Abercrombie Township on the Project. In November 2023, the Abercrombie Township board approved a conditional use permit for the Project.
- Desktop assessment for potential grasslands, wetlands and wooded areas has been completed for the Project Area. No USFWS Easements were identified within the Project Area. Eighty acres of NDGF PLOTs were identified within the Project Area. Field surveys for wetlands and natural resources are anticipated to be completed in Spring 2024.
- In presenting the federal threatened and endangered species that IPaC determined were in the area, notable points included:
    - The Project received a "not likely to adversely affect letter" based on USFWS determination keys for the northern long-eared bat
    - Per last consultation, the nearest known Dakota skipper locations were 50-60 miles west and southwest of the Project Area
- Biological studies completed in the Project Area include a ground based stick nest survey conducted in November 2023 that did not identify any bald eagle nests.
- Christina with Savion indicated they are working with local stakeholders on a vegetation management plan. Specifically working with the NRCS, county, and township on an appropriate seed mix. The Project also made commitments to the township to include native grasses under

panels and pollinator habitat in surrounding area. Christina mentioned that Richland County weed management, the NRCS, and USDA all will have input on the vegetation management plan. (Contacts are John Quast - NRCS Jonathan.quast@usda.gov, Jan Klostreich - Richland Soil Conservation District, and Perry Miller – Richland County Weed Board)

- In discussing the possible need for species specific surveys, Elisha Mueller (NDGF) first inquired about whether the grasslands present within the Project Area are broken or unbroken. Adam Holven (Tetra Tech) responded with describing the methodology Tetra Tech employs to classify grasslands, and further shared that the PLOTS land appeared to present greatest diversity among the grasslands within the Project Area. Elisha (NDGF) responded that all grasslands in the area are often invaded by smooth brome and Kentucky bluegrass, and that a habitat analysis of unbroken versus tilled/stripped land is likely the best methodology to determine where broken and unbroken grasslands are in the Project Area.
- Elisha (NDGF) further emphasized that unbroken grasslands are what NDGF views as most important to grassland species in the region. If no unbroken grasslands will be impacted by the Project, likely no Dakota skipper surveys would be needed. Greg (NDGF) mentioned that USDA tracts land conversion and this could be used to help assist in identifying broken versus unbroken grasslands.
- In further discussion of grasslands, Elisha (NDGF) inquired as to whether we were aware of sharp-tailed grouse leks in the area. Elisha further mentioned that the PLOTS land could host sharp-tails. To this point, Greg Link (NDGF) further inquired as to whether we were aware of any greater prairie chickens in the area. He acknowledged it is unlikely but could occur. To these points, Kim Gorman (Tetra Tech) discussed the conservative approach to digitizing wetland and grassland areas that Tetra Tech uses, to ensure that all areas visited during field surveys are classified in an appropriate way, including photos and species observations. Kim further inquired to the agencies whether lek location data is available for this area. Greg confirmed that they do not have up-to-date census blocks of leks for this particular area.
- The group continued to discuss grasslands in the context of solar development, shifting towards solar setback requirements for grassland species. Elisha indicated that she was unsure of setback requirements for solar development regarding grassland leks. Kim brought up the differences between solar and wind development and operation risk to species, and how to best tailor requirements and recommendations towards best benefiting species. Bruce Kreft (NDGF) mentioned they were looking to acquire new studies on leks and the impact solar has on grassland species.
- The discussion shifted to Tetra Tech aiming to get a better understanding of the agencies' desires to have pre- and post construction avian surveys. Kim began by inquiring about the wind energy guidelines (WEGs) influence on the need for pre- and post construction avian surveys, specifically within the context of a letter received from the USFWS recommending them. Heidi Riddle (USFWS) discussed the letter, mentioning how it partly stems from uncertainty on how solar impacts avian species and landscape scale projects. The USFWS is encouraging companies to think about how species may be impacted.
- In terms of recommendations, Heidi believes a habitat assessment would be good for the Project, and further emphasized a desire for post construction monitoring. To better understand agency

requirements, Kim inquired as to what is recommended versus what is required. Heidi clarified nothing is required, but the recommendations are meant to guide.

- In the context of avian surveys, Elisha mentioned that post construction surveys are very important to NDGF and are a standard recommendation for both wind and solar projects. The NDGF further hopes to utilize the data beyond due diligence, as to not waste the data and instead use it to benefit future development through increased understanding of solar development and wildlife interactions in the region. Elisha further mentioned that though they cannot require anything, the PSC takes concerns from the NDGF into consideration, and further mentioned that survey effort is important to the PSC.
- In further discussing the WEGs influence on solar guidance, Elisha identified the WEGs as a solid document that already exists, thus a good starting point for determining solar surveys, though NDGF is eventually planning on creating a general BMP for renewable energy in the region.
- In discussing sharp-tailed grouse surveys, Elisha mentioned that they can lek in a broad variety of habitats, but the most important facet is avoidance of unbroken grassland habitat. If the Project can avoid nesting habitat (which includes both unbroken and restored grasslands), there would be no need to survey.
- Shifting to Project design, Elisha inquired as to how much of the landscape will be panels within the Project Area. Savion indicated that around 2,500 acres of Project Area will be panel coverage, demarcated by fenced areas. Savion further emphasized that the 2,500 acres is the fenced area, so there would be gaps between solar panels within that area.
- Elisha inquired about whether the Project would be pursuing voluntary offset. Tetra Tech indicated the Project was currently identifying grassland and wetland habitat to inform site design.
- Christina asked the group how they define "unbroken grasslands." Greg indicated that though the area is highly agricultural, there are areas with livestock grazing, grassland, and riparian areas, all as potential small unbroken grassland. Greg further stated that the majority of unbroken grassland in the area may be outside the Project Area.
- In a brief discussion brought up by Adam, Greg and Elisha indicated that railroad corridors are disturbed lands, and NDGF's priority is areas that have not been tilled.
- In discussing expectations on wildlife safe fencing, Kim inquired as to what wildlife species are being protected by the recommended fencing. Greg expressed concern across the state for migratory big game animals, with a goal of limiting barriers to moving wildlife. Elisha indicated that the goal is to limit trapping of wildlife and that wildlife safe fencing is a standard recommendation for all projects.
- Christina identified the anticipated fencing surrounding panels and corridors would be included and could be used by wildlife. The fence is described as an agricultural style fence with no barb wire on top. It would be six feet high around the solar panels, though more secure fencing with barbed wire is required to house the electrical facilities such as the substation. Christina further mentioned the goal is to keep people out, not animals.
- Kim inquired about wetlands, specifically in terms of what meets criteria for wetlands to be species habitat. Bruce replied that farmed wetlands are not usually an issue, and the recommendation is to identify all wetlands in the area, but to focus on ones that meet wetland

criteria for soil, vegetation, and hydrology. To this point, Adam asked whether revegetated wetlands in a formerly agricultural area could be used as an offset, to which Bruce replied this would not count as offset if located under panels. Wetlands restored in the Project Area, but beyond the solar panels may qualify for offset.

Action Items

- Elisha Mueller (NDGF) to check in with upland game biologist Jesse Kolar for appropriate setbacks from for sharp-tailed grouse and solar projects.
- Elisha Mueller to check with Jesse Kolar for lek survey guidelines for solar projects.
- Tetra Tech to request eagle nest location data for the Project Area from Sandra Johnson at NDGF.
- Tetra Tech to request lek locations for the Project Area and identified setback from Sandra Johnson at NDGF.
- Tetra Tech to check with senior biologists for studies on sharp-tailed grouse impacts from solar development.
- Tetra Tech to send PCMM reports from Midwest solar project for reference.

From: Riddle, Heidi L
To: Holven, Adam; Mueller, Elisha K.; Link, Greg W.; Kreft, Bruce L.; cvfrancis@nd.gov; adinges@nd.gov
Cc: Nick Schuler; Christina Martens; Gorman, Kim
Subject: RE: [EXTERNAL] MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND
Date: Tuesday, March 5, 2024 9:11:22 AM

You don't often get email from heidi_riddle@fws.gov. Learn why this is important

CAUTION: This email originated from an external sender. Verify the source before opening links or attachments.

Hello Adam,

Thanks for sending the meeting minutes. I have no additional comments/edits.

Heidi

Heidi Riddle, CWB®
Fish and Wildlife Biologist
USFWS North Dakota Ecological Services Field Office
3425 Miriam Ave
Bismarck, ND 58501
(701) 319-6708
heidi_riddle@fws.gov

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Monday, February 19, 2024 10:39 AM
To: Mueller, Elisha K. <ekmueller@nd.gov>; Link, Greg W. <glink@nd.gov>; Kreft, Bruce L. <bkreft@nd.gov>; cvfrancis@nd.gov; adinges@nd.gov; Riddle, Heidi L <heidi_riddle@fws.gov>
Cc: Nick Schuler <nschuler@savionenergy.com>; Christina Martens <cmartens@savionenergy.com>; Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: [EXTERNAL] MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Elisha, Greg, Bruce, Curt, Andy, and Heidi,

Thank you again for your time on January 30th and the opportunity to present on our proposed project.

Attached please find draft meeting minutes for your review. Please review and let us know if you have any comments/edits or if we can finalize.

Also attached are some white papers on avian/solar interactions in Wisconsin.

We look forward to our continued consultation.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
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Flickertail Solar

Agency Consultation – Biological Discussion

Teleconference

January 30, 2024

Attendees:
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- Elisha (NDGF) further emphasized that unbroken grasslands are what NDGF views as most important to grassland species in the region. If no unbroken grasslands will be impacted by the Project, no Dakota skipper surveys would be needed. Greg (NDGF) mentioned that USDA tracts land conversion and this could be used to help assist in identifying broken versus unbroken grasslands.
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NDGF further hopes to utilize the data beyond due diligence, as to not waste the data and instead use it to benefit future development and enforce and understanding of solar development and wildlife interactions in the region. Elisha further mentioned that though they cannot require anything, the PSC takes concerns from the NDGF into consideration, and further mentioned that survey effort is important to the PSC.

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- Elisha Mueller (NDGF) to check in with upland game biologist Jesse Kolar for appropriate setbacks from for sharp-tailed grouse and solar projects.
- Elisha Mueller to check with Jesse Kolar for lek survey guidelines for solar projects.
- Tetra Tech to request eagle nest location data for the Project Area from Sandra Johnson at NDGF.
- Tetra Tech to request lek locations for the Project Area and identified setback from Sandra Johnson at NDGF.
- Tetra Tech to check with senior biologists for studies on sharp-tailed grouse impacts from solar development.
- Tetra Tech to send PCMM reports from Midwest solar project for reference.

From: Riddle, Heidi L
To: Holven, Adam
Cc: Christina Martens
Subject: RE: [EXTERNAL] USFWS Comment of Flickertail Solar
Date: Thursday, January 4, 2024 12:01:20 PM

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Hi Adam,

Thanks for the clarification. Our letter would be the same. Our early response letters (prior to exact siting) are pretty general in nature, so I don't believe it would change. Let me know if that works for you.

Thanks also for the virtual meeting invitation.

Heidi

Heidi Riddle, CWB®
Fish and Wildlife Biologist
USFWS North Dakota Ecological Services Field Office
3425 Miriam Ave
Bismarck, ND 58501
(701) 319-6708
heidi_riddle@fws.gov

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Thursday, January 4, 2024 11:51 AM
To: Riddle, Heidi L <heidi_riddle@fws.gov>
Cc: Christina Martens <cmartens@savionenergy.com>
Subject: RE: [EXTERNAL] USFWS Comment of Flickertail Solar

Thanks Heidi,

The Project did move south from Colfax Township into Abercrombie Township (about a 2-mile shift south). It is still on the same landform, would that warrant a new letter?

I will also forward you the invite for the meeting.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201

From: Riddle, Heidi L
To: Holven, Adam
Cc: Christina Martens
Subject: RE: [EXTERNAL] USFWS Comment of Flickertail Solar
Date: Thursday, January 4, 2024 10:57:11 AM
Attachments: 2022 04 22 Flickertail.pdf

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Hello Adam,

Thank you so much for following up on your October 2023 request for comments. I did not receive that letter, it may have been routed in error, I apologize for that. The USFWS provided comments on this proposal in 2022, and I have attached that letter. Let me know if the letter addresses your request. Please forward me the calendar invite for the January 30 meeting with NDGF and I will plan to attend if I'm available.

Regards,

Heidi Riddle, CWB®
Fish and Wildlife Biologist
USFWS North Dakota Ecological Services Field Office
3425 Miriam Ave
Bismarck, ND 58501
(701) 319-6708
heidi_riddle@fws.gov

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Thursday, January 4, 2024 10:43 AM
To: Riddle, Heidi L <heidi_riddle@fws.gov>
Cc: Christina Martens <cmartens@savionenergy.com>
Subject: [EXTERNAL] USFWS Comment of Flickertail Solar

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Good morning Heidi,

Tetra Tech, Inc., on behalf of Flickertail Solar, mailed a request for comment letter to the USFWS on

October 19, 2023 (attached). We have not heard back from the USFWS to date. If possible, would the USFWS be able to provide comment on the Project? Additionally, we are having a virtual meeting with NDGF on January 30, 2 pm CDT to present the Project and discuss items presented in the NDGF's comment letter. We would like to extend an invitation to the USFWS to join this meeting as well to discuss any comments the USFWS has on the Project.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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United States Department of the Interior

FISH AND WILDLIFE SERVICE
North Dakota Ecological Services Field Office
3425 Miriam Avenue
Bismarck, North Dakota 58501
(701) 250-4481, ndfieldoffice@fws.gov

In Reply Refer To:
Flickertail Solar Project

April 21, 2022

Lisa Brouelette
TetraTech
lisa.brouellette@tetratech.com

Dear Ms. Brouelette:

Thank you for your coordination with the U.S. Fish and Wildlife Service (FWS) and for providing information about the proposed Flickertail Solar Project in Richland County, North Dakota. We appreciate your communications with the FWS and the North Dakota Game and Fish Department (Department), and respectfully request any future reports that may result from wildlife/habitat studies in/around the project area.

Large-scale solar facilities are a relatively new addition to the landscape and research is ongoing to determine impacts to wildlife. Most research on the impacts of solar facilities on wildlife has occurred outside of the great plains grasslands. There is a potential opportunity to use the Flickertail site to conduct a systematic study of wildlife impacts, similar to those done after the construction of wind energy facilities in the state. Information gained from such a study could be useful in future reviews of these types of projects. Our first and foremost recommendation to all project proponents in North Dakota is to avoid grasslands and wetlands – two primary types of habitat in the state that support native species. We also recommend establishing buffers around sensitive habitats to prevent destructive impacts associated with project activities and possible displacement of wildlife. Choosing a project site dominated by cropland greatly increases the potential to avoid and reduce direct/indirect impacts to wildlife habitat and we support efforts toward that end. We recommend referring to the Department's April 12, 2022, letter and guidance document when estimating impacts to grasslands. We recommend addressing all FWS trust resources and applicable avoidance, minimization, and offset measures in a Bird and Bat Conservation Strategy (BBCS) for our review.

Endangered Species Act

In accordance with section 7(c) of the Endangered Species Act (ESA), as amended, 16 U.S.C. 1531 et seq., we have determined that the following federally listed species may occur in the project area (this list is considered valid for 90 days):

Species	Status	Expected Occurrence
Northern Long-eared Bat (*Myotis septentrionalis*)	Threatened; (Proposed Endangered)	Summer resident, seasonal migrant
Rufa Red Knot (*Calidris canutus rufa*)	Threatened	Rare seasonal migrant
Dakota skipper (*Hesperia dacotae*)	Threatened	Year round resident
Western Prairie-Fringed Orchid (*Platanthera praeclara*)	Threatened	Plant
Monarch Butterfly (*Danaus plexippus plexippus*)	Candidate	Habitats including fields, meadows, marshes, and along roadsides

Northern Long-eared Bat:
The northern long-eared bat is a medium-sized brown bat that roosts singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees in the summer and migrates to hibernacula (often caves) in the winter. White nose is considered a significant threat to this species, but individuals may be harmed by other activities such as modifications to hibernacula, timber harvest, human disturbance, and collisions with wind turbines. The proposed project site is not heavily forested, but riparian corridors within the project area may serve as habitat for the species. We recommend conducting a habitat assessment for the project area and describing avoidance and minimization measures in the BBCS. Post-construction mortality studies per the WEG are recommended to determine impacts to bats and inform the need for additional adaptive management strategies.

On March 22, 2022, the FWS announced a proposal to reclassify the northern long-eared bat as endangered under the Endangered Species Act. If the proposal is finalized, the 4(d) rule currently in place will be nullified. For more information regarding the northern long-eared bat 4(d) rule, please see: https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis

Rufa Red Knot
The rufa red knot is a robin-sized shorebird listed as threatened under the Endangered Species Act (see: http://www.gpo.gov/fdsys/pkg/FR-2014-12-11/pdf/2014-28338.pdf for more information). The red knot migrates annually between its breeding grounds in the Canadian Arctic and several wintering regions, including the Southeast United States, the Northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego at the southern tip of South America. Although

it is primarily a coastal species, small numbers of rufa red knots are reported annually across the interior United States (i.e., greater than 25 miles from the Gulf or Atlantic Coasts) during spring and fall migration. These reported sightings are concentrated along the Great Lakes. The red knot likely uses North Dakota habitats similar to those of the piping plover. The species does not breed in this state.

Dakota Skipper

The Dakota skipper (*Hesperia dacotae*) is a small prairie butterfly listed as a threatened species under the Endangered Species Act (see: http://www.gpo.gov/fdsys/pkg/FR-2014-10-24/pdf/2014-25190.pdf). Dakota skippers are obligate residents of high quality prairie ranging from wet-mesic tallgrass prairie to dry-mesic mixed grass prairie. In North Dakota, Dakota skippers inhabit dry-mesic hill prairies with abundant purple coneflower *(Echinacea angustifolia)*, but also use mesic to wet-mesic tallgrass prairie habitats characterized by wood lily (*Lilium philadelphicum*) and mountain deathacamas (smooth camas; *Zigadenus elegans*). Their dispersal ability is very limited due in part to their short adult life span and single annual flight. Dakota skippers are known to occupy suitable habitats within your proposed project area. Extirpation of Dakota skippers from a site may be permanent unless the site occurs within about 0.6 miles of another inhabited site that generates a sufficient number of emigrants. Avoidance of impacts to native prairie habitat is recommended to reduce the risk of adverse effects to this species. A survey protocol (2018) has been developed for North Dakota, however this species is difficult to detect and identify; only permitted surveyors can accurately conduct surveys for this species (June 10- July 25). Critical habitat has also been designated for this species in North Dakota; for survey protocols, additional details, and locations see the following website: http://www.fws.gov/Midwest/endangered/insects/dask/index.html.

Western Prairie-Fringed Orchid

The Western prairie fringed orchid (*Platanthera praeclara*) is known to occur in southeast North Dakota, however the life cycle of the plant often makes it difficult to detect. Although the plant is typically associated with intact tallgrass native prairie, the orchid has also been found on disturbed sites. Potential habitats generally include mesic upland prairies, wet prairies, sedge meadows, subirrigated prairies and swales in sand dune complexes. If these habitats exist within the proposed project area, surveys for the orchid should be considered prior to construction.

It is unclear to the FWS if the proposed Project activities (construction and operation) would create new or increased water depletions. Our general understanding is that PV solar facilities likely use modest amounts of water during operation. Due to the proposed Project location within the range of the orchid, the FWS recommends that construction activities (i.e., any associated borrow sites, ponded water, access roads, etc.) be further assessed to ensure they do not result in surface or groundwater depletion(s) that could indirectly impact the orchid.

Pesticide application in rights of ways and throughout solar facilities may have an adverse effect on the orchid, both directly and indirectly. The prairie fringed orchids depend on hawkmoths for pollination. Any threat to these insects, such as the use of insecticides, is a threat to the prairie fringed orchids.

Monarch Butterfly

On December 15, 2020, the monarch became a candidate for listing under the ESA. Candidate species are plants and animals for which the FWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which the development of a proposed listing regulation is precluded by other higher priority listing activities.

The monarch is a large butterfly, easily recognized by their orange and black markings, that lives in a variety of open habitats throughout North America and various additional locations across the globe. They need milkweed (*Asclepias* spp.) for breeding and additional nectar sources for completing their life cycle. The monarch butterfly has declined by 80 percent in the last 20 years. There are many potential reasons for the butterfly's decline, including habitat loss at breeding and overwintering sites, disease, pesticides, logging at overwintering sites and climate change. Candidate species are not proposed for listing but are species for which the development and publication of proposed rules for listing are anticipated. The FWS encourages cooperative conservation efforts for these species because they are, by definition, species that may warrant future protection under the ESA. The Rights-of-Way as Habitat Working Group has identified a number of Best Management Practices (BMPs) for pollinator-friendly solar energy (http://rightofway.erc.uic.edu/resources/best-management-practices/). Additional resources on ways to improve habitats for the monarch are located at: https://www.fws.gov/savethemonarch.

Bald and Golden Eagle Protection Act and Migratory Bird Treaty Act

While not all are listed as threatened or endangered, eagles and migratory birds have protections under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA). The BGEPA prohibits take which is defined as, "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb" (50 CFR 22.3). Disturb is defined in regulations as, "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.". The MBTA makes it unlawful without a waiver to pursue, hunt, take, capture, kill, or sell birds listed as migratory birds, including eagles. The statute does not discriminate between live or dead birds and also grants full protection to any bird parts including feathers, eggs, and nests.

To minimize impacts on migratory birds, the FWS has developed conservation measures that address specific project-related threats to birds (see https://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservationmeasures.php). We recommend development of a project-specific Bird and Bat Conservation Strategy (BBCS) to identify threats and conservation measures to address those threats. The FWS's Mountain-Prairie Regional Migratory Birds Office has developed an outline to assist wind developers assess project-related impacts to birds, bats and their habitats, and to work to avoid and minimize those impacts (attached). Although the document was

developed for wind projects, it can be used for any type of project. Any voluntary offsets that are being proposed should also be included in the BBCS.

For eagles and other raptors, we recommend identifying nests within the project area plus a 2-mile buffer from solar infrastructure and transmission lines. During nesting periods, observe timing stipulations for construction activities located near nests. Raptors are likely to use any trees or rock escarpments for nesting or perching. The Eagle Conservation Plan Guidance (ECPG) that was developed for wind may be helpful in identifying potential concentration and use areas. By affording these areas a buffer when considering infrastructure placement, impacts to raptor species can be greatly reduced.

To avoid direct impacts during construction or ground disturbing activities, conduct a nesting bird survey or other necessary survey for nesting birds. If active nests are detected, the nest area shall be flagged, and no activity shall take place near the nest (at a distance determined through coordination with the FWS and the Department) until the parties agree that construction can proceed with the incorporation of agreed-upon monitoring measures.

Despite the potential benefits of directly avoiding habitat, risk to wildlife still exists. Indirect impacts such as wildlife displacement in habitats adjacent to project facilities may occur, and direct impacts such as avian and bat collision mortality are anticipated regardless of the project location. Since grassland nesting birds and waterfowl are known to be displaced by turbines, we recommend buffering proposed wind energy facilities from grasslands and wetlands in the project area as much as possible. Peer-reviewed published literature described in the attached information (Shaffer et al. 2019, Loesch et al. 2013, Shaffer and Buhl 2016, and Leddy et al. 1999) can serve as your guide regarding appropriate distances needed to reduce/avoid this displacement. A buffer between facilities and any forested sites may also be prudent to reduce risk to bats that may use those habitats.

Eagle Guidance Documents

Golden eagles (*Aquila chrysaetos*) are year-round residents in western North Dakota and may be found throughout the state in winter or during migration. Bald eagles (*Haliaeetus leucocephalus*) occur throughout North Dakota in all seasons. Incidental take of eagles from actions such as electrocutions from power lines or wind turbine strikes are prohibited unless specifically authorized via an eagle incidental take permit from the FWS.

The FWS has developed guidance for the public regarding means to avoid take of bald and golden eagles:

- The 2007 *National Bald Eagle Management Guidelines* serve to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of BGEPA may apply. They provide conservation recommendations to help people avoid and/or minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by

the BGEPA. https://www.fws.gov/northeast/ecologicalservices/pdf/ NationalBaldEagleManagementGuidelines.pdf

- The 2013 *Eagle Conservation Plan Guidance, Module 1- Land-based Wind Energy, Version 2* is specific to wind energy development and provides in-depth guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities. Development of an Eagle Conservation Plan per these guidelines may serve as the basis for applying for an eagle incidental take permit for energy facilities. Applications for such eagle incidental take permits must include an Eagle Conservation Plan. https://www.fws.gov/migratorybirds/pdf/management/ eagleconservationplanguidance.pdf

The FWS also has promulgated new permit regulations under BGEPA:

- Eagle permit regulations, as allowed under BGEPA, were promulgated by the FWS in 2009 (74 FR 46836; Sept. 11, 2009) and revised in 2016 (81 FR 91494; Dec. 16, 2016). The regulations authorize the limited take of bald and golden eagles where the take to be authorized is associated with otherwise lawful activities. These regulations also establish permit provisions for intentional take of eagle nests where necessary to ensure public health and safety, in addition to other limited circumstances.

The revisions in 2016 included changes to permit issuance criteria and duration, definitions, compensatory mitigation standards, criteria for eagle nest removal permits, permit application requirements, and fees in order to clarify, improve implementation and increase compliance while still protecting eagles. https://www.gpo.gov/fdsys/pkg/ FR-2016-12-16/pdf/2016-29908.pdf

- *U.S. Fish and Wildlife Service, Region 6, Recommended Approach for Development and Submission of Eagle Conservation Plans submitted to Region 6, Migratory Management Office in support of an Eagle Incidental Take Permit Application for Wind Energy Projects* – finalized in July 2019, this guidance replaces an earlier outline version of ECP recommendations by the FWS's Mountain-Prairie Region (Region 6) entitled "Final Outline and Components of an Eagle Conservation Plan (ECP) for Wind Development: Recommendations from USFWS, Region 6". The purpose of the new guidance is to eliminate unnecessary work and expense by permit applicants and shorten/streamline the process of applying for an eagle incidental take permit (EITP). The guidance will reduce the ECP process to only those items necessary for the USFWS to conclude that the ECP is sufficient to support the EITP application, and ensure that we have what we need both for our review of the application and our required NEPA compliance.

Wetlands

According to National Wetlands Inventory maps, available online at: https://www.fws.gov/ wetlands/, wetlands exist within the proposed project area. If a project may impact wetlands or other important fish and wildlife habitats, the FWS, in accordance with the National

Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321-4347) and other environmental laws and rules, recommends complete avoidance of these areas, if possible; then minimization of any adverse impacts; and finally, replacement of any lost acres; in that order. Alternatives should be examined and the least damaging practical alternative selected. If wetland impacts are unavoidable, a mitigation plan addressing the number and types of wetland acres to be impacted and the methods of replacement should be prepared and submitted to the resource agencies for review.

Overhead Power Lines

The construction of additional overhead power lines associated with energy facilities creates the threat of avian electrocution, particularly for raptors. Thousands of these birds, including endangered species, are killed annually as they attempt to utilize overhead power lines as nesting, hunting, resting, feeding, and sunning sites. The FWS recommends the installation of underground, rather than overhead, power lines whenever possible/appropriate to minimize environmental disturbances. For all new overhead lines or modernization of old overhead lines, we recommend incorporating measures to prevent avian electrocutions. The publication entitled *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* includes many measures to reduce risk to birds including pole extensions, modified positioning of live phase conductors and ground wires, placement of perch guards and elevated perches, elimination of cross arms, use of wood (not metal) braces, and installation of various insulating covers. You may obtain this publication by contacting the Edison Electric Institute via their website at: http://www.eei.org/resourcesandmedia/products/Pages/products.aspx, or by calling 202-508-5000.

Please note that utilizing just one of the "*Suggested Practices . . .*" methods may not entirely remove the threat of electrocution to raptors. In fact, improper use of some methods may increase electrocution mortality. Perch guards, for example, may be only partially effective as some birds may still attempt to perch on structures with misplaced or small-sized guards and suffer electrocution as they approach too close to conducting materials. Among the most dangerous structures to raptors are poles that are located at a crossing of two or more lines, exposed above-ground transformers, or dead end poles. Numerous hot and neutral lines at these sites, combined with inadequate spacing between conductors, increase the threat of raptor electrocutions. Perch guards placed on other poles has, in some cases, served to actually shift birds to these more dangerous sites, increasing the number of mortalities. Thus, it may be necessary to utilize other methods or combine methods to achieve the best results. The same principles may be applied to substation structures.

Please also note that the spacing recommendation within the "*Suggested Practices . . .*" publication of at least 60 inches between conductors or features that cause grounding may not be protective of larger raptors such as eagles. This measure was based on the fact that the skin-to-skin contact distance on these birds (i.e., talon to beak, wrist to wrist, etc.) is less than 60 inches. However, an adult eagle's wingspan (distance between feather tips) may vary from 66 to 96 inches depending on the species (golden or bald) and gender of the bird, and unfortunately, wet feathers in contact with conductors and/or grounding connections can result in a lethal electrical

surge. Thus, the focus of the above precautionary measures should be: a) provide more than 96 inches of spacing between conductors or grounding features, b) insulate exposed conducting features so that contact will not cause raptor electrocution, and/or c) prevent raptors from perching on the poles in the first place.

Additional information regarding simple, effective ways to prevent raptor electrocutions on power lines is available in video form. *Raptors at Risk* may be obtained by contacting EDM International, Inc. at 4001 Automation Way, Fort Collins, Colorado, 80525-3479, Telephone No. (970) 204-4001, or by visiting their website at: https://www.edmlink.com/component/zoo/item/video-raptors-at-risk.

In addition to electrocution, overhead power lines also present the threat of avian line strike mortality. Particularly in situations where these lines are adjacent to wetlands or where waters exist on opposite sides of the lines, we recommend marking them in order to make them more visible to birds. For more information on bird strikes, please see *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* which, again, may be obtained by contacting the Edison Electric Institute via their website at: http://www.eei.org/resourcesandmedia/products/Pages/products.aspx, or by calling 202-508-5000.

While marking of power lines reduces line strike mortality, it does not preclude it entirely. Thus, marking of additional, existing, overhead lines is recommended to further offset the potential for avian line strike mortality. As noted above, the whooping crane is particularly susceptible to this type of mortality, and your project occurs within the whooping crane migratory corridor. Marking of existing lines elsewhere in the species' corridor is recommended.

Post Construction Monitoring

This report was prepared by the USGS and USFWS to respond to a need for monitoring methodology guidance for evaluating wildlife mortalities at solar facilities. The publication, Mortality Monitoring Design for Utility-Scale Solar Power Facilities (Huso et al. 2016), provides a framework to produce consistent carcass search methods at solar facilities. This report discusses methods to account for sources of imperfect fatality detections at solar facilities to ensure that resulting data are sufficient for estimating mortality using newly formulated estimators.

FWS Property Interests

As part of the National Wildlife Refuge System, the FWS administers fee title Refuge and Waterfowl Production Areas, as well as wetland and grassland easements, throughout North Dakota. For exact locations of FWS interest lands, please contact the appropriate Wetland Management Districts (WMD) for guidance regarding FWS easements. For Richland County, please contact Patrick Fitzmorris at Tewaukon WMD at (701) 724-3598.

Additional Information

While some of the guidance documents above were developed specifically for wind energy projects, the information is largely applicable to other types of projects as well. We have included guidelines and methods to be applied to various components of a solar facility, including power lines in order to avoid, minimize, and/or compensate for impacts to trust resources and assist you in achieving compliance with federal laws.

If changes are made in the project plans or operating criteria, or if additional information becomes available, the FWS should be informed so that the above determinations can be reconsidered.

Thank you for the opportunity to comment on this project proposal. If you have any additional questions or concerns, please contact Heidi Riddle of my staff, at (701) 355-8545 or heidi_riddle@fws.gov, or you can contact me at (701) 355-8512 or drew_becker@fws.gov.

Sincerely,

Drew N. Becker
ND Ecological Services Supervisor

Enclosure

cc: Greg Link, NDGF, Bismarck, ND
Patrick Fitzmorris, USFWS, Tewaukon WMD
Dave Azure, USFWS, Eastern ND WMD Complex

Literature Cited

Fargione, J, J. Kiesecker, M. J. Slaats, S. Olimb. 2012. Wind and wildlife in the Northern Great Plains: identifying low-impact areas for wind development.

Huso, Manuela, Dietsch, Thomas, and Nicolai, Chris, 2016, Mortality monitoring design for utility-scale solar power facilities: U.S. Geological Survey Open-File Report 2016-1087, 44 p., http://dx.doi.org/10.3133/ofr20161087.

Leddy, K. L, K. F. Higgins, D. E. Naugle. 1999. Effects of wind turbines on upland nesting birds in Conservation Reserve Program grasslands. Wilson Bulletin 111(1):100-104.

Loesch, C. R., J. A. Walker, R. E. Reynolds, J. S. Gleason, N. D. Niemuth, S. E. Stephens, and M. A. Erickson. 2013. Effect of wind energy development on breeding duck densities in the Prairie Pothole Region. Journal of Wildlife Management 77(3):587-598.

Longcore, T., C. Rich, P. Mineau, B. MacDonald, D.G. Bert, L.M. Sullivan, E. Mutrie, S.A. Gauthreaux, M.L. Avery, R.L. Crawford, A.M. Manville, E.R. Travis, and D. Drake. 2012. An estimate of avian mortality at communication towers in the United States and Canada. PLoS One 7(4): 1-17.

Niemuth, N. D., A. J. Ryba, A. T. Pearse, S. M. Kvas, D. A. Brandt, B. Wangler. 2018. Opportunistically collected data reveal habitat selection by migrating whooping cranes in the U.S. Northern Plains. Condor 120:343-356.

Shaffer, J. A. and D. A. Buhl. 2016. Effects of wind-energy facilities on breeding grassland bird distributions. Conservation Biology 30(1):59-71.

Shaffer, J. A., C. R. Loesch, and D. A. Buhl. 2019. Estimating offsets for avian displacement effects of anthropogenic impacts. Ecological Applications 0(0), 2019,e01983. [Online at: https://esajournals.onlinelibrary.wiley.com/doi/pdf/10.1002/eap.1983].

The Multiagency Avian-Solar Collaborative Working Group, 2016, Avian-Solar Science Coordination Plan, November.

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

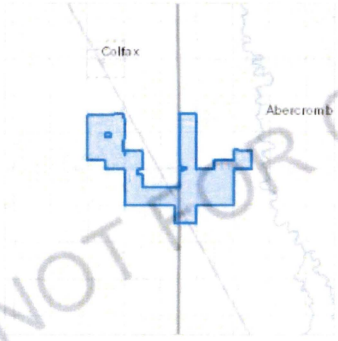
This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Richland County, North Dakota



Local office

North Dakota Ecological Services Field Office

(701) 250-4481
(701) 355-8513

3425 Miriam Avenue
Bismarck, ND 58501-7926

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

NOT FOR CONSULTATION

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Northern Long-eared Bat Myotis septentrionalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9045	Endangered

Insects

NAME	STATUS
Dakota Skipper Hesperia dacotae Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1028	Threatened
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS

Western Prairie Fringed Orchid Platanthera praeclara Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1669	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

NOT FOR CONSULTATION

Bald & Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

Additional information can be found using the following links:

- Eagle Managment https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

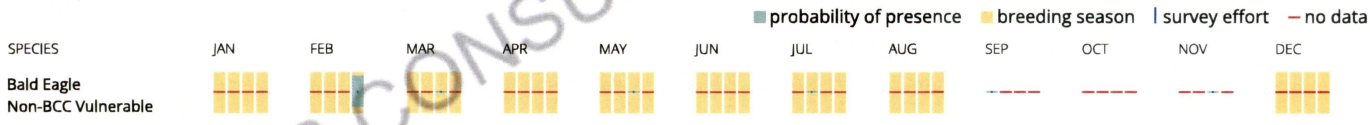
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

NOT FOR CONSULTATION



What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/ documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

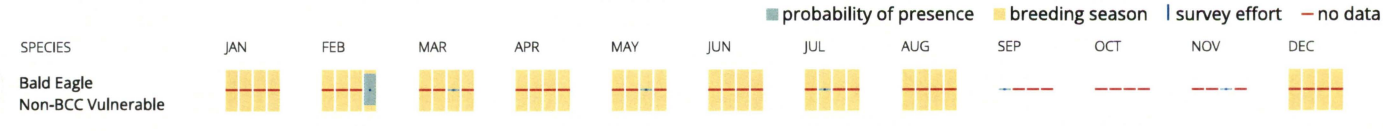
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

NOT FOR CONSULTATION

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND
- PEM1C
- PEM1Cx
- PEM1A
- PEM1E
- PEM1Cd
- PEM1B
- PEM1Ad

FRESHWATER POND
- PABFx
- PABF

RIVERINE
- R4SBCx
- R4SBC
- R4SBA

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
North Dakota Ecological Services Field Office
3425 Miriam Avenue
Bismarck, ND 58501-7926
Phone: (701) 250-4481 Fax: (701) 355-8513

In Reply Refer To:
Project code: 2023-0133254
Project Name: Flickertail Solar

September 26, 2023

Federal Nexus: no
Federal Action Agency (if applicable):

Subject: Technical assistance for 'Flickertail Solar'

Dear Nick Alex:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on September 26, 2023, for 'Flickertail Solar' (here forward, Project). This project has been assigned Project Code 2023-0133254 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements are not complete.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat Rangewide Determination Key (Dkey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

Determination for the Northern Long-Eared Bat

Based upon your IPaC submission and a standing analysis, your project is not reasonably certain to cause incidental take of the northern long-eared bat. Unless the Service advises you within 15 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the Action is not likely to result in unauthorized take of the northern long-eared bat.

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination for the northern long-eared bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Dakota Skipper *Hesperia dacotae* Threatened
- Monarch Butterfly *Danaus plexippus* Candidate
- Western Prairie Fringed Orchid *Platanthera praeclara* Threatened

You may coordinate with our Office to determine whether the Action may cause prohibited take of the animal species and/or critical habitat listed above. Note that if a new species is listed that may be affected by the identified action before it is complete, additional review is recommended to ensure compliance with the Endangered Species Act.

Next Steps

Coordination with the Service is complete. This letter serves as technical assistance. All conservation measures should be implemented as proposed. Thank you for considering federally listed species during your project planning.

We are uncertain where the northern long-eared bat occurs on the landscape outside of known locations. Because of the steep declines in the species and vast amount of available and suitable forest habitat, the presence of suitable forest habitat alone is a far less reliable predictor of their presence. Based on the best available information, most suitable habitat is now expected to be unoccupied. During the interim period, while we are working on potential methods to address this uncertainty, we conclude take is not reasonably certain to occur in areas of suitable habitat where presence has not been documented.

If no changes occur with the Project or there are no updates on listed species, no further consultation/coordination for this project is required for the northern long-eared bat. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional coordination with the Service should take place before project implements any changes which are final or commits additional resources.

If you have any questions regarding this letter or need further assistance, please contact the North Dakota Ecological Services Field Office and reference Project Code 2023-0133254 associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

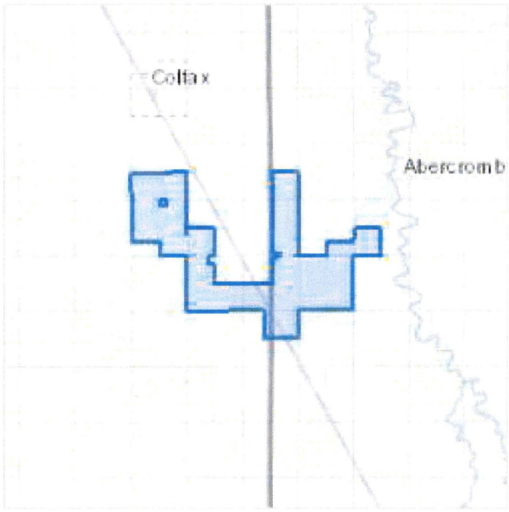
Flickertail Solar

2. Description

The following description was provided for the project 'Flickertail Solar':

> Proposed solar Project in Richland County, ND

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@46.42742615,-96.81226662136172,14z



DETERMINATION KEY RESULT

Based on the answers provided, the proposed Action is consistent with a determination of "may affect, but not likely to adversely affect" for the Endangered northern long-eared bat (*Myotis septentrionalis*).

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of the northern long-eared bat or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. Do you have post-white nose syndrome occurrence data that indicates that northern long-eared bats (NLEB) are likely to be present in the action area?

   Bat occurrence data may include identification of NLEBs in hibernacula, capture of NLEBs, tracking of NLEBs to roost trees, or confirmed acoustic detections. With this question, we are looking for data that, for some reason, may have not yet been made available to U.S. Fish and Wildlife Service.

   No

3. Does any component of the action involve construction or operation of wind turbines?

   Note: For federal actions, answer 'yes' if the construction or operation of wind power facilities is either (1) part of the federal action or (2) would not occur but for a federal agency action (federal permit, funding, etc.).

   No

4. Is the proposed action authorized, permitted, licensed, funded, or being carried out by a Federal agency in whole or in part?

   No

PROJECT QUESTIONNAIRE

IPAC USER CONTACT INFORMATION

Agency:	Private Entity
Name:	Nick Alex
Address:	2001 Killebrew Drive
Address Line 2:	Suite 141
City:	Bloomington
State:	MN
Zip:	55425
Email	nick.alex@tetratech.com
Phone:	6126432220

North Dakota Department of Environmental Quality

July 2, 2024

Adam Holven
Tetra Tech, Inc.
2001 Killebrew Drive, Suite 141
Bloomington, MN 55425

Re: Flickertail Solar Site Compatibility Certificate in Richland County

Dear Mr. Holven:

The North Dakota Department of Environmental Quality (Department) has reviewed the information concerning the above-referenced project received at the Department on June 17, 2024, with respect to possible environmental impacts.

1. Necessary measures should be taken to minimize fugitive dust emissions created during construction activities. Any complaints that may arise should be dealt with in an efficient and effective manner.

2. Projects disturbing one or more acres are required to have a permit to discharge stormwater runoff until the site is stabilized by the re-establishment of vegetation or other permanent cover. Further information on the stormwater permit may be obtained from the Department's website or by calling the Division of Water Quality at 701-328-5210. Check with the local officials to be sure any local stormwater management considerations are addressed. Stormwater runoff from the project area discharges to a 303(d) listed water body (Wild Rice River). Extra care should be taken to ensure construction activity does not affect the water body.

3. The construction project overlies the Colfax glacial drift aquifer. Care should be taken to avoid spills of any materials that may have an adverse effect on groundwater quality. All spills must be immediately reported to this Department and appropriate remedial actions performed.

4. All solid waste materials must be managed and transported in accordance with the state's solid and hazardous waste rules. Appropriate efforts to reduce, reuse and/or recycle waste materials are strongly encouraged. As appropriate, segregation of inert waste from non-inert waste can generally reduce the cost of waste management. Further information on waste management and recycling is available from the Department's Division of Waste Management at 701-328-5166.

The Department owns no land in or adjacent to the proposed improvements, nor does it have any projects scheduled in the area. In addition, we believe the proposed activities are consistent with the State Implementation Plan for the Control of Air Pollution for the State of North Dakota.

If you have any questions regarding our comments, please feel free to contact this office.

Sincerely,

L. David Glatt, P.E., Director
North Dakota Department of Environmental Quality

LDG:ll
Attach.

Construction and Environmental Disturbance Requirements

The following are the minimum requirements of the North Dakota Department of Environmental Quality (Department) for projects that involve construction and environmental disturbance in or near waters of the State of North Dakota. They ensure that minimal environmental degradation occurs as a result of construction or related work which has the potential to affect waters of the state. All projects must be constructed to minimize the loss of soil, vegetative cover, and pollutants (chemical or biological) from a site.

Soils

Prevent the erosion and sediment loss using erosion and sediment controls. Fragile and sensitive areas such as wetlands, riparian zones, delicate flora, and land resources must be prohibited against compaction, vegetation loss and unnecessary damage.

Surface Waters

All construction must be managed to minimize impacts to aquatic systems. Follow safe storage and handling procedures to prevent the contamination of water from fuel spills, lubricants, and chemicals. Stream bank and stream bed disturbances must be contained to minimize silt movement, nutrient upsurges, plant dislocations, and any physical chemicals, or biological disruption. The use of pesticides or herbicides in or near surface waters is allowed under the Department's pesticide application permit with notification to the Department.

Fill Material

Any fill material placed below the ordinary high-water mark must be free of topsoil, decomposable materials, and persistent synthetic organic compounds, including, but not limited to, asphalt, tires, treated lumber, and construction debris. The Department may require testing of fill material. All temporary fills must be removed. Debris and solid waste must be properly disposed or recycled. Impacted areas must be restored to near original condition.

September 12, 2024

Adam Holven
Tetra Tech, Inc.
2001 Killebrew Drive, Suite 141
Bloomington, MN 55425

Re: Flickertail Solar Site Compatibility Certificate in Richland County

Dear Mr. Holven:

The North Dakota Department of Environmental Quality (Department) has reviewed the information concerning the above-referenced project received at the Department on June 17, 2024, with respect to possible environmental impacts.

1. Necessary measures should be taken to minimize fugitive dust emissions created during construction activities. Any complaints that may arise should be dealt with in an efficient and effective manner.

2. Projects disturbing one or more acres are required to have a permit to discharge stormwater runoff until the site is stabilized by the re-establishment of vegetation or other permanent cover. Further information on the stormwater permit may be obtained from the Department's website or by calling the Division of Water Quality at 701-328-5210. Check with the local officials to be sure any local stormwater management considerations are addressed. Stormwater runoff from the project area discharges to a 303(d) listed water body (Wild Rice River). Extra care should be taken to ensure construction activity does not affect the water body.

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4. All solid waste materials must be managed and transported in accordance with the state's solid and hazardous waste rules. Appropriate efforts to reduce, reuse and/or recycle waste materials are strongly encouraged. As appropriate, segregation of inert waste from non-inert waste can generally reduce the cost of waste management. Further information on waste management and recycling is available from the Department's Division of Waste Management at 701-328-5166.

The Department owns no land in or adjacent to the proposed improvements, nor does it have any projects scheduled in the area. In addition, we believe the proposed activities are consistent with the State Implementation Plan for the Control of Air Pollution for the State of North Dakota.

If you have any questions regarding our comments, please feel free to contact this office.

Sincerely,

L. David Glatt, P.E., Director
North Dakota Department of Environmental Quality

LDG:ll
Attach.

Note: This response letter, originally dated July 2, 2024, was recently discovered unsigned.

Construction and Environmental Disturbance Requirements

The following are the minimum requirements of the North Dakota Department of Environmental Quality (Department) for projects that involve construction and environmental disturbance in or near waters of the State of North Dakota. They ensure that minimal environmental degradation occurs as a result of construction or related work which has the potential to affect waters of the state. All projects must be constructed to minimize the loss of soil, vegetative cover, and pollutants (chemical or biological) from a site.

Soils

Prevent the erosion and sediment loss using erosion and sediment controls. Fragile and sensitive areas such as wetlands, riparian zones, delicate flora, and land resources must be prohibited against compaction, vegetation loss and unnecessary damage.

Surface Waters

All construction must be managed to minimize impacts to aquatic systems. Follow safe storage and handling procedures to prevent the contamination of water from fuel spills, lubricants, and chemicals. Stream bank and stream bed disturbances must be contained to minimize silt movement, nutrient upsurges, plant dislocations, and any physical chemicals, or biological disruption. The use of pesticides or herbicides in or near surface waters is allowed under the Department's pesticide application permit with notification to the Department.

Fill Material

Any fill material placed below the ordinary high-water mark must be free of topsoil, decomposable materials, and persistent synthetic organic compounds, including, but not limited to, asphalt, tires, treated lumber, and construction debris. The Department may require testing of fill material. All temporary fills must be removed. Debris and solid waste must be properly disposed or recycled. Impacted areas must be restored to near original condition.

North Dakota Department of Transportation

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November 2, 2023

Adam Holven
Tetra Tech, Inc.
2001 Killebrew Dr., Suite 141
Bloomington, MN 55425

FLICKERTAIL SOLAR PROJECT LOCATED SOUTH OF COLFAX IN ABERCROMBIE TOWNSHIP, RICHLAND COUNTY, NORTH DAKOTA

This project should have no adverse effect on the North Dakota Department of Transportation highways; however, you will need to obtain a Utility Permit for NDDOT Fargo District Office before installing any utilities within the Interstate Highway right of way.

Additionally, if because of this project any work needs to be done on or in highway right of way, appropriate permits and risk management documents will need to be obtained prior to any work being done from the Department of Transportation District Engineer, Aaron Murra at 701-239-8903.

JON KETTERLING, P.E., DIRECTOR – OFFICE OF PROJECT DEVELOPMENT

57/jk/js
c: Aaron Murra, Fargo District Engineer

North Dakota Department of Trust Lands Surface Management Division

Holven, Adam

From: Stegmiller, Joseph H. <jstegmiller@nd.gov>
Sent: Wednesday, October 25, 2023 8:29 AM
To: Holven, Adam
Subject: Flickertail Solar and the potential for solar projects in North Dakota.

You don't often get email from jstegmiller@nd.gov. Learn why this is important

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Good Morning,

The Department of Trust Lands recently received the request for comments notification for the Flickertail Solar project in Richland County, North Dakota. The Department of Trust Lands manages state trust lands, which this project does not affect, so the Department don't have a specific comment on the project. However, I wanted to reach out to get more information on the potential for solar projects in North Dakota. Let me know if you would be willing to have a phone conversation some time to discuss some questions. Also, feel free to forward this to whomever would best be to answer the questions.

Thanks

Joseph Stegmiller
Surface Division Director
Natural Resources Professional

701.328.1912 • jstegmiller@nd.gov • land.nd.gov

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North Dakota Department of Water Resources

NORTH Dakota | Water Resources

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November 14, 2023

Adam Holven
Tetra Tech, Inc.
2001 Killebrew Drive, STE 141
Bloomington, MN 55425

Dear Mr. Holven:

This is in response to your request for a review of the environmental impacts associated the Flickertail Solar project located in Richland County, ND.

The proposed project has been reviewed by Department of Water Resources, and the following comments are provided:

- There is a FEMA National Flood Insurance Program (NFIP) regulatory floodplain identified or mapped where this proposed project is to take place. Impacted areas are designated to be in NFIP Zone A. The State of North Dakota has no formal NFIP permitting authority, as all NFIP permitting decisions are considered by impacted NFIP participating communities, which is the community with zoning authority for the area in question. Please work directly with the local floodplain administrator of the zoning authority impacted to achieve NFIP and community compliance.

- The Department of Water Resources (DWR) and Water Resource Districts are responsible for regulating drainage and water management in North Dakota. The DWR is also responsible for regulating the construction and modification of any dikes, levees, or other devices. Consequently, the DWR requests to be notified regarding a proposed project's impacts, if any, to water resources, such as watercourses (i.e. streams or rivers), agricultural drains, and wetlands (i.e. ponds, sloughs, lakes, or any series thereof), and dikes, levees, and other water control devices, as any alterations, modifications, improvements, or impacts to those may require a drainage permit(s) or a construction permit(s) from the DWR. For more information on these requirements, please visit the Regulation & Appropriation tab on the DWR's website (dwr.nd.gov), or contact the DWR's Regulatory Division at 701-328-4956 or dwrregpermits@nd.gov.

- Initial review indicates the project does not require a conditional or temporary permit for water appropriation. However, if surface water or groundwater will be diverted for construction of the project, a water permit will be required per North Dakota Century Code § 61-04-02. Please consult with the Department of Water

Resources Water Appropriation Division if you have any questions at (701) 328-2754 or appropinfo@nd.gov.

- The Department of Water Resources maintains a network of observation wells across the state for monitoring the water levels and quality in glacial and bedrock aquifers. These wells are often installed in road and highway rights-of-way to limit inconvenience to the adjacent landowners. Department of Water Resources observation wells have a yellow protective casing extending between 1 and 3 feet above ground surface, and their locations are marked with a stake. If an observation well is encountered during project activities and must be removed, please contact the Water Appropriation Division. The Department of Water Resources hopes to keep all observation wells, but otherwise will ensure the well is properly abandoned.

Thank you for the opportunity to provide review comments. Should you have further questions, please contact me at 701-328-4970 or vdavila@nd.gov.

Sincerely,

Vanessa Davila

Vanessa Davila
Water Resource Planner

VD:dm/1570

North Dakota Game and Fish Department

From: Johnson, Sandra K.
To: Gorman, Kim
Cc: Holven, Adam; Bellrichard, Kathy
Subject: RE: Flickertail Solar - Request for Eagle Nest Locations
Date: Thursday, September 12, 2024 1:41:10 PM
Attachments: image002.png
image003.png
image004.png
image005.png
image006.png
image007.png
image008.png
image009.png
image010.png
image011.png
image012.png

CAUTION: This email originated from an external sender. Verify the source before opening links or attachments.

Hi Kimberly,
There are no known eagle nests within 2 miles of the project area. The closest known Bald Eagle nest is more than 3 miles from the site.
Thanks,
Sandy

Sandra Johnson
Conservation Biologist

(701) 328-6382 • sajohnson@nd.gov • gf.nd.gov



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From: Gorman, Kim <Kim.Gorman@tetratech.com>
Sent: Monday, September 9, 2024 3:08 PM
To: Johnson, Sandra K. <sajohnson@nd.gov>
Cc: Holven, Adam <adam.holven@tetratech.com>; Gorman, Kim <Kim.Gorman@tetratech.com>; Bellrichard, Kathy <kathy.bellrichard@tetratech.com>
Subject: RE: Flickertail Solar - Request for Eagle Nest Locations

***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Sandra,

Sending along the KMZ for the Flickertail Solar Project Area as attached. Could you please check your eagle nest dataset and send along any nests within 2 miles?

Much appreciated!

Kimberely

Kimberely Gorman | Vice President / Operations Manager
Pronouns: she, her, hers
Direct **(612) 643-2224** | Business **(612) 643-2200** | Mobile **(612) 998-7468** | Fax **(612) 643-2201** kim.gorman@tetratech.com
Time Zone: Central (UTC -05.00)
Climate positive and carbon negative by 2030. Read more

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2001 Killebrew Drive, Suite 141, Bloomington, Minnesota 55425 | tetratech.com

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From: Johnson, Sandra K. <sajohnson@nd.gov>
Sent: Monday, September 9, 2024 7:02 AM
To: Holven, Adam <adam.holven@tetratech.com>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: Flickertail Solar - Request for Bald Eagle Nest Locations

⚠ **CAUTION:** This email originated from an external sender. Verify the source before opening links or attachments. ⚠

Hi Adam,
Please send me a KMZ or shapefile of the project location. Do not zip the files, our email does not accept them.
Thanks,
Sandy

Sandra Johnson
Conservation Biologist

(701) 328-6382 • sajohnson@nd.gov • gf.nd.gov



NORTH Dakota | Game and Fish
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From: Holven, Adam <adam.holven@tetratech.com>
Sent: Thursday, September 5, 2024 5:32 PM

To: Johnson, Sandra K. <sajohnson@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: Flickertail Solar - Request for Bald Eagle Nest Locations

You don't often get email from adam.holven@tetratech.com. Learn why this is important

***** **CAUTION:** This email originated from an outside source. Do not click links or open attachments unless you know they are safe. *****

Hi Sandra,

I left you a message today, but I am looking for information to determine if there are known bald eagle nest within 2 miles of the Flickertail Solar Project in Richland County. This is different from the Flickertail **Wind** Project that you have work with Kim on.

What information would you need from me to do a search of 2-mile area around the Flickertail Solar Project?

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | **www.tetratech.com**
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I will be out of the office on PTO during the following dates: Monday, September 9 through Friday, September 13.

From: Holven, Adam
To: Mueller, Elisha K.; Kolar, Jesse L.
Cc: Christina Martens; Gorman, Kim
Subject: Flickertail Solar - Lek Survey Results
Date: Tuesday, July 9, 2024 4:21:00 PM
Attachments: 20240617_Flickertail Solar Project_Lek Survey Report.pdf

---

Hi Elisha and Jesse,

Please find attached the lek survey results for Flickertail Solar. Per our last discussion on April 2, the Project committed to undertaking this survey. No leks were identified during the survey.

Can you please confirm if the NDGF is requesting any other pre-construction wildlife surveys for Flickertail Solar?

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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See Appendix N – Lek Survey

From:	Holven, Adam
To:	Mueller, Elisha K.; Link, Greg W.; Kreft, Bruce L.; Francis, Curtis V.; Dinges, Andrew J.; Riddle, Heidi L
Cc:	Nick Schuler; Christina Martens; Gorman, Kim
Subject:	RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND
Date:	Wednesday, May 22, 2024 1:47:00 PM
Attachments:	20240130_USFWS_NDGF_FlickertailSolar Meeting Minutes_20240306.pdf

Hi folks,

Sorry about the delay in distributing the final notes that include Elisha's comments. It has been a busy spring.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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Flickertail Solar

Agency Consultation – Biological Discussion

Teleconference

January 30, 2024

USFWS Review of the Meeting Notes: 3/5/2024

NDGF Review of the Meeting Notes: 3/6/2024

Attendees:
USFWS: Heidi Riddle
NDGF: Elisha Mueller, Greg Link, Bruce Kreft, Curt Francis, Andy Dinges
Savion: Christina Martens, Nick Schuler
Tetra Tech: Kimberely Gorman, Adam Holven, Nick Alex

Location: Microsoft Teams call

Date / Time: January 30, 2024, 2:00 PM Central

Discussion Summary

- Introductions were completed and a project overview was provided.
- The Project has shifted south from Colfax Township to Abercrombie Township since the last discussion with NDGF and USFWS in October 2021.
- The Project is actively working with Abercrombie Township on the Project. In November 2023, the Abercrombie Township board approved a conditional use permit for the Project.
- Desktop assessment for potential grasslands, wetlands and wooded areas has been completed for the Project Area. No USFWS Easements were identified within the Project Area. Eighty acres of NDGF PLOTs were identified within the Project Area. Field surveys for wetlands and natural resources are anticipated to be completed in Spring 2024.
- In presenting the federal threatened and endangered species that IPaC determined were in the area, notable points included:
    - The Project received a "not likely to adversely affect letter" based on USFWS determination keys for the northern long-eared bat
    - Per last consultation, the nearest known Dakota skipper locations were 50-60 miles west and southwest of the Project Area
- Biological studies completed in the Project Area include a ground based stick nest survey conducted in November 2023 that did not identify any bald eagle nests.
- Christina with Savion indicated they are working with local stakeholders on a vegetation management plan. Specifically working with the NRCS, county, and township on an appropriate seed mix. The Project also made commitments to the township to include native grasses under

panels and pollinator habitat in surrounding area. Christina mentioned that Richland County weed management, the NRCS, and USDA all will have input on the vegetation management plan. (Contacts are John Quast - NRCS Jonathan.quast@usda.gov, Jan Klostreich - Richland Soil Conservation District, and Perry Miller – Richland County Weed Board)

- In discussing the possible need for species specific surveys, Elisha Mueller (NDGF) first inquired about whether the grasslands present within the Project Area are broken or unbroken. Adam Holven (Tetra Tech) responded with describing the methodology Tetra Tech employs to classify grasslands, and further shared that the PLOTS land appeared to present greatest diversity among the grasslands within the Project Area. Elisha (NDGF) responded that all grasslands in the area are often invaded by smooth brome and Kentucky bluegrass, and that a habitat analysis of unbroken versus tilled/stripped land is likely the best methodology to determine where broken and unbroken grasslands are in the Project Area.
- Elisha (NDGF) further emphasized that unbroken grasslands are what NDGF views as most important to grassland species in the region. If no unbroken grasslands will be impacted by the Project, likely no Dakota skipper surveys would be needed. Greg (NDGF) mentioned that USDA tracts land conversion and this could be used to help assist in identifying broken versus unbroken grasslands.
- In further discussion of grasslands, Elisha (NDGF) inquired as to whether we were aware of sharp-tailed grouse leks in the area. Elisha further mentioned that the PLOTS land could host sharp-tails. To this point, Greg Link (NDGF) further inquired as to whether we were aware of any greater prairie chickens in the area. He acknowledged it is unlikely but could occur. To these points, Kim Gorman (Tetra Tech) discussed the conservative approach to digitizing wetland and grassland areas that Tetra Tech uses, to ensure that all areas visited during field surveys are classified in an appropriate way, including photos and species observations. Kim further inquired to the agencies whether lek location data is available for this area. Greg confirmed that they do not have up-to-date census blocks of leks for this particular area.
- The group continued to discuss grasslands in the context of solar development, shifting towards solar setback requirements for grassland species. Elisha indicated that she was unsure of setback requirements for solar development regarding grassland leks. Kim brought up the differences between solar and wind development and operation risk to species, and how to best tailor requirements and recommendations towards best benefiting species. Bruce Kreft (NDGF) mentioned they were looking to acquire new studies on leks and the impact solar has on grassland species.
- The discussion shifted to Tetra Tech aiming to get a better understanding of the agencies' desires to have pre- and post construction avian surveys. Kim began by inquiring about the wind energy guidelines (WEGs) influence on the need for pre- and post construction avian surveys, specifically within the context of a letter received from the USFWS recommending them. Heidi Riddle (USFWS) discussed the letter, mentioning how it partly stems from uncertainty on how solar impacts avian species and landscape scale projects. The USFWS is encouraging companies to think about how species may be impacted.
- In terms of recommendations, Heidi believes a habitat assessment would be good for the Project, and further emphasized a desire for post construction monitoring. To better understand agency

requirements, Kim inquired as to what is recommended versus what is required. Heidi clarified nothing is required, but the recommendations are meant to guide.

- In the context of avian surveys, Elisha mentioned that post construction surveys are very important to NDGF and are a standard recommendation for both wind and solar projects. The NDGF further hopes to utilize the data beyond due diligence, as to not waste the data and instead use it to benefit future development through increased understanding of solar development and wildlife interactions in the region. Elisha further mentioned that though they cannot require anything, the PSC takes concerns from the NDGF into consideration, and further mentioned that survey effort is important to the PSC.
- In further discussing the WEGs influence on solar guidance, Elisha identified the WEGs as a solid document that already exists, thus a good starting point for determining solar surveys, though NDGF is eventually planning on creating a general BMP for renewable energy in the region.
- In discussing sharp-tailed grouse surveys, Elisha mentioned that they can lek in a broad variety of habitats, but the most important facet is avoidance of unbroken grassland habitat. If the Project can avoid nesting habitat (which includes both unbroken and restored grasslands), there would be no need to survey.
- Shifting to Project design, Elisha inquired as to how much of the landscape will be panels within the Project Area. Savion indicated that around 2,500 acres of Project Area will be panel coverage, demarcated by fenced areas. Savion further emphasized that the 2,500 acres is the fenced area, so there would be gaps between solar panels within that area.
- Elisha inquired about whether the Project would be pursuing voluntary offset. Tetra Tech indicated the Project was currently identifying grassland and wetland habitat to inform site design.
- Christina asked the group how they define "unbroken grasslands." Greg indicated that though the area is highly agricultural, there are areas with livestock grazing, grassland, and riparian areas, all as potential small unbroken grassland. Greg further stated that the majority of unbroken grassland in the area may be outside the Project Area.
- In a brief discussion brought up by Adam, Greg and Elisha indicated that railroad corridors are disturbed lands, and NDGF's priority is areas that have not been tilled.
- In discussing expectations on wildlife safe fencing, Kim inquired as to what wildlife species are being protected by the recommended fencing. Greg expressed concern across the state for migratory big game animals, with a goal of limiting barriers to moving wildlife. Elisha indicated that the goal is to limit trapping of wildlife and that wildlife safe fencing is a standard recommendation for all projects.
- Christina identified the anticipated fencing surrounding panels and corridors would be included and could be used by wildlife. The fence is described as an agricultural style fence with no barb wire on top. It would be six feet high around the solar panels, though more secure fencing with barbed wire is required to house the electrical facilities such as the substation. Christina further mentioned the goal is to keep people out, not animals.
- Kim inquired about wetlands, specifically in terms of what meets criteria for wetlands to be species habitat. Bruce replied that farmed wetlands are not usually an issue, and the recommendation is to identify all wetlands in the area, but to focus on ones that meet wetland

criteria for soil, vegetation, and hydrology. To this point, Adam asked whether revegetated wetlands in a formerly agricultural area could be used as an offset, to which Bruce replied this would not count as offset if located under panels. Wetlands restored in the Project Area, but beyond the solar panels may qualify for offset.

Action Items

- Elisha Mueller (NDGF) to check in with upland game biologist Jesse Kolar for appropriate setbacks from for sharp-tailed grouse and solar projects.
- Elisha Mueller to check with Jesse Kolar for lek survey guidelines for solar projects.
- Tetra Tech to request eagle nest location data for the Project Area from Sandra Johnson at NDGF.
- Tetra Tech to request lek locations for the Project Area and identified setback from Sandra Johnson at NDGF.
- Tetra Tech to check with senior biologists for studies on sharp-tailed grouse impacts from solar development.
- Tetra Tech to send PCMM reports from Midwest solar project for reference.

Holven, Adam

From: Holven, Adam
Sent: Tuesday, April 2, 2024 9:51 AM
To: Kolar, Jesse L.; Mueller, Elisha K.
Cc: Gorman, Kim
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

Hi Jesse,

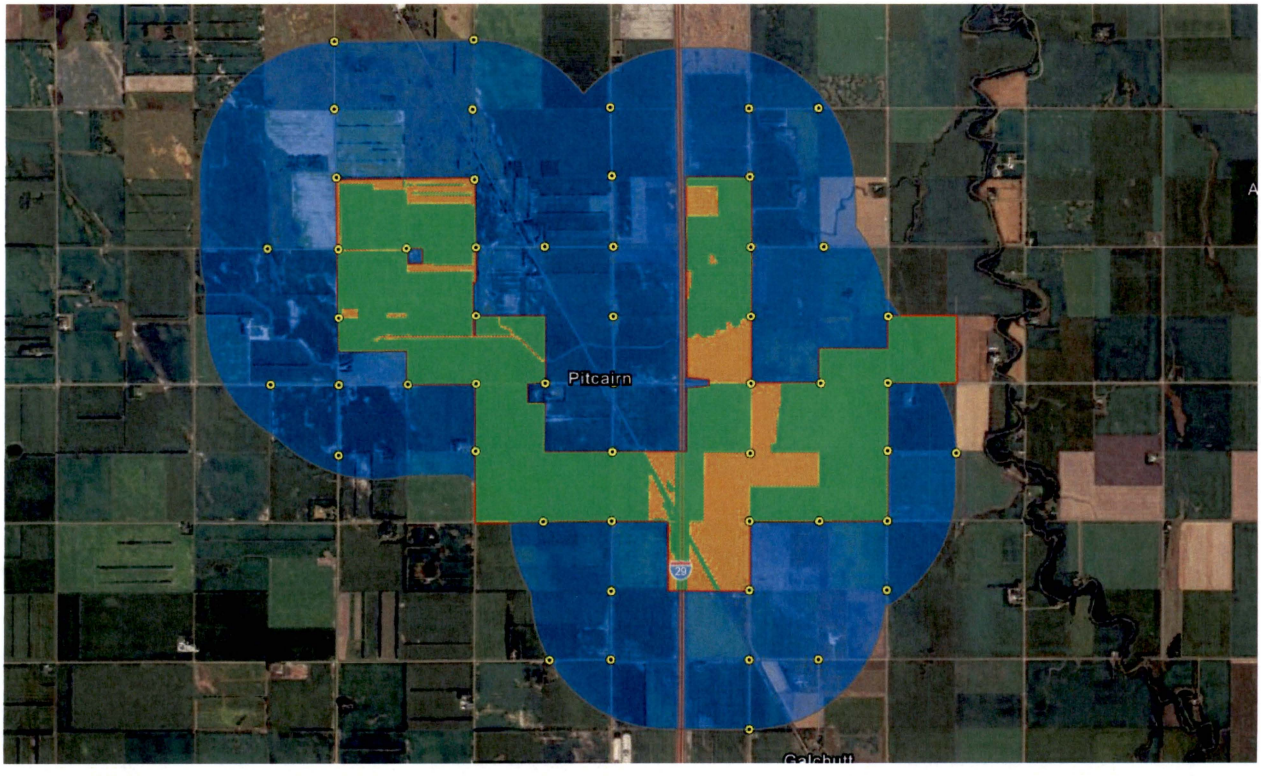
The client has approved the survey. After our discussion last week, I reviewed all landuse data (GIS and photos) from the cultural resource survey and identified those areas in the Project Area that were not cultivated (i.e., pastures, hay/alfalfa fields, grassy ditches, and planted grassy fields – orange shaded area below). I buffered all areas by 1 mile (blue shaded area below) and established listening stations every 0.5 mile along public roadways, with the exception of I-29 (yellow and black circles).

We have 52 listening stations that will be surveyed. Our schedule is outlined below.

- Week 1: between April 8 and April 13, 2024
- Week 2: between April 22 and April 27, 2024
- Week 3: between May 13 and May 15, 2024

We'll keep you posted if we find anything.

Thanks,
Adam



Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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From: Kolar, Jesse L. <jlkolar@nd.gov>
Sent: Monday, April 1, 2024 5:40 PM
To: Holven, Adam <adam.holven@tetratech.com>; Mueller, Elisha K. <ekmueller@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: Re: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Ours doesn't work great for pre-development surveys since we have established leks we're counting males and females. The attached would work well, but assumes you're not counting the birds on the leks. If you can get a rough count of the males on any observed leks, that'd be useful for post-development monitoring. Also, if you don't use waypoints for stops, a Lat/Long would be necessary to record.

Jesse

Prairie Grouse Pre-dev Survey Datasheet.xlsx

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Monday, April 1, 2024 4:22 PM
To: Kolar, Jesse L. <jlkolar@nd.gov>; Mueller, Elisha K. <ekmueller@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Hi Jesse,

Do you have an example of lek listening survey data sheet that you would recommend that we use at the Flickertail Solar site?

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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From: Kolar, Jesse L. <jlkolar@nd.gov>
Sent: Tuesday, March 26, 2024 2:55 PM
To: Holven, Adam <adam.holven@tetratech.com>; Mueller, Elisha K. <ekmueller@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Yes, I'll be able to join then.

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Tuesday, March 26, 2024 1:15 PM
To: Mueller, Elisha K. <ekmueller@nd.gov>; Kolar, Jesse L. <jlkolar@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Thanks Elisha,

Jesse, would that time work for you?

Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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From: Mueller, Elisha K. <ekmueller@nd.gov>
Sent: Tuesday, March 26, 2024 1:31 PM
To: Holven, Adam <adam.holven@tetratech.com>; Kolar, Jesse L. <jlkolar@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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That works for me.

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Tuesday, March 26, 2024 12:56 PM
To: Mueller, Elisha K. <ekmueller@nd.gov>; Kolar, Jesse L. <jlkolar@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Thanks Elisha,

Would to 2 to 3 pm CDT tomorrow (3/27) work for you and Jesse?

Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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From: Mueller, Elisha K. <ekmueller@nd.gov>
Sent: Tuesday, March 26, 2024 9:24 AM
To: Holven, Adam <adam.holven@tetratech.com>; Kolar, Jesse L. <jlkolar@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Unfortunately, we have had another meeting scheduled for 3pm today. My apologies.

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Tuesday, March 26, 2024 9:19 AM
To: Mueller, Elisha K. <ekmueller@nd.gov>; Kolar, Jesse L. <jlkolar@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Hi Elisha and Jesse,

Would 3:00 pm CDT today work for a call to discuss protocols for a proposed lek survey at Flickertail Solar?

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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From: Holven, Adam
Sent: Monday, March 25, 2024 8:50 AM
To: Mueller, Elisha K. <ekmueller@nd.gov>; Kolar, Jesse L. <jlkolar@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

Thanks Elisha and Jesse,

I checked Kim's calendar and I think tomorrow (3/26) at 3:00 pm CDT would work. If you don't have any conflicts with this time, I will send out a teams invite.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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From: Mueller, Elisha K. <ekmueller@nd.gov>
Sent: Monday, March 25, 2024 8:20 AM
To: Kolar, Jesse L. <jlkolar@nd.gov>; Holven, Adam <adam.holven@tetratech.com>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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I am available Tuesday and Thursday afternoon and Wednesday between 2-4.

Elisha

From: Kolar, Jesse L. <jlkolar@nd.gov>
Sent: Friday, March 22, 2024 4:31 PM
To: Holven, Adam <adam.holven@tetratech.com>; Mueller, Elisha K. <ekmueller@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

My afternoons are quite flexible the next few weeks. We're doing grouse surveys, so I'll be out most days until ~10:30 CDT, pending weather.

Jesse

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Friday, March 22, 2024 2:04 PM
To: Mueller, Elisha K. <ekmueller@nd.gov>; Kolar, Jesse L. <jlkolar@nd.gov>
Cc: Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Hi Elisha and Jesse,

Kim and I have reviewed the protocols and would like to set up a call next week to discuss what a proposed survey would like at Flickertail Solar.

Is there a time or two that works for you next week?

Thanks and have a good weekend.

Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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From: Mueller, Elisha K. <ekmueller@nd.gov>
Sent: Monday, March 11, 2024 10:40 AM
To: Holven, Adam <adam.holven@tetratech.com>
Cc: Kolar, Jesse L. <jlkolar@nd.gov>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Hi Adam,

You can find survey protocol recommendations in our wind BMP guide:
https://gf.nd.gov/sites/default/files/publications/wind-energy-development-bmp.pdf

Elisha

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Monday, March 11, 2024 10:24 AM
To: Mueller, Elisha K. <ekmueller@nd.gov>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Thanks Elisha,

Could you point me to the most recent survey protocols for review? I would like to review and then set up a call with Jesse to discuss.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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From: Mueller, Elisha K. <ekmueller@nd.gov>
Sent: Wednesday, March 6, 2024 4:12 PM
To: Holven, Adam <adam.holven@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

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Hi Adam,

I also spoke with Jesse, our upland game biologist, about sharp-tailed grouse surveys. His recommendation is to buffer the grass (both planted and native, as both are suitable nesting habitat) by 1 mile and survey that area within the project boundary. It is likely that any leks in the area would be captured in that effort.

Please feel free to reach out if you have any other questions.
Elisha

From: Mueller, Elisha K.
To: Holven, Adam; Link, Greg W.; Kreft, Bruce L.; Francis, Curtis V.; Dinges, Andrew J.; Riddle, Heidi L
Cc: Nick Schuler; Christina Martens; Gorman, Kim
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND
Date: Wednesday, March 6, 2024 3:54:52 PM
Attachments: 20240130_USFWS_NDGF_FlickertailSolar Meeting Minutes_20240219.docx

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I only had a few edits to clarify a bit. Thanks for the opportunity to review.

Elisha

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Thursday, February 29, 2024 2:49 PM
To: Mueller, Elisha K. <ekmueller@nd.gov>; Link, Greg W. <glink@nd.gov>; Kreft, Bruce L. <bkreft@nd.gov>; Francis, Curtis V. <cvfrancis@nd.gov>; Dinges, Andrew J. <adinges@nd.gov>; Riddle, Heidi L <heidi_riddle@fws.gov>
Cc: Nick Schuler <nschuler@savionenergy.com>; Christina Martens <cmartens@savionenergy.com>; Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND

Some people who received this message don't often get email from adam.holven@tetratech.com. Learn why this is important

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Hi folks,

I hope your week is going well. Would it be possible to receive your comments/edits on the meeting minutes by March 8?

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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Flickertail Solar

Agency Consultation – Biological Discussion

Teleconference

January 30, 2024

Attendees:
USFWS: Heidi Riddle
NDGF: Elisha Mueller, Greg Link, Bruce Kreft, Curt Francis, Andy Dinges
Savion: Christina Martens, Nick Schuler
Tetra Tech: Kimberely Gorman, Adam Holven, Nick Alex

Location: Microsoft Teams call

Date / Time: January 30, 2024, 2:00 PM Central

Discussion Summary

- Introductions were completed and a project overview was provided.
- The Project has shifted south from Colfax Township to Abercrombie Township since the last discussion with NDGF and USFWS in October 2021.
- The Project is actively working with Abercrombie Township on the Project. In November 2023, the Abercrombie Township board approved a conditional use permit for the Project.
- Desktop assessment for potential grasslands, wetlands and wooded areas has been completed for the Project Area. No USFWS Easements were identified within the Project Area. Eighty acres of NDGF PLOTs were identified within the Project Area. Field surveys for wetlands and natural resources are anticipated to be completed in Spring 2024.
- In presenting the federal threatened and endangered species that IPaC determined were in the area, notable points included:
    - The Project received a "not likely to adversely affect letter" based on USFWS determination keys for the northern long-eared bat
    - Per last consultation, the nearest known Dakota skipper locations were 50-60 miles west and southwest of the Project Area
- Biological studies completed in the Project Area include a ground based stick nest survey conducted in November 2023 that did not identify any bald eagle nests.
- Christina with Savion indicated they are working with local stakeholders on a vegetation management plan. Specifically working with the NRCS, county, and township on an appropriate seed mix. The Project also made commitments to the township to include native grasses under panels and pollinator habitat in surrounding area. Christina mentioned that Richland County weed management, the NRCS, and USDA all will have input on the vegetation management plan. (Contacts are John Quast - NRCS Jonathan.quast@usda.gov, Jan Klostreich - Richland Soil Conservation District, and Perry Miller – Richland County Weed Board)

- In discussing the possible need for species specific surveys, Elisha Mueller (NDGF) first inquired about whether the grasslands present within the Project Area are broken or unbroken. Adam Holven (Tetra Tech) responded with describing the methodology Tetra Tech employs to classify grasslands, and further shared that the PLOTS land appeared to present greatest diversity among the grasslands within the Project Area. Elisha (NDGF) responded that all grasslands in the area are often invaded by smooth brome and Kentucky bluegrass, and that a habitat analysis of unbroken versus tilled/stripped land is likely the best methodology to determine where broken and unbroken grasslands are in the Project Area.
- Elisha (NDGF) further emphasized that unbroken grasslands are what NDGF views as most important to grassland species in the region. If no unbroken grasslands will be impacted by the Project, likely no Dakota skipper surveys would be needed. Greg (NDGF) mentioned that USDA tracts land conversion and this could be used to help assist in identifying broken versus unbroken grasslands.
- In further discussion of grasslands, Elisha (NDGF) inquired as to whether we were aware of sharp-tailed grouse leks in the area. Elisha further mentioned that the PLOTS land could host sharp-tails. To this point, Greg Link (NDGF) further inquired as to whether we were aware of any greater prairie chickens in the area. He acknowledged it is unlikely but could occur. To these points, Kim Gorman (Tetra Tech) discussed the conservative approach to digitizing wetland and grassland areas that Tetra Tech uses, to ensure that all areas visited during field surveys are classified in an appropriate way, including photos and species observations. Kim further inquired to the agencies whether lek location data is available for this area. Greg confirmed that they do not have up-to-date census blocks of leks for this particular area.
- The group continued to discuss grasslands in the context of solar development, shifting towards solar setback requirements for grassland species. Elisha indicated that she was unsure of setback requirements for solar development regarding grassland leks. Kim brought up the differences between solar and wind development and operation risk to species, and how to best tailor requirements and recommendations towards best benefiting species. Bruce Kreft (NDGF) mentioned they were looking to acquire new studies on leks and the impact solar has on grassland species.
- The discussion shifted to Tetra Tech aiming to get a better understanding of the agencies' desires to have pre- and post construction avian surveys. Kim began by inquiring about the wind energy guidelines (WEGs) influence on the need for pre- and post construction avian surveys, specifically within the context of a letter received from the USFWS recommending them. Heidi Riddle (USFWS) discussed the letter, mentioning how it partly stems from uncertainty on how solar impacts avian species and landscape scale projects. The USFWS is encouraging companies to think about how species may be impacted.
- In terms of recommendations, Heidi believes a habitat assessment would be good for the Project, and further emphasized a desire for post construction monitoring. To better understand agency requirements, Kim inquired as to what is recommended versus what is required. Heidi clarified nothing is required, but the recommendations are meant to guide.
- In the context of avian surveys, Elisha mentioned that post construction surveys are very important to NDGF and are a standard recommendation for both wind and solar projects. The

Commented [MEK1]: I cannot speak to requirements from USFWS.

NDGF further hopes to utilize the data beyond due diligence, as to not waste the data and instead use it to benefit future development through increased understanding of solar development and wildlife interactions in the region. Elisha further mentioned that though they cannot require anything, the PSC takes concerns from the NDGF into consideration, and further mentioned that survey effort is important to the PSC.

- In further discussing the WEGs influence on solar guidance, Elisha identified the WEGs as a solid document that already exists, thus a good starting point for determining solar surveys, though NDGF is eventually planning on creating a general BMP for renewable energy in the region.
- In discussing sharp-tailed grouse surveys, Elisha mentioned that they can lek in a broad variety of habitats, but the most important facet is avoidance of unbroken grassland habitat. If the Project can avoid nesting habitat (which includes both unbroken and restored grasslands), there would be no need to survey.
- Shifting to Project design, Elisha inquired as to how much of the landscape will be panels within the Project Area. Savion indicated that around 2,500 acres of Project Area will be panel coverage, demarcated by fenced areas. Savion further emphasized that the 2,500 acres is the fenced area, so there would be gaps between solar panels within that area.
- Elisha inquired about whether the Project would be pursuing voluntary offset. Tetra Tech indicated the Project was currently identifying grassland and wetland habitat to inform site design.
- Christina asked the group how they define "unbroken grasslands." Greg indicated that though the area is highly agricultural, there are areas with livestock grazing, grassland, and riparian areas, all as potential small unbroken grassland. Greg further stated that the majority of unbroken grassland in the area may be outside the Project Area.
- In a brief discussion brought up by Adam, Greg and Elisha indicated that railroad corridors are disturbed lands, and NDGF's priority is areas that have not been tilled.
- In discussing expectations on wildlife safe fencing, Kim inquired as to what wildlife species are being protected by the recommended fencing. Greg expressed concern across the state for migratory big game animals, with a goal of limiting barriers to moving wildlife. Elisha indicated that the goal is to limit trapping of wildlife and that wildlife safe fencing is a standard recommendation for all projects.
- Christina identified the anticipated fencing surrounding panels and corridors would be included and could be used by wildlife. The fence is described as an agricultural style fence with no barb wire on top. It would be six feet high around the solar panels, though more secure fencing with barbed wire is required to house the electrical facilities such as the substation. Christina further mentioned the goal is to keep people out, not animals.
- Kim inquired about wetlands, specifically in terms of what meets criteria for wetlands to be species habitat. Bruce replied that farmed wetlands are not usually an issue, and the recommendation is to identify all wetlands in the area, but to focus on ones that meet wetland criteria for soil, vegetation, and hydrology. To this point, Adam asked whether revegetated wetlands in a formerly agricultural area could be used as an offset, to which Bruce replied this would not count as offset if located under panels. Wetlands restored in the Project Area, but beyond the solar panels may qualify for offset.

Deleted: and enforce and

Deleted: suitable grassland habitat

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Action Items

- Elisha Mueller (NDGF) to check in with upland game biologist Jesse Kolar for appropriate setbacks from for sharp-tailed grouse and solar projects.
- Elisha Mueller to check with Jesse Kolar for lek survey guidelines for solar projects.
- Tetra Tech to request eagle nest location data for the Project Area from Sandra Johnson at NDGF.
- Tetra Tech to request lek locations for the Project Area and identified setback from Sandra Johnson at NDGF.
- Tetra Tech to check with senior biologists for studies on sharp-tailed grouse impacts from solar development.
- Tetra Tech to send PCMM reports from Midwest solar project for reference.

From:	Holven, Adam
To:	Mueller, Elisha K.; Link, Greg W.; Kreft, Bruce L.; cvfrancis@nd.gov; adinges@nd.gov; Riddle, Heidi L
Cc:	Nick Schuler; Christina Martens; Gorman, Kim
Subject:	MEETING MINUTES FOR REVIEW - USFWS NDGF - Virtual Meeting - Flickertail Solar, Richland County, ND
Date:	Monday, February 19, 2024 10:38:00 AM
Attachments:	20240130_USFWS_NDGF_FlickertailSolar Meeting Minutes_20240219.docx Badger Hollow Solar PCM report 2023.PDF Two Creeks Solar PCM report 2023.PDF

Elisha, Greg, Bruce, Curt, Andy, and Heidi,

Thank you again for your time on January 30th and the opportunity to present on our proposed project.

Attached please find draft meeting minutes for your review. Please review and let us know if you have any comments/edits or if we can finalize.

Also attached are some white papers on avian/solar interactions in Wisconsin.

We look forward to our continued consultation.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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Flickertail Solar

Agency Consultation – Biological Discussion

Teleconference

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NDGF: Elisha Mueller, Greg Link, Bruce Kreft, Curt Francis, Andy Dinges
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- The group continued to discuss grasslands in the context of solar development, shifting towards solar setback requirements for grassland species. Elisha indicated that she was unsure of setback requirements for solar development regarding grassland leks. Kim brought up the differences between solar and wind development and operation risk to species, and how to best tailor requirements and recommendations towards best benefiting species. Bruce Kreft (NDGF) mentioned they were looking to acquire new studies on leks and the impact solar has on grassland species.
- The discussion shifted to Tetra Tech aiming to get a better understanding of the agencies' desires to have pre- and post construction avian surveys. Kim began by inquiring about the wind energy guidelines (WEGs) influence on the need for pre- and post construction avian surveys, specifically within the context of a letter received from the USFWS recommending them. Heidi Riddle (USFWS) discussed the letter, mentioning how it partly stems from uncertainty on how solar impacts avian species and landscape scale projects. The USFWS is encouraging companies to think about how species may be impacted.
- In terms of recommendations, Heidi believes a habitat assessment would be good for the Project, and further emphasized a desire for post construction monitoring. To better understand agency requirements, Kim inquired as to what is recommended versus what is required. Heidi clarified nothing is required, but the recommendations are meant to guide.
- In the context of avian surveys, Elisha mentioned that post construction surveys are very important to NDGF and are a standard recommendation for both wind and solar projects. The

NDGF further hopes to utilize the data beyond due diligence, as to not waste the data and instead use it to benefit future development and enforce and understanding of solar development and wildlife interactions in the region. Elisha further mentioned that though they cannot require anything, the PSC takes concerns from the NDGF into consideration, and further mentioned that survey effort is important to the PSC.

- In further discussing the WEGs influence on solar guidance, Elisha identified the WEGs as a solid document that already exists, thus a good starting point for determining solar surveys, though NDGF is eventually planning on creating a general BMP for renewable energy in the region.
- In discussing sharp-tailed grouse surveys, Elisha mentioned that they can lek in a broad variety of habitats, but the most important facet is avoidance of unbroken grassland habitat. If the Project can avoid suitable grassland habitat, there would be no need to survey.
- Shifting to Project design, Elisha inquired as to how much of the landscape will be panels within the Project Area. Savion indicated that around 2,500 acres of Project Area will be panel coverage, demarcated by fenced areas. Savion further emphasized that the 2,500 acres is the fenced area, so there would be gaps between solar panels within that area.
- Elisha inquired about whether the Project would be pursuing voluntary offset. Tetra Tech indicated the Project was currently identifying grassland and wetland habitat to inform site design.
- Christina asked the group how they define "unbroken grasslands." Greg indicated that though the area is highly agricultural, there are areas with livestock grazing, grassland, and riparian areas, all as potential small unbroken grassland. Greg further stated that the majority of unbroken grassland in the area may be outside the Project Area.
- In a brief discussion brought up by Adam, Greg and Elisha indicated that railroad corridors are disturbed lands, and NDGF's priority is areas that have not been tilled.
- In discussing expectations on wildlife safe fencing, Kim inquired as to what wildlife species are being protected by the recommended fencing. Greg expressed concern across the state for migratory big game animals, with a goal of limiting barriers to moving wildlife. Elisha indicated that the goal is to limit trapping of wildlife and that wildlife safe fencing is a standard recommendation for all projects.
- Christina identified the anticipated fencing surrounding panels and corridors would be included and could be used by wildlife. The fence is described as an agricultural style fence with no barb ware on top. It would be six feet high around the solar panels, though more secure fencing with barbed wire is required to house the electrical facilities such as the substation. Christina further mentioned the goal is to keep people out, not animals.
- Kim inquired about wetlands, specifically in terms of what meets criteria for wetlands to be species habitat. Bruce replied that farmed wetlands are not usually an issue, and the recommendation is to identify all wetlands in the area, but to focus on ones that meet wetland criteria for soil, vegetation, and hydrology. To this point, Adam asked whether revegetated wetlands in a formerly agricultural area could be used as an offset, to which Bruce replied this would not count as offset if located under panels. Wetlands restored in the Project Area, but beyond the solar panels may qualify for offset.

Action Items

- Elisha Mueller (NDGF) to check in with upland game biologist Jesse Kolar for appropriate setbacks from for sharp-tailed grouse and solar projects.
- Elisha Mueller to check with Jesse Kolar for lek survey guidelines for solar projects.
- Tetra Tech to request eagle nest location data for the Project Area from Sandra Johnson at NDGF.
- Tetra Tech to request lek locations for the Project Area and identified setback from Sandra Johnson at NDGF.
- Tetra Tech to check with senior biologists for studies on sharp-tailed grouse impacts from solar development.
- Tetra Tech to send PCMM reports from Midwest solar project for reference.

PSC REF#:467347






Public Service Commission of Wisconsin
RECEIVED: 5/5/2023 10:47:40 AM

May 5, 2023

Mr. Cru Stubley
Secretary to the Commission
Public Service Commission of Wisconsin
4822 Madison Yards Way
Madison, WI 53705-9100

Docket 5-BS-228: Joint Application of Madison Gas and Electric Company and Wisconsin Public Service Corporation for Approval to Acquire Ownership Interests in Solar Electric Generating Facilities

Docket 9696-CE-100: Application for a Certificate of Public Convenience and Necessity of Two Creeks Solar, LLC to Construct a Solar Electric Generation Facility, to be Located in Manitowoc and Kewaunee Counties, Wisconsin

Dear Mr. Stubley:

Pursuant to the Final Decisions issued April 18, 2019 in dockets 5-BS-228 and 9696-CE-100, Wisconsin Public Service Corporation ("WPSC") and Madison Gas and Electric Company ("MGE") (collectively, Applicants) hereby submit the post construction avian study for the Two Creeks Solar Project.

Order Point 9 of the Commission's Final Decision in Docket 5-BS-228 issued April 18, 2019 states:

> *Applicants shall be bound by all commitments made by developers in their applications, subsequent filings, and the provisions of the Commission's Final Decision in dockets 9696-CE-100, 9696-CE-101, 9697-CE-100, and 9697-CE-101. The assignment of the Certificates of Public Convenience and Necessity for the projects does not confer additional rights to the applicants than what was afforded to the developers at the time of the application and as specified in the Final Decisions in dockets 9696-CE-100, 9696-CE-101, 9697-CE-100, and 9697-CE-101. Notwithstanding Wis. Stat. §§ 32.02 and 32.03(5)(a), such transfer shall not confer any right to use eminent domain.*

The 9696-CE-100 April 18, 2019 Final Decision – PSCW Order Point 9 states:

> *Two Creeks shall work with Commission and DNR staff on developing and conducting a post-construction avian mortality study.*

Should you have any questions regarding this study report, please contact Rich Stasik at (414) 221-3685 or richard.stasik@wecenergygroup.com.

Respectfully submitted,

/s/ Theodore T. Eidukas
Theodore T. Eidukas
Vice President - Regulatory Affairs
WEC Energy Group
Wisconsin Public Service Corp.

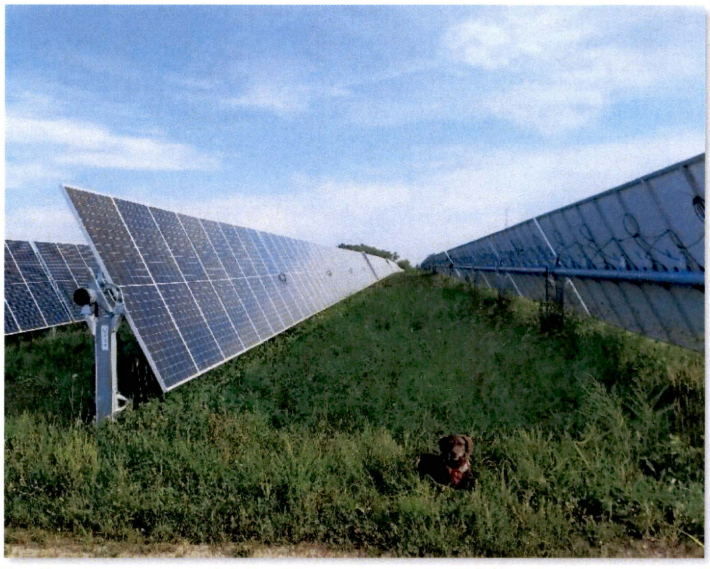
/s/ Scott R. Smith
Scott R. Smith
Assistant Vice President -
Business and Regulatory Strategy
Madison Gas and Electric Co.

Attachments

Post-Construction Monitoring at the Two Creeks Solar Project Manitowoc County, Wisconsin

Final Report

March 15 – October 31, 2022



Prepared for:

Two Creeks Solar, LLC

6011 Irish Road
Two Rivers, Wisconsin 54241

Prepared by:

Meredith Rodriguez, Daniel Riser-Espinoza, Wally Erickson, and Molly Tuma

Western EcoSystems Technology, Inc.
400 West Seventh Street, Suite 200
Bloomington, Indiana 47404

May 1, 2023

WEST

Confidential Business Information

STUDY PARTICIPANTS

Meredith Rodriguez	Project Manager
Wally Erickson	Senior Reviewer
Daniel Riser-Espinoza	Statistician
Laura Martinez Steele	Statistician and Dog-handler
Molly Tuma	Field Coordinator and Report Writer
Carissa Goodman	Technical Editor
Lucille Hentzen	Field Technician
Noelle Freeman	Field Technician
Anna Ciecka	Detection Dog Coordinator
Kristen VanNess	Dog-handler
Emily Jacob	Dog-handler

REPORT REFERENCE

Rodriguez, M., D. Riser-Espinoza, W. Erickson, and M. Tuma. 2023. Post-Construction Monitoring at the Two Creeks Solar Project, Manitowoc County, Wisconsin. Draft Report: March 15 – October 31, 2022. Prepared for WEC Energy Group, Milwaukee, Wisconsin. Prepared by Western EcoSystems Technology, Inc. (WEST). Bloomington, Indiana. May 1, 2023.

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INTRODUCTION

Wisconsin Public Service (WPS) is operating the Two Creeks Solar Project (Project), a 150-megawatt (MW) photovoltaic (PV) solar project in Manitowoc County, Wisconsin. The Project consists of six blocks that were individually fenced. Each block has panel rows ranging from approximately 55.0–80.0 meters (m; 180.4–262.5 feet [ft]) long, with a width between rows of 5.0 m (16.5 ft). The majority of rows are approximately 80.0 m long. Cables and combiner boxes run perpendicular to panel rows. Panels use a single-axis tracking system.

A second solar project of comparable size, Phase 1 of the Badger Hollow Solar Farm in Iowa County was developed at the same time and purchased by WPS. In order to have comparable results, WPS chose to conduct post-construction monitoring (PCM) studies using the same search methods at both Two Creeks and Badger Hollow. Western EcoSystems Technology, Inc. (WEST) developed a post-construction monitoring plan for both projects. The primary objectives for post-construction monitoring are to 1) fulfill the WDNR and PSC requirements to collect data on avian fatalities within the Project and Phase 1 of the Badger Hollow Solar Farm with a focus on waterbirds and waterfowl and 2) determine if there are notable temporal, spatial, or species patterns in observed fatalities within or between the two projects.

STUDY AREA

The 788 acre (ac) Project is in Manitowoc County, Wisconsin, less than 3.7 kilometers (km; 2.3 miles [mi]) south of Two Creeks, Wisconsin, and 0.3 km (0.2 mi) west of Lake Michigan (Figure 1). The Project lies approximately 183 m (600 ft) above mean sea level. Panel-covered areas account for 86% (680 ac) of the Project footprint. The site is vegetated in accordance with the Project's vegetation management plan, predominantly with grasses ranging from approximately 0.2–0.5 m (7.9–19.7 inches [in]) tall.

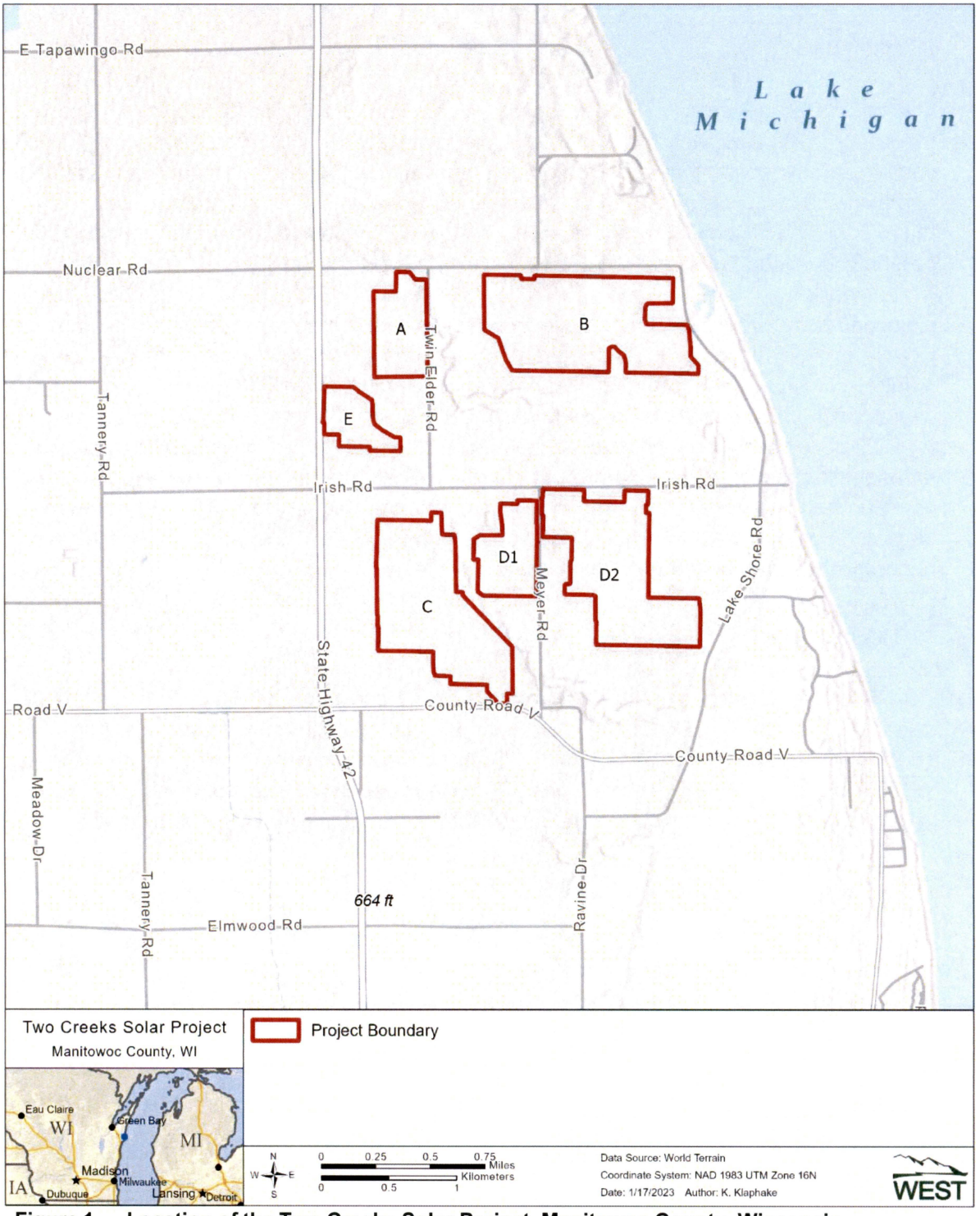

Figure 1. Location of the Two Creeks Solar Project, Manitowoc County, Wisconsin.
Note: Each individually fenced area is labeled according to an identifying letter assigned during development.

METHODS

Study Design

WEST conducted post-construction monitoring using dog-handler teams consisting of one dog and one handler each, which relied primarily on scent to find evidence of avian fatalities (hereafter we use the term detection to refer to intact carcasses, partial carcasses, and feather spots found during the study). Dog-handler teams were used because scent was the preferred search methodology since vegetation was at varying heights throughout the study and may have been more challenging for humans using visual scans. Monitoring occurred across three seasons: spring (March 15 – May 15), summer (May 16 – August 31), and fall (September 1 – October 31). To determine appropriate search frequencies for monitoring, we reviewed publicly available data from wind energy studies in the upper Midwest, which had recorded median persistence times of 10 days for large birds (Johnson et al. 2000; Gruver et al. 2009; Derby et al. 2010, 2012, Kerlinger et al. 2014, Fagen Engineering 2014, 2015). Based on expected persistence times, the monitoring effort focused on the avian migratory season, with weekly searches in the spring and fall, and searches every other week in the summer. Search methods were designed to achieve 20% coverage of the areas occupied by panels in the Project. Each search round required two days of searches to be completed, ensuring the presence of biologists on site multiple days per week. Completing multiple days of searches during the spring and fall periods made certain that searches occurred over a wide range of environmental variables, including after rain and storm events.

Components of the Project's study included:

- Standardized carcass searches
- Searcher efficiency trials to estimate the proportion of detections found by dog-handler teams
- Carcass persistence trials to estimate the length of time that a carcass remains possible to detect in the field

Standardized Carcass Searches

Detection dogs were considered candidates for carcass searches if they met basic temperament and obedience criteria, and demonstrated the trainability to detect bird carcasses and feather spots. Temperament characteristics that are sought after are high-energy dogs, with a high food or toy drive. The detection dogs used in this study successfully completed WEST's detection dog scent training protocol and were experienced finding bird carcasses at post-construction monitoring studies for wind projects.



Figure 2. Example illustration of cross-row survey at the Two Creeks Solar Project, Manitowoc County, Wisconsin.

Note: Assuming that winds flow from the north or northwest, the surveyed area along the fence is represented by green shading.

Dog-handler teams conducted cross-row sampling within the Project by walking transects on the roads along the southern edges of panel rows. Based on a review of the predominant wind direction in the Project, the area north of the transect was established as the search area for all three seasons (Figure 2). Dog-handlers directed the detection dogs along the transect at a slow pace. If the detection dog indicated a change in behavior that suggested the presence of a detection, the dog-handler allowed the detection dog to move into the panel rows to follow the scent, if it was safe to do so. If the handler deemed it is unsafe to allow the detection dog to follow the scent cone to its source off-leash, a GPS point was taken at the point of the change of behavior and the detection dog was directed to follow the scent cone from a safer trajectory. The dog-handler alternated surveying transects east to west and west to east. Between transects, the dog-handler team walked along the outer edge of the block, thereby surveying some fence line between each searched row (Figure 2).

Survey Plots

Throughout the study, standing vegetation within the Project ranged between one centimeter ([cm]; 0.4 in) and 130 cm (60 in) tall, with average vegetation heights between 30–61 cm (12–24 in) tall. To manage vegetation, site-wide mowing occurred twice during the study period between June 15 and October 31.

Scent detection varies with humidity level and wind speed, as well as carcass size (Barrientos et al. 2018). The degree of carcass decomposition will also impact detection rates; however, the results of an initial pilot study indicated that some large and small birds could be detected out to a range of 45 m (148 ft; Rodriguez et al. 2021). Therefore, to calculate the area necessary to search 20% of the Project, WEST assumed that up to half of a panel row would be searched by a detection dog walking perpendicularly to panels along the edge of each block (i.e., cross-row sampling). The area up to 45 m north of the transect was considered a survey plot. The area required to search 20% of the Project, 136.0 ac (0.6 square km), was divided across 22 survey plots in blocks A, B, C, and D2 (Figure 3). One transect in block A was searched for part of the spring season, but was replaced with another transect due to a drainage ditch causing accessibility and safety issues at the original transect.

Data Collection

All detections found were recorded. Detections were not collected, but spatial locations were recorded to ensure no double-counting would occur. Each detection was assigned a unique identification number based on the species identification, location, and date found. For each detection, the dog-handler recorded information on a data sheet, including the date and time, species, sex and age (when possible), observer, block, measured distance from nearest Project component, distance to nearest PV panel, distance to end of the row, location of detection as Universal Transverse Mercator (UTM) or latitude/longitude coordinates, habitat surrounding detection, condition of detection (i.e., intact, scavenged, dismembered, feather spot, or injured), and estimated time of death (i.e., less than one day, 2–3 days, 4–7 days, 8–14 days, more than 14 days, or unknown).

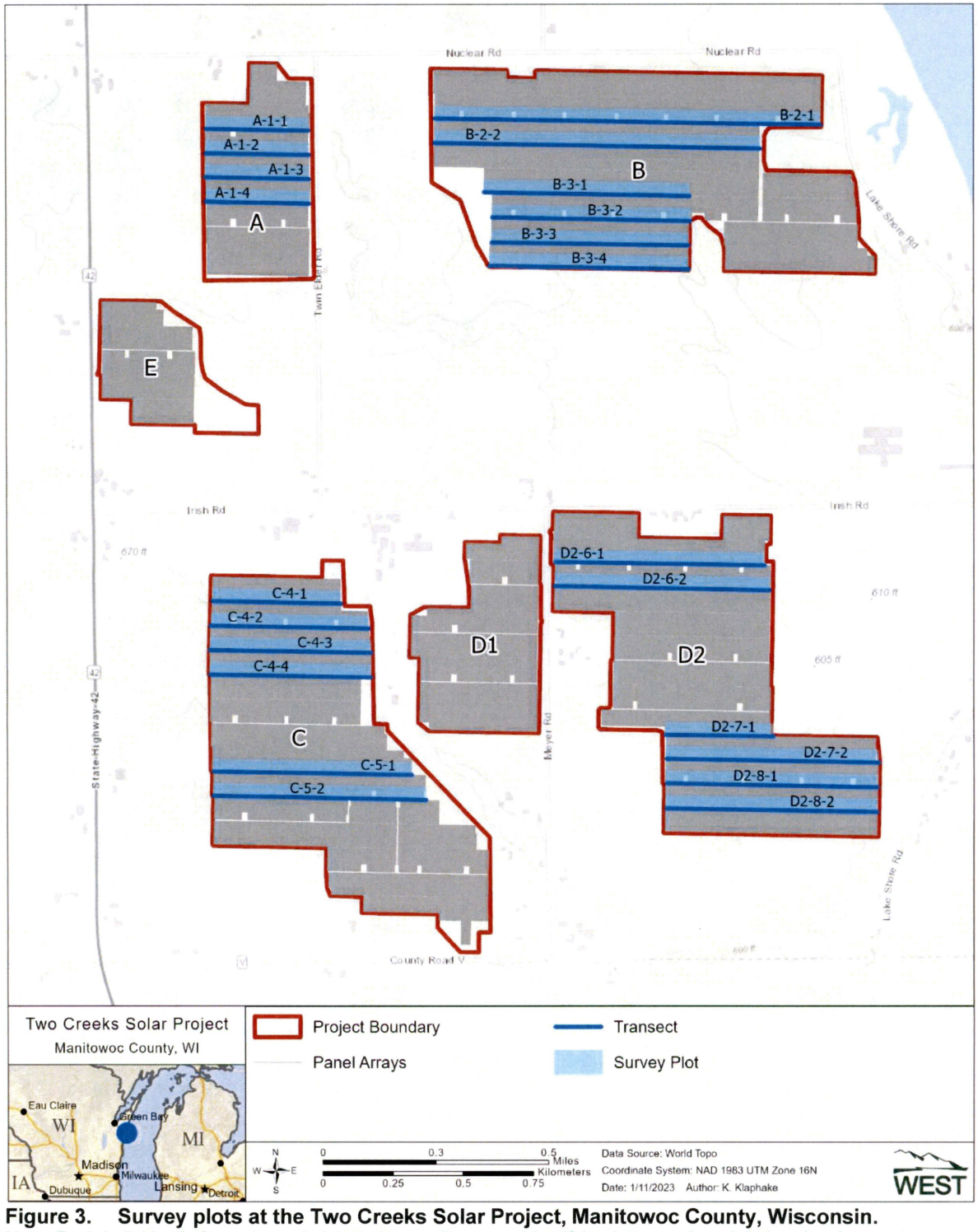

Figure 3. Survey plots at the Two Creeks Solar Project, Manitowoc County, Wisconsin.
Note: Each individually fenced area is labeled according to an identifying letter assigned during development.

All detections were assigned to a size class (i.e., small bird or large bird), a taxonomic family, an ecological guild and weight categories (i.e., 0–100 grams [0–3.5 ounces]; 101–999 grams [3.5–35 ounces]; and 1,000+ grams [35+ ounces]). Both body length and wingspan were used to inform the size class. Large birds were defined as birds greater than 30 cm in length or between 23 and 30 cm (nine and 12 in) with a wingspan of more than 46 cm (18 in). Small birds were defined as birds less than or equal to 23 cm in length or between 23 and 30 cm with a wingspan less than or equal to 46 cm. Detections were categorized as water associates or water obligates following methods outlined by Kosciuch et al. 2021: species that require water to take flight were categorized as water obligates, and species that rely on water for foraging, roosting, and/or reproduction were categorized as water associates.

Digital photographs were taken of the detections *in situ* to document any visible injuries, identification, surrounding habitat and any visible imprints or marks on surrounding infrastructure. The condition of each detection found was recorded using the following categories:

- Intact – a carcass that is complete, not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
- Scavenged – an entire carcass that shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location (e.g., wings, skeletal remains, portion of a carcass, etc.), or a carcass that has been heavily infested by insects.
- Dismembered – an entire carcass that is found in multiple pieces distributed more than 1.0 m (3.3 ft) apart from one another due to scavenging or other reasons.
- Injured – a bird found alive.
- Feather spot – Ten or more feathers (excluding down), or two or more primary feathers or five or more tail feathers within a 2.0-square meter (21.5-square foot) area indicating predation or scavenging of a bird carcass.

Potential causes of death were recorded using the following definitions:

- Collision—signs of blunt trauma, blood, imprints, or fecal smears on panels or infrastructure
- Electrocution—singed or burnt feathers or flesh
- Predation—observed or cached
- Unknown—scavenged or intact carcass with no apparent sign of injury

Detections found outside survey plots (e.g., south of a transect or more than 45 m north of a transect), or outside of the scheduled search time, were coded as incidental discoveries and were documented following the same protocol for those found during standard searches. All species identifications were confirmed by a biologists with significant field experience in identification of birds and their feathers. When feather spots were unable to be identified to species, detections were identified to the closest genus or group possible (e.g., unidentified sparrow). Injured birds would have been recorded and evaluated for potential rehabilitation.

Bias Trials

Bias trials were conducted throughout the study period to estimate the percentage of detections found by dog-handler and the likelihood a detection persisted long enough to be found during searches. WEST coordinated with the site managers weekly during the study period to determine where and when mowing was scheduled to occur in the upcoming weeks to ensure that mowing would not interfere with or interrupt bias trials.

For all bias trials, commercially-obtained surrogates, including hen mallards (*Anas platyrhynchos*) and hen ring-necked pheasants (*Phasianus colchicus*) were used for large birds, and juvenile coturnix quail (*Coturnix coturnix*) were used for small birds. Primary feathers were clipped to help distinguish bias trials from other detections found at the Project. However, in the spring, mallard carcasses used in bias trials were rapidly scavenged, raising concern that feather spots would be found without primaries and could be mistaken for detections; therefore, at the start of the summer, WEST began using ring-necked pheasants in place of mallards for large bird trials. Due to supply issues in the fall, biologists used mallards again for bias trials, but clipped both the body feathers and the primaries to help distinguish bias trials from other detections found at the Project.

Searcher Efficiency Trials

Searcher efficiency trials were conducted in the same areas where carcass searches occurred. A minimum of 20 carcasses per size class (i.e., small and large birds) were dropped per season. Searcher efficiency trial carcasses were placed over three to four dates during each season, thereby spreading the trials throughout the survey period to incorporate the effects of varying weather, climatic and vegetation conditions. A biologist not involved in the standard surveys placed the trial carcasses. Dog-handler teams did not know when trials were occurring or where trial carcasses were located within the Project. Trial carcasses were dropped from waist high or higher, and allowed to land in a random posture. Each trial carcass was discreetly marked with electrical tape wrapped around one leg, so it could be identified as a bias trial if found by searchers or facility personnel. Documentation of each location included GPS coordinates and notes about the substrate and carcass placement. The number and location of trial carcasses found by searchers was recorded and compared to the total number placed. The number of trial carcasses available for detection was determined immediately after the conclusion of the trial. The dog-handler team had one opportunity to discover trial carcasses. Any missed trial carcasses were recovered as quickly as possible after surveys were complete.

All trial carcasses were placed according to a sampling plan that randomly allocated carcasses of each size class (i.e., large birds and small birds) across different transects and different distances from the search transects. Each trial carcass was dropped in a preselected row along a transect, and at a random preselected distance into panel rows (e.g., 25 m north of the transect). Searcher efficiency trial carcasses were placed out to the maximum assumed detection distance of 45 m, based on a pilot study conducted at a PV solar facility with similar ground conditions (Rodriguez et al. 2021).

Carcass Persistence Trials

A minimum of 15 trial carcasses per size class were monitored within the Project in each season. Carcass persistence trial carcasses were monitored for 28 days or until the carcass had deteriorated to a point where it would no longer qualify as a documentable fatality. Trial carcasses were monitored using motion-triggered digital trail cameras and in-person checks by WEST biologists (e.g., WEST 2017, 2018b, 2018a). Two trail camera models were used for carcass persistence trials, the Browning Dark Ops HD Pro X Trail Game Camera and Bushnell Trophy Cam, Model 119717CW. All cameras were configured with similar settings to take a photograph when motion occurred in front of the camera, 24-hours a day. Trial carcasses were placed 0.3–0.9 m (1.0–3.0 ft) in front of the camera and the motion-trigger for all cameras was set for a distance greater than 0.9 m in order to capture scavenger activity around the trial carcass.

Biologists checked the cameras multiple times throughout a trial to replace batteries and memory cards, and record whether the carcass was intact, scavenged, or missing. If a trial carcass was not found at the original placement location, the biologist searched in all directions up to 30 m (100 ft) out from the placement location in an effort to locate any scavenged remains. If the detection dog team was available, they conducted these checks to increase the chance of finding the carcass. If any remains were found, the camera was moved to the new location. Trial carcasses were left at their location until they were removed by scavenging or other means, completely decomposed, or at the end of the carcass persistence trial, whichever occurred first. At the end of the 28-day period, any evidence of the carcasses was removed. To minimize potential bias caused by scavenger swamping (Smallwood 2007, Smallwood et al. 2010), trial carcasses were distributed throughout the Project, not just within survey plots. Trials were placed at least twice a season to incorporate effects of weather, scavenging types and densities. Likewise, to reduce possible biases related to leaving scent traces or visual cues that may unnecessarily alert potential scavengers, all trial carcasses were handled with latex gloves. Scavenger species, including insects, were recorded during in-person checks and during photos review.

Data Management

Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers were responsible for ensuring that all information was recorded correctly and datasheets were submitted in a timely manner. Irregular codes or data suspected as unusual were discussed with the observer and/or project manager. Errors, omissions, or problems were traced back to the field documentation, and appropriate changes were made.

Prior to analysis, the locations of mallard carcasses or feather spots without signs of clipped feathers were reviewed to exclude potential bias trial remains. Placement timing and locations of unrecovered bias trials were reviewed against potential fatalities. Detections of mallards found within 100 m (328 ft) of unrecovered bias trials were assumed to be the same and were excluded

from the dataset. Mallard detections outside of 100 m of previously placed bias trials were considered detections for the purposes of analysis.

Data Compilation and Storage

A Microsoft SQL Server was used to store, organize, and retrieve survey data. Data in the electronic database followed a pre-defined format to facilitate subsequent QA/QC and data analysis. All field collected data, and electronic data files will be retained for reference.

Statistical Analysis

Detections were included in fatality estimation if they were found within the selected survey plots and had an estimated time of death within the study period. Per the Project's study plan (Rodriguez et al. 2022), fatality estimates were only calculated if at least 10 detections were found and included in analysis for a given category (e.g., all birds, large birds, large birds in fall), as estimates become unstable when fewer than 10 detections are adjusted for an estimate (Korner-Nievergelt et al. 2011). Furthermore, it should be underscored that detections included in the fatality estimation data set are often represented by feather spots and partial carcasses in addition to intact carcasses, many of which cannot be attributed to identifiable causes (e.g. collision). Thus, reported fatality estimates should be interpreted carefully and do not necessarily represent the actual number of avian collisions that could have occurred during the study period.

Fatality estimates were calculated using GenEst (a Generalized Estimator of Mortality; Dalthorp et al. 2018, Simonis et al. 2018). To obtain an overall estimate of fatality, each detection included in the analysis was adjusted for searcher efficiency, carcass persistence, a detection reduction factor (also referred to as "*k*"; see *Detection Reduction Factor*), and a search area adjustment equal to the proportion of the facility being searched. Estimates and 90% confidence intervals (CI) were calculated using a parametric bootstrap (Dalthorp et al. 2018). Bootstrapping is a computer simulation technique that is useful for calculating variances and CIs for complicated test statistics. One thousand bootstrap samples were used. The lower 5th and upper 95th percentiles of the 1,000 bootstrap estimates were estimates of the lower limit and upper limit of 90% CIs. Fatality estimates per acre were calculated by dividing site wide estimates by the number of acres covered by panels within the Project as calculated in ArcGIS, based on spatial data provided by WEC.

Searcher Efficiency Estimation

Data collected during searcher efficiency trials were used to model the probability large and small birds were detected by the dog-handler teams. Estimates were obtained for each size class separately using a logit regression model (Dalthorp et al. 2018). The season was included as a potential covariate. The appropriate model was selected using an information theoretic approach known as AICc, or corrected Akaike Information Criteria (Burnham and Anderson 2002). The best-supported model was selected as the most parsimonious model (i.e. the model with the fewest parameters) within two AICc units of the model with the lowest AICc value. Model parsimony provides an additional model selection criterion to distinguish models within two AICc units of the model with the lowest AICc value, ranking simple models over more complex models with otherwise similar relative explanatory power.The searcher efficiency modeling approach used in GenEst is capable of generating estimates and confidence intervals even when there is no variability

in detection data (i.e. either all trials are found or no trials are found). In these two cases, the estimate of searcher efficiency was calculated by doubling the number of trials and reversing the outcome of a single found trial. For example, if 10 out of 10 trials were found, GenEst would calculate searcher efficiency as 19 out of 20 found; if 0 out of 10 trials were found GenEst would calculate searcher efficiency based on 1 out of 20 trials found. See the GenEst R package documentation for additional details (Dalthorp et al. 2018).

Carcass Persistence Estimation

Data collected during carcass persistence trials were used to model the amount of time in days that carcasses remained available to be located by the searcher. To adjust detections for removal bias, carcass persistence models were used to calculate the average probability a detection persisted through the search interval (i.e., the time between scheduled searches). The persistence of a detection was modeled using an interval-censored survival regression for each size class with exponential, log-logistic, log-normal, and Weibull as potential persistence distributions (Dalthorp et al. 2018, Kalbfleisch and Prentice 2002). The season was included in the models as a potential covariate on each persistence distribution parameter. The best-supported model was selected as the most parsimonious model within two AICc units of the model with the lowest AICc value.

Detection Reduction Factor

The change in searcher efficiency between successive searches is defined by a parameter called the detection reduction factor that ranges from zero to one. When k is zero, it implies that a detection is missed on the first search and that detection would never be found. A k of one implies searcher efficiency remains constant no matter how many times a carcass is missed. The detection reduction factor is a required parameter for GenEst; however, data were not collected to estimate k in this study. A value for k of 0.67 has been estimated for bats (Huso et al. 2017). In the absence of published data on k for birds, this value was used in this study to calculate fatality estimates for birds. A recent simulation study (Rabie et al. 2021) demonstrated that k has relatively little influence on estimates in a broad range of circumstances, and assuming a modest value (e.g., 0.67) for k is acceptable for typical post-construction monitoring studies.

RESULTS

Standardized Carcass Searches

Summary of Avian Species Recorded

A total of 543 carcass searches were conducted from March 15 – October 31, 2022. Twenty-four avian detections representing 12 identifiable species were found during the study, including ten found incidentally outside survey plots (Table 1). No water obligates were recorded at the Project. Detections of 12 water associates (50%) were recorded (three were found incidentally and nine were found during surveys; Table 2).The water associates recorded at the Project consisted of five mallard feather spots (20.8% of detections), four red-winged blackbird detections (*Agelaius phoeniceus*; two feather spots, one scavenged detection and one intact carcass; 16.7% of detections), the feather spot of a killdeer (*Charadrius vociferous*), a scavenged sora (*Porzana*

carolina), and a scavenged unidentified shorebird (each individually 4.2% of detections). Possible evidence of panel collision was observed for only two detections, as evidenced by feathers and a smear on a panel above a detection and a carcass found with a bloody elbow (Table 2). No state- or federally listed species were found, and no injured or stranded birds were found.

The most commonly recorded species during the study were mallards, followed by red-winged blackbirds. All other identifiable species were represented by one detection each (Table 1). Two detections (8.3%), a golden-crowned kinglet (*Regulus satrapa*), and a red-winged blackbird, were found intact. Six of the 24 detections (25.0%) were scavenged, 13 (54.2%) were feather spots, and three (12.5%) were dismembered. Four detections that were found as partial carcasses or as feather spots and could not be identified to species. Although the unidentified large bird could not be identified to species, based on the length, width, and black coloration of a primary feather, it was determined to be a turkey vulture (*Cathartes aura*), Canada goose (*Branta canadensis*), or American white pelican (*Pelecanus erythrorhynchos*).

Of the 24 detections found during the study, 14 were eligible for inclusion in fatality estimates. Ten detections were excluded from analysis because they were found incidentally outside survey plots (Table 1).

Table 1. Number and percent (%) of detections by species included and excluded from analysis at the Two Creeks Solar Project, Manitowoc County, Wisconsin, from March 15 – October 31, 2022.

	Included in Fatality Estimate		Outside Survey Plots*		Total	
Species	**Total**	**%**	**Total**	**%**	**Total**	**%**
mallard	3	21.4	2	20.0	5	20.8
red-winged blackbird	3	21.4	1	10.0	4	16.7
unidentified small bird	1	7.1	1	10.0	2	8.3
American crow	1	7.1	0	0	1	4.2
clay-colored sparrow	1	7.1	0	0	1	4.2
killdeer	1	7.1	0	0	1	4.2
mourning dove	1	7.1	0	0	1	4.2
sora	1	7.1	0	0	1	4.2
unidentified passerine	1	7.1	0	0	1	4.2
unidentified shorebird	1	7.1	0	0	1	4.2
chimney swift	0	0	1	10.0	1	4.2
dark-eyed junco	0	0	1	10.0	1	4.2
golden-crowned kinglet	0	0	1	10.0	1	4.2
hermit thrush	0	0	1	10.0	1	4.2
Savannah sparrow	0	0	1	10.0	1	4.2
unidentified large bird	0	0	1	10.0	1	4.2
Overall Birds	**14**	**100**	**10**	**100**	**24**	**100**

* Detections not included in analysis.

Sums of values may not add to total value shown, due to rounding.

Table 2. Bird detections found at the Two Creeks Solar Project, Manitowoc County, Wisconsin, March 15 – October 31, 2022.

Species	Date Found	Guild	Size Class	Condition	Cause	Latitude	Longitude
Spring (March 15 – May 15)							
chimney swift[1]	03/22/2022	swifts/hummingbirds	small bird	dismembered	unknown	44.25225	-87.54262
red-winged blackbird[2]	03/22/2022	blackbirds/orioles	small bird	feather spot	unknown	44.24656	-87.54955
unidentified large bird[1]	03/25/2022	N/A	large bird	feather spot	unknown	44.26687	-87.54033
mallard[2]	03/29/2022	waterbirds/waterfowl	large bird	feather spot	unknown	44.25255	-87.53805
unidentified passerine	04/05/2022	passerines	small bird	feather spot	possible collision with panel	44.24679	-87.53293
dark-eyed junco[1]	04/15/2022	sparrows	small bird	dismembered	unknown	44.24760	-87.53312
mallard[1,2]	04/15/2022	waterbirds/waterfowl	large bird	feather spot	unknown	44.25243	-87.54259
mallard[1,2]	04/20/2022	waterbirds/waterfowl	large bird	feather spot	unknown	44.25097	-87.55682
mourning dove	04/20/2022	doves/pigeons	large bird	feather spot	unknown	44.24976	-87.55818
mallard[2]	04/22/2022	waterbirds/waterfowl	large bird	feather spot	unknown	44.26645	-87.55412
golden-crowned kinglet[1]	04/28/2022	gnatcatchers/kinglets	small bird	intact	unknown	44.26410	-87.54420
unidentified small bird	04/29/2022	N/A	small bird	dismembered	unknown	44.26638	-87.55545
mallard[2]	05/10/2022	waterbirds/waterfowl	large bird	feather spot	unknown	44.24987	-87.55593
red-winged blackbird[2]	05/10/2022	blackbirds/orioles	small bird	scavenged	predated	44.25206	-87.55553
Summer (May 16 – August 31)							
American crow	05/16/2022	corvids	large bird	feather spot	unknown	44.24764	-87.53769
savannah sparrow[1]	05/18/2022	sparrows	small bird	scavenged	unknown	44.26415	-87.54113
unidentified small bird[1]	05/18/2022	N/A	small bird	feather spot	unknown	44.26703	-87.53242
clay-colored sparrow	06/01/2022	sparrows	small bird	scavenged	unknown	44.26266	-87.54478
red-winged blackbird[2]	06/27/2022	blackbirds/orioles	small bird	feather spot	unknown	44.26715	-87.55559
red-winged blackbird[1,2]	07/26/2022	blackbirds/orioles	small bird	intact	possible collision with panel	44.26407	-87.54285
killdeer[2]	08/23/2022	shorebirds	large bird	feather spot	unknown	44.26730	-87.54463
Fall (September 1 – October 31)							
sora[2]	09/13/2022	rails/coots	small bird	scavenged	unknown	44.26502	-87.54266
unidentified shorebird[2]	10/18/2022	shorebirds	N/A	scavenged	unknown	44.24677	-87.55615
hermit thrush[1]	10/19/2022	thrushes	small bird	scavenged	unknown	44.26302	-87.53659

[1] Denotes a detection that was found incidentally.

[2] Denotes a water-associated species, or species that relies on water for foraging, roosting, and/or reproduction, as defined by Kosciuch et al. 2021.

N/A = not applicable

Temporal Patterns of Avian Detections

Detections were found throughout the study period in relatively low numbers; the maximum number of detections per week was three, or approximately 0.003 birds per ac per week (Figure 4). More detections were recorded in the spring. The observed composition of bird species varied by season; however, all mallard detections were found in the spring (Table 2).

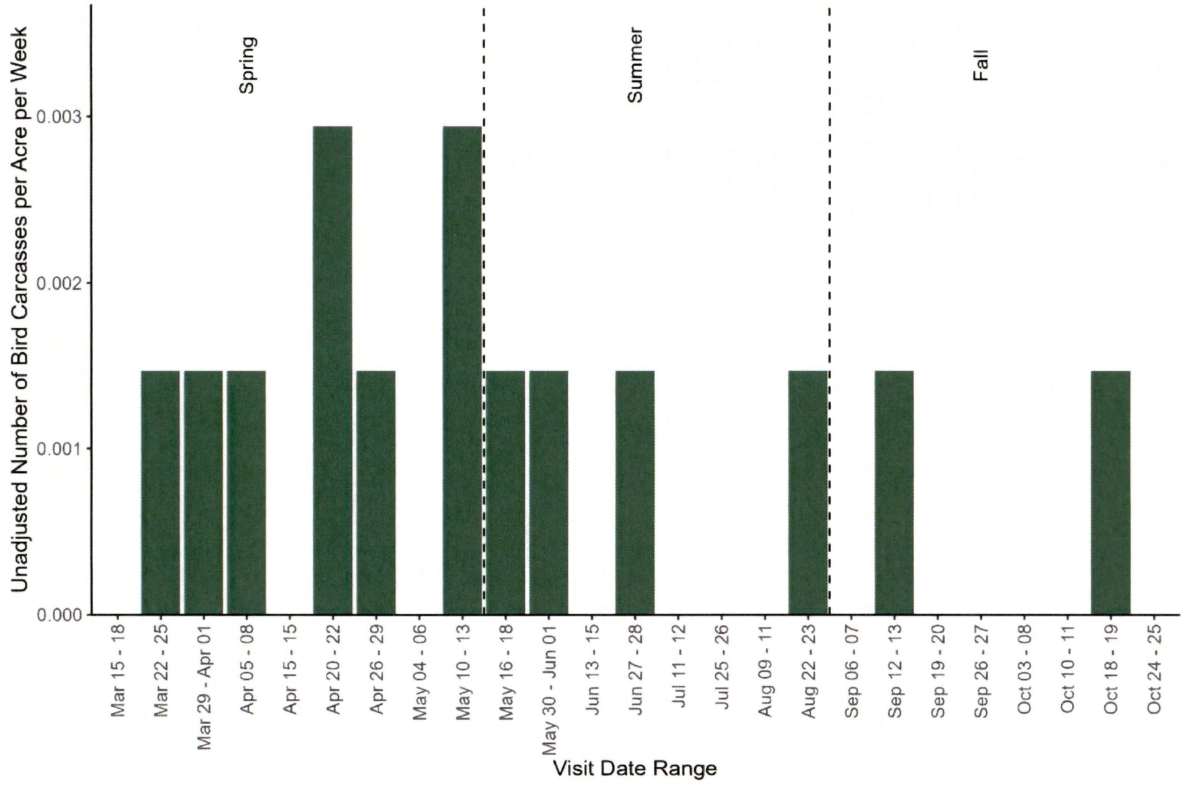

Figure 4. Temporal distribution of all avian detections (unadjusted for searcher efficiency and carcass persistence) at the Two Creeks Solar Project, Manitowoc County, Wisconsin, March 15 – October 31, 2022.

Spatial Distribution of Avian Detections

Detections were discovered in all of the surveyed blocks. No spatial patterns were evident (Figure 5).

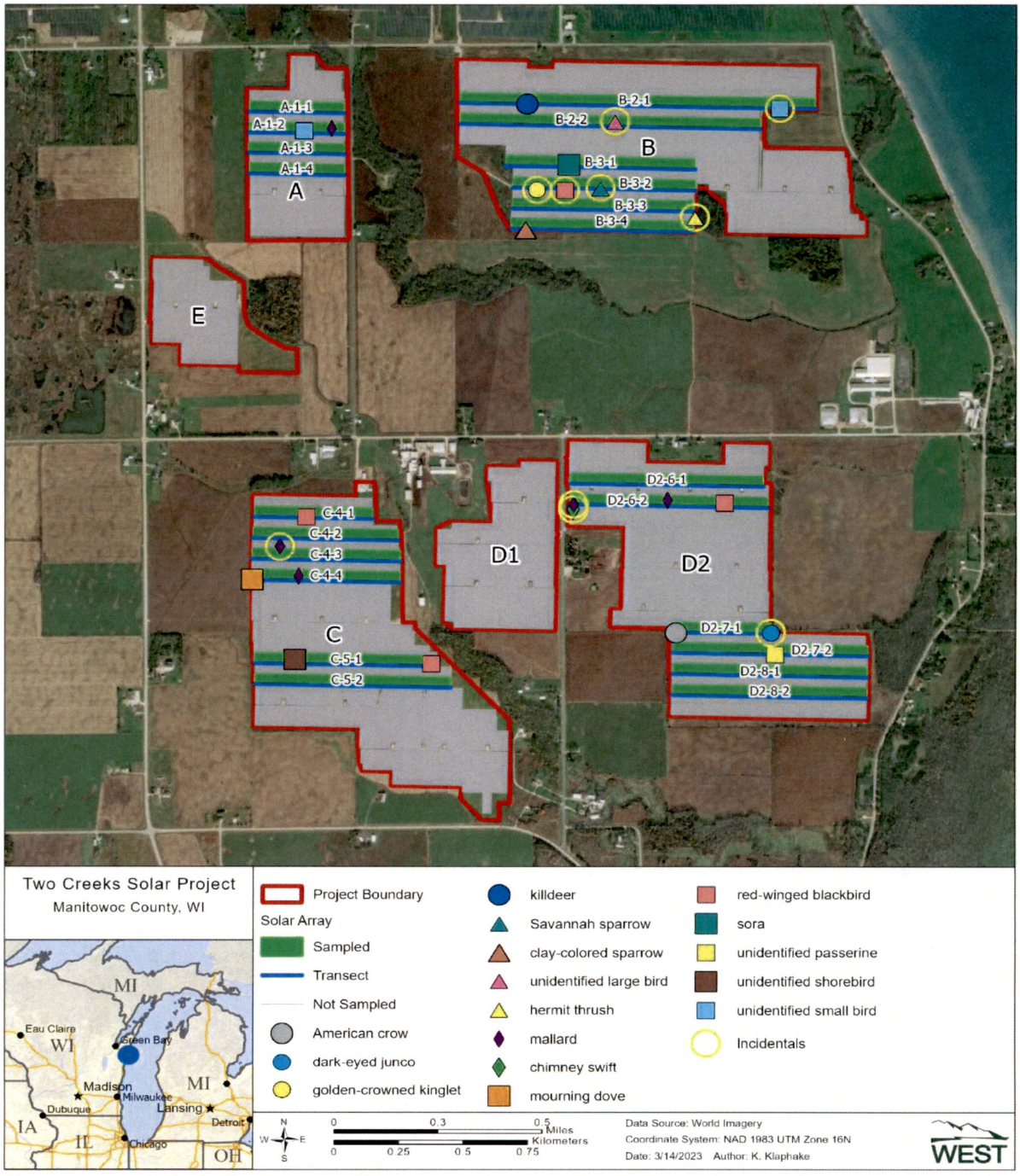

Figure 5. Location of avian detections found at the Two Creeks Solar Project, Manitowoc County, Wisconsin, March 15 – October 31, 2022.

Note: Each individually fenced area is labeled according to an identifying letter assigned during development.

Searcher Efficiency Trials

During the study period, 82 large and 83 small bird trial carcasses were placed in the solar arrays. Of the carcasses placed, 69 large and 61 small bird trial carcasses were available to be found (Table 3). The top searcher efficiency model for each size class included season as a covariate, suggesting that searcher efficiency varied by season (Appendix A). Estimated searcher efficiency for the solar arrays for large birds ranged from 0.02 (90% CI: 0–0.10) in summer, to 0.59 (90% CI: 0.41–0.75) in fall. For small birds, estimated searcher efficiency ranged from 0.10 (90% CI: 0.03–0.26) in summer to a high of 0.43 (90% CI: 0.27–0.61) in spring (Appendix B).

Table 3. Searcher efficiency results at the Two Creeks Solar Project, Manitowoc County, Wisconsin, March 15 – October 31, 2022.

Size Class	Season	Number Placed	Number Available	Number Found	% Found
Large Bird	Spring	30	23	9	39.1
	Summer	28	24	0	0
	Fall	24	22	13	59.1
	Overall	**82**	**69**	**22**	**31.9**
Small Bird	Spring	32	21	9	42.9
	Summer	27	21	2	9.5
	Fall	24	19	4	21.1
	Overall	**83**	**61**	**15**	**24.6**

% = percent

Carcass Persistence Trials

Ninety carcass persistence trials were placed during the study, with 36 (18 large birds, 18 small birds) placed in spring, 31 (15 large birds, 16 small birds) placed in summer, and 23 (12 large birds, 11 small birds) placed in fall. The selected model for large birds had a log-logistic with a location parameter that varied by season, and no covariates (intercept-only) for the scale parameter, suggesting that median carcass persistence varied by season for large birds (Appendix A). The selected model for small birds had a lognormal distribution with a location parameter that varied by season, and no covariates (intercept-only) for the scale parameter, suggesting that median carcass persistence also varied by season for small birds (Appendix A).

The estimated median persistence time for large birds was 0.9 days in the spring, 55.2 days in the summer, and 151.6 days in the fall (Appendix A). Estimated median persistence time for small birds was 3.3 days during spring, 2.7 days during summer, and 20.0 days during fall (Appendix C). The average probability of persistence as a function of days since placement is provided in Figures 6 and 7.

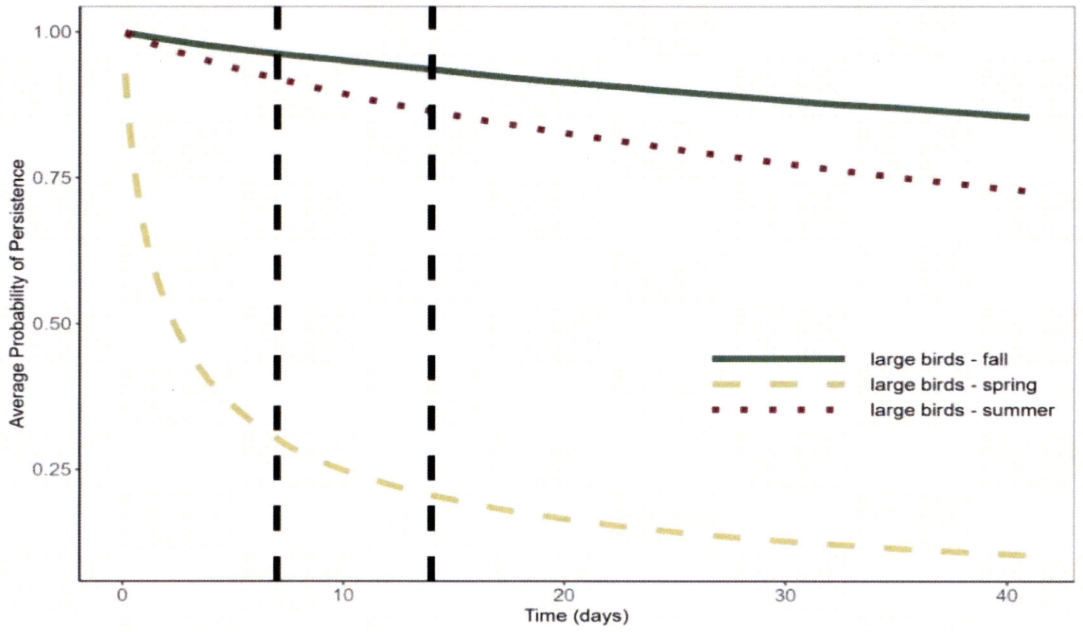

Figure 6. Average probability of persistence ($\hat{r}$) for large birds as a function of days since placement and season at the Two Creeks Solar Project, Manitowoc County, Wisconsin, March 15 – October 31, 2022.

Note: The vertical lines represent the 7- and 14-day search intervals used in this study.

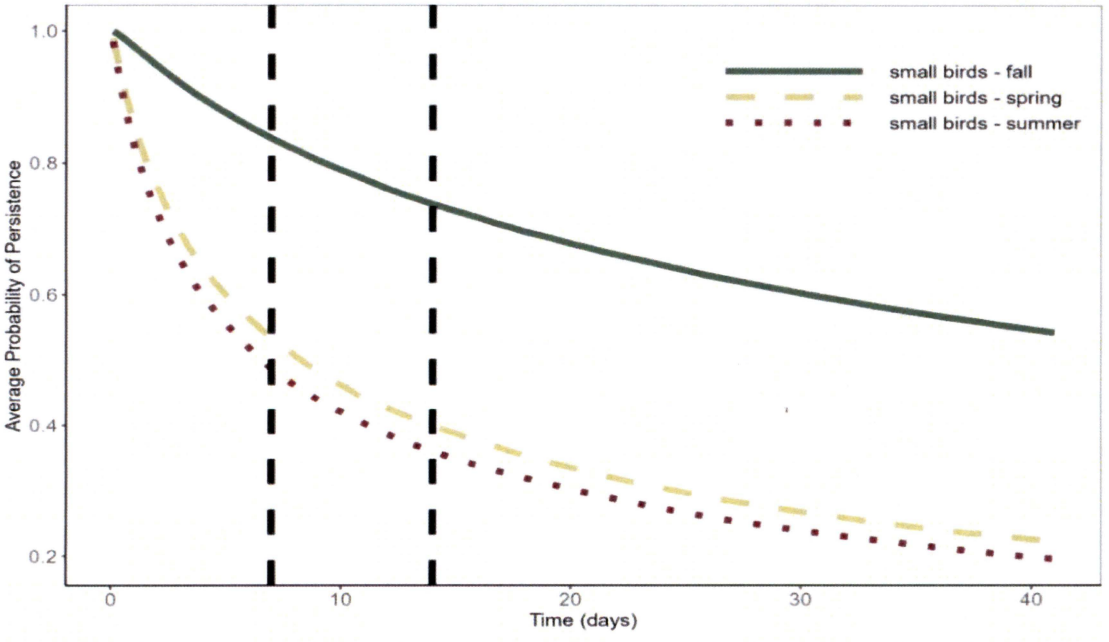

Figure 7. Average probability of persistence ($\hat{r}$) for small birds as a function of days since placement and season at the Two Creeks Solar Project, Manitowoc County, Wisconsin, March 15 – October 31, 2022.

Note: The vertical lines represent the 7- and 14-day search intervals used in this study.

Scavenging or removal was captured on camera for 43 (46.7%) of the carcass persistence trials. The most common scavenger observed at the Project was striped skunk (*Mephitis mephitis*; 37.2% of scavenging observations), followed by raccoon (*Procyon lotor*; 34.9%; Table 4). Other scavengers observed included American crow (*Corvus brachyrhynchos*), domestic cat (*Felis catus)*, American kestrel (*Falco sparverius*), coyote (*Canis latrans*), red-tailed hawk (*Buteo jamacensis*), Virginia opossum (*Didelphis virginiana*), an unidentified mouse, and an unidentified large carnivore.

Table 4. Scavenger species documented during carcass persistence trials at the Two Creeks Solar Project, Manitowoc County, Wisconsin, March 15 – October 31, 2022.

Scavenger	Number of trials where scavenging was observed	Number of trials with removal observed	Percent of trials where scavenging was observed[1]
striped skunk	16	8	37.2
raccoon	15	12	34.9
American crow	3	2	7.0
domestic cat	3	1	7.0
American kestrel	1	1	2.3
coyote	1	0	2.3
red-tailed hawk	1	1	2.3
Virginia opossum	1	0	2.3
unidentified mouse	1	0	2.3
unidentified large carnivore	1	0	2.3
Overall	**43**	**25**	**100**

1. "Trials" is the number of trials in which a scavenger was observed on camera, which was 43 of the 92 trials.

Estimated Fatality Rates

The estimated fatality rate per ac covered by PV panels was 0.85 birds (90% CI: 0.33–2.78) for the study period. The correction factors used to estimate the fatality rate are presented in Appendix B.

Results Between Projects

No water obligates were recorded at either the Project or Badger Hollow. Seventeen avian detections representing six identifiable species were found at Badger Hollow during the study, including four detections found incidentally outside survey plots. The composition of water associates varied between Projects; water associates accounted for two detections (11.7%; one unidentified duck feather spot found during surveys and one mallard feather spot found incidentally) at Badger Hollow and 50% of detections at the Project (three found incidentally and nine found during surveys). No spatial patterns were evident at either Project. The majority of detections (58.3%; 14 of 24) at the Project were recorded in the spring, while no temporal patterns were recorded at Badger Hollow. Estimated fatality rates for both projects were less than one bird per ac. The full results of PCM at Badger Hollow are presented in Rodriguez et al. 2023.

CONCLUSIONS

Twenty-four detections were recorded across 543 carcass searches. No water obligates were recorded at the Project. Detections of 12 water associates (five mallards, four red-winged blackbirds, one killdeer, one sora, and one unidentified shorebird) were recorded at the Project during surveys and incidentally. Possible evidence of panel collision was observed for two detections; the cause of death for all other detections was unknown. Detections were found throughout the study period, but the majority were recorded in the spring. No spatial patterns were recorded across the study.

REFERENCES

Barrientos, R., R. C. Martins, F. Ascensão, M. D'Amico, F. Moreira, and L. Borda-de-Água. 2018. A Review of Searcher Efficiency and Carcass Persistence in Infrastructure-Driven Mortality Assessment Studies. Biological Conservation 222: 146-153.

Barron-Gafford, G. A., M. A. Pavao-Zuckerman, R. L. Minor, L. F. Sutter, I. Barnett-Moreno, D. T. Blackett, M. Thompson, K. Dimond, A. K. Gerlak, G. P. Nabhan, and J. E. Macknick. 2019. Agrivoltaics Provide Mutual Benefits across the Food–Energy–Water Nexus in Drylands. Nature Sustainability 2: 848-855. doi: 10.1038/s41893-019-0364-5.

Burnham, K. P. and D. R. Anderson. 2002. Model Selection and Multimodel Inference: A Practical Information-Theoretic Approach. Second Edition. Springer, New York, New York.

Dalthorp, D. H., J. Simonis, L. Madsen, M. M. Huso, P. Rabie, J. M. Mintz, R. Wolpert, J. Studyvin, and F. Korner-Nievergelt. 2018. Generalized Mortality Estimator (GenEst) - R Code & Gui. US Geological Survey (USGS) Software Release. doi: 10.5066/P9O9BATL. Available online: https://www.usgs.gov/software/genest-a-generalized-estimator-mortality

Delta Waterfowl. 2023. U.S. Waterfowler Numbers, Duck & Goose Harvest Increased in 2020-2021. Accessed January 2023. Available online: https://deltawaterfowl.org/waterfowl-numbers-up/.

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010. Post-Construction Fatality Surveys for the Elm Creek Wind Project: March 2009- February 2010. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Derby, C., K. Chodachek, and M. Sonnenberg. 2012. Post-Construction Fatality Surveys for the Elm Creek II Wind Project. Iberdrola Renewables: March 2011-February 2012. Prepared for Iberdrola Renewables, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. October 8, 2012.

eBird. 2023a. Bird Observations: Manitowoc County, Wisconsin. Date Range: Jan-Dec, 2013-2023. Accessed January 2023. Available online: https://ebird.org/barchart?byr=2013&eyr=2023&bmo=1&emo=12&r=US-WI-071

eBird. 2023b. Ebird: An Online Database of Bird Distribution and Abundance [Web Application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Accessed January 2023. Available online: https://ebird.org/

Electric Power Research Institute (EPRI). 2021. Issues of Background Mortality in Studies of Infrastructure-Caused Mortality. 2021 Technical Update. No. 3002021566. Final Report. EPRI, Palo Alto, California. September 2021. Available online: https://www.epri.com/research/products/000000003002021566

Esri. 2022. World Imagery and Aerial Photos (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Accessed January 2022. Available online: https://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=10df2279f9684e4a9f6a7f08febac2a9

Esri. 2023. World Imagery and Aerial Photos (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Accessed January 2023. Available online: https://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=10df2279f9684e4a9f6a7f08febac2a9

Fagen Engineering, LLC. 2014. 2013 Avian and Bat Monitoring Annual Report: Big Blue Wind Farm, Blue Earth, Minnesota. Prepared for Big Blue Wind Farm. Prepared by Fagen Engineering, LLC. May 2014.

Fagen Engineering, LLC. 2015. 2014 Avian and Bat Monitoring Annual Report: Big Blue Wind Farm, Blue Earth, Minnesota. Prepared for Big Blue Wind Farm. Prepared by Fagen Engineering, LLC.

Gruver, J., M. Sonnenberg, K. Bay, and W. Erickson. 2009. Post-Construction Bat and Bird Fatality Study at the Blue Sky Green Field Wind Energy Center, Fond Du Lac County, Wisconsin. July 21 - October 31, 2008 and March 15 - June 4, 2009. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. December 17, 2009. Available online: https://tethys.pnnl.gov/sites/default/files/publications/West_FondDuLac_BlueSkyWind.pdf

H. T. Harvey & Associates. 2015. California Valley Solar Ranch Project Avian and Bat Protection Plan Final Postconstruction Fatality Report. Prepared for HPR II, LLC, California Valley Solar Ranch, Santa Margarita, California. Prepared by H.T. Harvey and Associates. Project # 3326-03. March 4, 2015.

Huso, M., D. Dalthorp, and F. Korner-Nievergelt. 2017. Statistical Principles of Post-Construction Fatality Monitoring Design. In: M. Perrow, ed. Wildlife and Wind Farms, Conflicts and Solutions. Pelagic Publishing, Exeter, United Kingdom. Vol. 2, Onshore: Monitoring and Mitigation.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, and D. A. Shepherd. 2000. Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-Year Study. Final report prepared for Northern States Power Company, Minneapolis, Minnesota, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. September 22, 2000. 212 pp. Available online: https://tethys.pnnl.gov/sites/default/files/publications/JohnsonBuffalo-2000.pdf

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, US Fish and Wildlife Service (USFWS), Ashland, Oregon. April 2014. 28 pp.

Kalbfleisch, J. D. and R. L. Prentice. 2002. The Statistical Analysis of Failure Time Data. John Wiley & Sons, Hoboken, New Jersey.

Kerlinger, P. 2000. Avian Mortality at Communication Towers: A Review of the Recent Literature, Research, and Methodology. US Fish and Wildlife Service, Office of Migratory Bird Management. March 2000.

Kerlinger, P., J. Guarnaccia, R. Curry, and C. J. Vogel. 2014. Bird and Bat Fatality Study, Heritage Garden I Wind Farm, Delta County, Michigan: 2012-2014. Prepared for Heritage Sustainable Energy, LLC. Prepared by Curry and Kerlinger, LLC, McLean, Virginia. November 2014.

Korner-Nievergelt, F., P. Korner-Nievergelt, O. Behr, I. Niermann, R. Brinkmann, and B. Hellriegel. 2011. A New Method to Determine Bird and Bat Fatality at Wind Energy Turbines from Carcass Searches. Wildlife Biology 17: 350-363. doi: 10.2981/10-121.

Kosciuch, K., D. Riser-Espinoza, M. Gerringer, and W. Erickson. 2020. A Summary of Bird Mortality at Photovoltaic Utility Scale Solar Facilities in the Southwestern U.S. PLoS ONE 15(4): e0232034. doi: 10.1371/journal.pone.0232034.

Kosciuch, K., D. Riser-Espinoza, C. Moqtaderi, and W. Erickson. 2021. Aquatic Habitat Bird Occurrences at Photovoltaic Solar Energy Development in Southern California, USA. Diversity 13(11): 524. doi: 10.3390/d13110524.

Kosciuch, K., D. Riser-Espinoza, K. Russell, J. Sullivan, and N. Bartok. 2022. Alberta Regional Solar Fatality Analysis. Prepared for Foothills Solar Limited Partnership, Vancouver, British Columbia. Prepared by Western EcoSystems Technology, Inc. (WEST), Calgary, Alberta. August 3, 2022.

Longcore, T., C. Rich, P. Mineau, B. MacDonald, D. G. Bert, L. M. Sullivan, E. Mutrie, S. A. Gauthreaux, Jr., M. L. Avery, R. L. Crawford, A. M. Manville, II, E. R. Travis, and D. Drake. 2012. An Estimate of Avian Mortality at Communication Towers in the United States and Canada. PLoS ONE 7(4): e34025. doi: 10.1371/journal.pone.0034025.

Longcore, T., C. Rich, P. Mineau, B. MacDonald, D. G. Bert, L. M. Sullivan, E. Mutrie, S. A. Gauthreaux, Jr., M. L. Avery, R. L. Crawford, A. M. Manville, II, E. R. Travis, and D. Drake. 2013. Avian Mortality at Communication Towers in the United States and Canada: Which Species, How Many, and Where? Biological Conservation 158: 410-419. doi: 10.1016/j.biocon.2012.09.019.

Manville, A. 2000. Avian Mortality at Communication Towers: Background and Overview. In: W. R. Evans and A. M. Manville, II, eds. Proceedings of the Workshop on Avian Mortality at Communication Towers; 1-5.

National Land Cover Database (NLCD). 2019. National Land Cover Database 2019 - Landcover & Imperviousness (NLCD2019). Available online: https://www.mrlc.gov/data. *As cited* includes:

Homer, C., J. Dewitz, S. Jin, G. Xian, C. Costello, P. Danielson, L. Gass, M. Funk, J. Wickham, S. Stehman, R. Auch, and K. Riitters. 2020. Conterminous United States Land Cover Change Patterns 2001–2016 from the 2016 National Land Cover Database. ISPRS Journal of Photogrammetry and Remote Sensing 162(5): 184-199. doi: 10.1016/j.isprsjprs.2020.02.019.

Jin, S., C. Homer, L. Yang, P. Danielson, J. Dewitz, C. Li, Z. Zhu, G. Xian, and D. Howard. 2019. Overall Methodology Design for the United States National Land Cover Database 2016 Products. Remote Sensing. 2971. doi: 10.3390/rs11242971.

Wickham, J., S. V. Stehman, D. G. Sorenson, L. Gass, and J. A. Dewitz. 2021, Thematic Accuracy Assessment of the NLCD 2016 Land Cover for the Conterminous United States: Remote Sensing of Environment 257: 112357. doi: 10.1016/j.rse.2021.112357.

and

Yang, L., S. Jin, P. Danielson, C. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. Dewitz, J. Fry, M. Funk, B. Granneman, G. C. Liknes, M. Rigge, and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies. ISPRS Journal of Photogrammetry and Remote Sensing 146: 108-123. doi: 10.1016/j.isprsjprs.2018.09.006.

North American Datum (NAD). 1983. NAD83 Geodetic Datum.

Rabie, P. A., D. Riser-Espinoza, J. Studyvin, D. Dalthorp, and M. Huso. 2021. AWWI Technical Report: Performance of the GenEst Mortality Estimator Compared to the Huso and Shoenfeld Estimators. Washington, D.C. March 10, 2021. Available online: https://awwi.org/resources/genest/

Rodriguez, M., A. Ciecka, and D. Riser-Espinoza. 2021. Detection-dog Pilot Study, Grand Ridge Solar Farm, LaSalle County, Illinois. Draft Report. Prepared for Invenergy Services LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. October 1, 2021. 11 pages.

Rodriguez, M., D. Riser-Espinoza, W. Erickson, and L. Voorhees. 2022. Post-construction Monitoring Study Plan for the Two Creeks Solar Project, Manitowoc County, Wisconsin. Prepared for WEC Energy Group, Milwaukee, Wisconsin. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. February 10, 2022

Rodriguez, M., D. Riser-Espinoza, W. Erickson, and M. Tuma. 2023. Post-Construction Monitoring at the Badger Hollow Solar Farm, Iowa County, Wisconsin. Draft Report: March 15 – October 31, 2022. Prepared for Invenergy Renewables LLC, Chicago, Illinois, and WEC Energy Group, Milwaukee, Wisconsin. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. March 1, 2023. 26 pages + appendices

Simonis, J., D. H. Dalthorp, M. M. Huso, J. M. Mintz, L. Madsen, P. Rabie, and J. Studyvin. 2018. GenEst User Guide—Software for a Generalized Estimator of Mortality. US Geological Survey Techniques and Methods, Volume 7, Chapter C19, 72 pp. doi: 10.3133/tm7C19. Available online: https://pubs.usgs.gov/tm/7c19/tm7c19.pdf

Smallwood, K. S. 2007. Estimating Wind Turbine-Caused Bird Mortality. Journal of Wildlife Management 71: 2781-2791.

Smallwood, K. S., D. A. Bell, S. A. Snyder, and J. E. DiDonato. 2010. Novel Scavenger Removal Trials Increase Wind Turbine-Caused Avian Fatality Estimates. Journal of Wildlife Management 74: 1089-1097. doi: 10.2193/2009-266.

Western EcoSystems Technology, Inc. (WEST). 2017. Avian and Bat Monitoring at the Desert Sunlight Solar Farm Project, Riverside County, California: 2015 – 2016 Annual Report. Prepared for Desert Sunlight 250, LLC and Desert Sunlight 300, LLC, Juno Beach, Florida. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne Wyoming.

Western EcoSystems Technology, Inc. (WEST). 2018a. Post-Construction Monitoring at the Blythe Solar Power Project, Riverside County, California, 2016 - 2017 Annual Report. Prepared for Blythe Solar Energy Center, LLC, Juno Beach, Florida. Prepared by WEST, Cheyenne Wyoming.

Western EcoSystems Technology, Inc. (WEST). 2018b. Post-Construction Monitoring at the Desert Sunlight Solar Farm Project Riverside County, California. Second Annual Report: 2016 – 2017. Prepared for Desert Sunlight 250, LLC. Prepared by Western EcoSystems Technology, Inc. (WEST). Revised: July 16, 2018.

Appendix A. Searcher Efficiency and Carcass Persistence Model Fitting Results for the Two Creeks Solar Project, Manitowoc County, Wisconsin, from March 15 – October 31, 2022.

Appendix A1. Searcher efficiency models for each size class fit to searcher efficiency trial data collected at the Two Creeks Solar Project, Manitowoc County, Wisconsin, from March 15 – October 31, 2022.

Model	Component	Covariates	AICc	ΔAICc
Large Birds	Solar Array	Season	67.94	0*
		No Covariates	88.56	20.51
Small Birds	Solar Array	Season	67.87	0*
		No Covariates	70.12	2.25

* Selected model

AICc= corrected Akaike Information Criteria; ΔAICc=change in AICc

Appendix A2. Top carcass persistence models for each size class fit to carcass persistence data collected at the Two Creeks Solar Project, Manitowoc County, Wisconsin, from March 15 – October 31, 2022.

Size	Location Covariates	Scale Covariates	Distribution	AICc	ΔAICc
Large Bird	Season	No Covariates	log-logistic	118.01	0*
	Season	No Covariates	lognormal	118.62	0.61
	Season	No Covariates	Weibull	119.33	1.32
	Season	Season	lognormal	120.10	2.09
	Season	Season	log-logistic	121.33	3.32
	Season	Season	Weibull	123.97	5.96
	Season	–	exponential	128.05	10.04
	No Covariates	No Covariates	lognormal	146.13	28.12
	No Covariates	Season	Weibull	147.01	29.00
	No Covariates	Season	lognormal	147.35	29.34
	No Covariates	No Covariates	log-logistic	147.62	29.61
	No Covariates	Season	log-logistic	149.66	31.65
	No Covariates	No Covariates	Weibull	150.04	32.03
	No Covariates	–	exponential	183.13	65.12
Small Bird	Season	No Covariates	lognormal	155.87	0*
	Season	No Covariates	log-logistic	156.40	0.53
	Season	No Covariates	Weibull	156.42	0.55
	No Covariates	Season	log-logistic	156.49	0.62
	Season	Season	lognormal	156.84	0.97
	No Covariates	Season	lognormal	156.84	0.97
	Season	Season	log-logistic	157.09	1.22
	No Covariates	No Covariates	lognormal	158.65	2.78
	No Covariates	No Covariates	log-logistic	158.84	2.97
	Season	Season	Weibull	160.79	4.92
	No Covariates	No Covariates	Weibull	162.67	6.80
	Season	–	exponential	163.09	7.22
	No Covariates	Season	Weibull	163.44	7.57
	No Covariates	–	exponential	174.38	18.51

* Selected model

AICc= corrected Akaike Information Criteria; ΔAICc=change in AICc

Appendix A3. Carcass persistence top models with covariates, distributions, and model parameters for the Two Creeks Solar Farm, Manitowoc County, Wisconsin, from March 15, 2022 – October 31, 2022.

Size Class	Season	Distribution	Predicted Median Removal Times (days)	Parameter 1	Parameter 2
Large bird	Fall	log-logistic**	151.6	shape = 1.142	scale = 5.021
	Spring	log-logistic**	0.9	shape = 1.142	scale = -0.121
	Summer	log-logistic**	55.2	shape = 1.142	scale = 4.01
Small bird	Fall	lognormal*	20.0	meanlog = 2.997	sdlog = 1.819
	Spring	lognormal*	3.3	meanlog = 1.179	sdlog = 1.819
	Summer	lognormal*	2.7	meanlog = 0.999	sdlog = 1.819

* Parameterization follows the base R parameterization for this distribution.

** Parameterization follows the FAdist parameterization for this distribution.

Appendix B. Correction Adjustment Factors for Studies Conducted at the Two Creeks Solar Project, Manitowoc County, Wisconsin, from March 15, 2022 – October 31, 2022.

Appendix B. Estimated adjustment factors, with 90% confidence intervals (CI) for fatality estimates at the Two Creeks Solar Farm, Manitowoc County, Wisconsin, from March 15 – October 31, 2022.

	Spring		Summer		Fall	
	Estimate	**90% CI**	**Estimate**	**90% CI**	**Estimate**	**90% CI**
Searcher Efficiency						
Large Bird	0.39	0.24–0.56	0.02	0–0.10	0.59	0.41–0.75
Small Bird	0.43	0.27–0.61	0.10	0.03–0.26	0.21	0.10–0.40
Average Probability of a Detection Persisting Through the Search Interval*						
Large Bird	0.30	0.18–0.42	0.87	0.73–0.94	0.97	0.89–0.99
Small Bird	0.53	0.38–0.68	0.37	0.22–0.55	0.84	0.69–0.93
Probability of Available and Detected						
Large Bird	0.12	0.06–0.21	0.04	0.01–0.20	0.79	0.61–0.90
Small Bird	0.26	0.15–0.40	0.06	0.02–0.18	0.29	0.12–0.49

* The search interval was twice per month in Summer and weekly in Spring and Fall.

PSC REF#:467322





Public Service Commission of Wisconsin
RECEIVED: 5/5/2023 9:23:34 AM

May 5, 2023

Mr. Cru Stubley
Secretary to the Commission
Public Service Commission of Wisconsin
4822 Madison Yards Way
Madison, WI 53705-9100

RE: Docket 5-BS-228: Joint Application of Madison Gas and Electric Company and Wisconsin Public Service Corporation for Approval to Acquire Ownership Interests in Solar Electric Generating Facilities

Docket 5-BS-234: Joint Application of Madison Gas and Electric Company and Wisconsin Electric Power Company for Approval to Acquire Ownership Interests in the Badger Hollow II Solar Electric Generating Facility

Docket 9697-CE-100: Application for a Certificate of Public Convenience and Necessity of Badger Hollow Solar Farm, LLC to Construct a Solar Electric Generation Facility, to be Located in Iowa County, Wisconsin

Dear Mr. Stubley:

Pursuant to the Final Decisions issued April 18, 2019 in dockets 5-BS-228 and 9697-CE-100 as well as the Final Decision issued March 6, 2020 in docket 5-BS-234, Wisconsin Electric Power Company ("Wisconsin Electric"), Wisconsin Public Service Corporation ("WPSC") and Madison Gas and Electric Company ("MGE") (collectively, Applicants) hereby submit the post construction avian study report for the Badger Hollow Solar Project.

Order Point 9 of the Commission's Final Decision in Docket 5-BS-228 issued April 18, 2019 states:

> *Applicants shall be bound by all commitments made by developers in their applications, subsequent filings, and the provisions of the Commission's Final Decision in dockets 9696-CE-100, 9696-CE-101, 9697-CE-100, and 9697-CE-101. The assignment of the Certificates of Public Convenience and Necessity for the projects does not confer additional rights to the applicants than what was afforded to the developers at the time of the application and as specified in the Final Decisions in dockets 9696-CE-100, 9696-CE-101, 9697-CE-100, and 9697-CE-101. Notwithstanding Wis. Stat. §§ 32.02 and 32.03(5)(a), such transfer shall not confer any right to use eminent domain.*

Order Point 7 of the Commission's Final Decision in Docket 5-BS-234 issued March 6, 2020 states:

> *The applicants shall be bound by all commitments made by developers in their applications, subsequent filings, and the provisions of the Commission's Final Decision in dockets 9697-CE-100 and 9697-CE-101. The assignment of the CPCNs for the projects does not confer additional rights to the applicants than what was afforded to the*

developers at the time of the application and as specified in the Final Decisions in dockets 9697-CE-100 and 9697-CE-101. Notwithstanding Wis. Stat. §§ 32.02 and 32.03(5)(a), such transfer shall not confer any right to use eminent domain.

The 9697-CE-100 April 18, 2019 Final Decision – PSCW Order Point 9 states:

Badger Hollow shall work with Commission and DNR staff on developing and conducting a post-construction avian mortality study.

Should you have any questions regarding this study report, please contact Rich Stasik at (414) 221-3685 or richard.stasik@wecenergygroup.com.

Respectfully submitted,

/s/ Theodore T. Eidukas
Theodore T. Eidukas
Vice President -
State Regulatory Affairs
WEC Energy Group
Wisconsin Public Service Corp.

/s/ Scott R. Smith
Scott R. Smith
Assistant Vice President -
Business and Regulatory Strategy
Madison Gas and Electric Co.

Attachments

Post-Construction Monitoring at the Badger Hollow Solar Farm Iowa County, Wisconsin

Final Report

March 15 – October 31, 2022

Prepared for:

Badger Hollow Solar Farm LLC

3105 Vickerman Road
Cobb, Wisconsin 53526

Prepared by:

Meredith Rodriguez, Daniel Riser-Espinoza, Wally Erickson, and Molly Tuma

Western EcoSystems Technology, Inc.
400 West Seventh Street, Suite 200
Bloomington, Indiana 47404

May 1, 2023



STUDY PARTICIPANTS

Meredith Rodriguez	Project Manager
Wally Erickson	Senior Reviewer
Todd Mabee	Senior Reviewer
Daniel Riser-Espinoza	Statistician
Kelsey O'Brien	Statistician
Molly Tuma	Field Coordinator and Report Writer
David Klein	Technical Editor
Lucille Hentzen	Field Technician
Noelle Freeman	Field Technician
Anna Ciecka	Detection Dog Coordinator
Kristen VanNess	Dog-handler
Laura Martinez Steele	Dog-handler
Emily Jacob	Dog-handler

REPORT REFERENCE

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Appendix B. Correction adjustment factors for studies conducted at the Badger Hollow Solar Farm, Iowa County, Wisconsin, from March 15 – October 31, 2022.

1 INTRODUCTION

Badger Hollow Solar Farm LLC (Badger Hollow) is operating the Badger Hollow Solar Farm, a 300-megawatt (MW) photovoltaic (PV) solar project in Iowa County, Wisconsin. Phase 1 (Project), a 150-MW installation, is operational. The Project consists of nine blocks that were individually fenced. Each block has panel rows ranging from approximately 58–86 meters (m) long, with a width between rows of 4.1 m. The majority of rows are approximately 86 m long. Panels use a single-axis tracking system.

A second solar project of comparable size, Two Creeks Solar Project in Manitowoc County, was developed at the same time and purchased by Wisconsin Public Service Corporation (WPS), who also owns and operates Badger Hollow Solar Farm LLC. In order to have comparable results, WPS chose to conduct post-construction monitoring (PCM) studies using the same search methods at both Badger Hollow and Two Creeks. Western EcoSystems Technology, Inc. (WEST) developed a PCM plan for both projects. The primary objectives for PCM are to 1) fulfill the WDNR and PSC requirements to collect data on avian fatalities within the Project and Two Creeks Solar Project with a focus on waterbirds and waterfowl and 2) determine if there are notable temporal, spatial, or species patterns in observed fatalities within or between the two projects.

2 STUDY AREA

The 972 acre Project Area is in Iowa County, Wisconsin, 3.1 kilometers southwest of Cobb, Wisconsin (Figure 1). The Project lies approximately 350 m above sea level. Panel-covered areas account for 69% (670 acres) of the Project Area. The site is vegetated in accordance with the Project's vegetation management plan, predominantly with grasses ranging 0.2– 0.5 m tall.

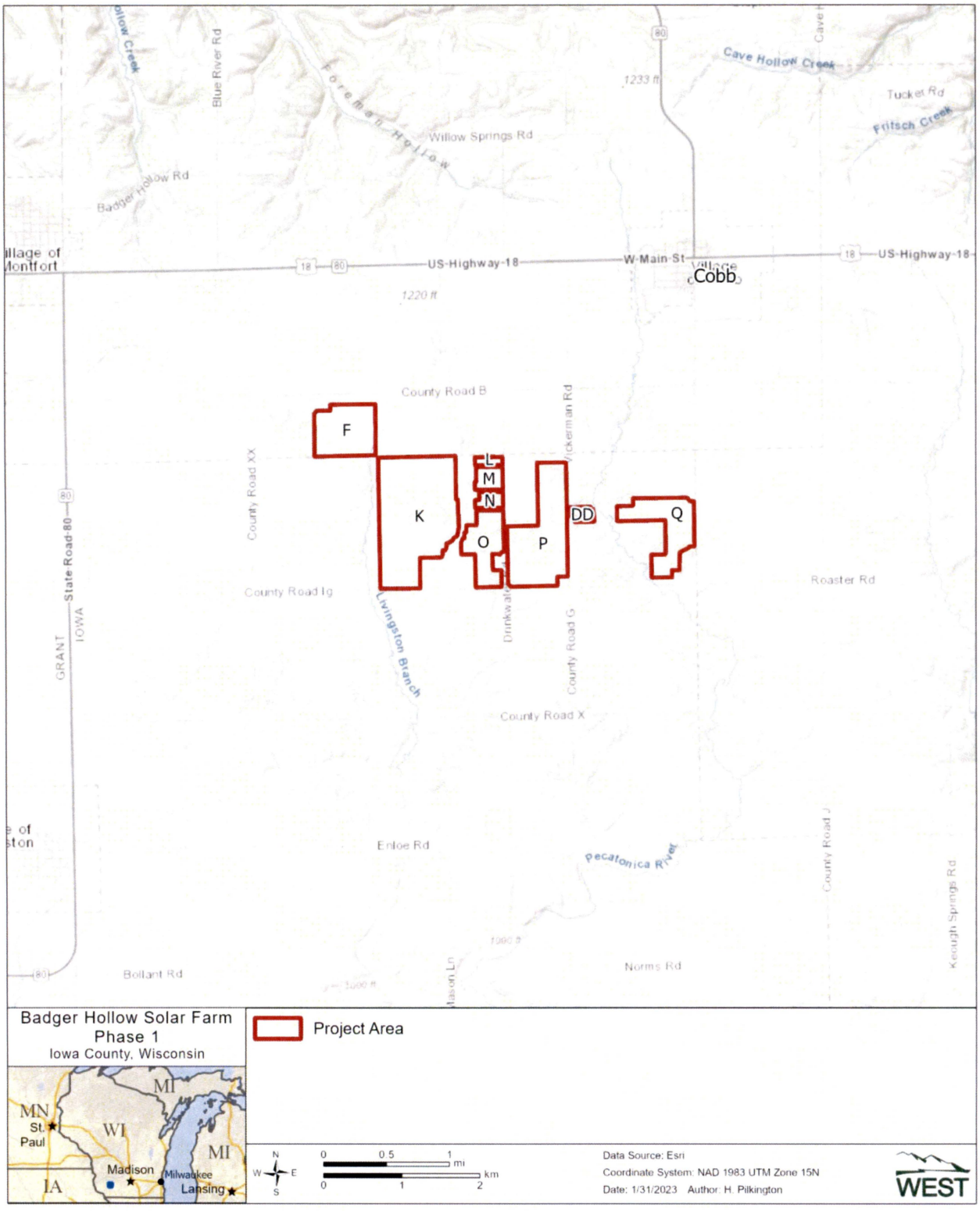

Figure 1. Location of Phase 1 of the Badger Hollow Solar Farm in Iowa County, Wisconsin.
Note: Each individually fenced area is labeled according to an identifying letter assigned during development.

3 METHODS

3.1 Study Design

WEST conducted PCM using dog-handler teams consisting of one dog and one handler each, which relied primarily on scent to find evidence of avian fatalities (hereafter we use the term detection to refer to intact carcasses, partial carcasses, and feather spots found during the study). Dog-handler teams were used because scent was the preferred search methodology because vegetation was at varying heights throughout the study and may have been more challenging for humans using visual scans. Monitoring occurred across three seasons: spring (March 15 – May 15), summer (May 16 – August 31), and fall (September 1 – October 31). To determine appropriate search frequencies for monitoring, we reviewed publicly available data from wind energy studies in the upper Midwest, which had recorded median persistence times of 10 days for large birds (Johnson et al. 2000; Gruver et al. 2009; Derby et al. 2010, 2012, Kerlinger et al. 2014, Fagen Engineering 2014, 2015). Based on expected persistence times, the monitoring effort focused on the avian migratory seasons, with weekly searches in the spring and fall, and searches every other week in the summer. Search methods were designed to achieve 20% coverage of the areas occupied by panels in the Project. Each search round required two days of searches to be completed, ensuring the presence of biologists on site multiple days per week. Completing multiple days of searches during the spring and fall periods made certain that searches occurred over a wide range of environmental variables, including after rain and storm events.

Components of the PCM study included:

- Standardized carcass searches
- Searcher efficiency trials to estimate the proportion of detections found by dog-handler teams
- Carcass persistence trials to estimate the length of time a carcass remains possible to detect in the field

3.1.1 Standardized Carcass Searches

Detection dogs were considered candidates for carcass searches if they met basic temperament and obedience criteria, and demonstrated the trainability to detect bird carcasses and feather spots. Temperament characteristics that are sought after are high-energy dogs, with a high food or toy drive. The detection dogs used in this study successfully completed WEST's detection dog scent training protocol and were experienced finding bird carcasses at PCM studies for wind projects.

Dog-handler teams conducted cross-row sampling within the Project by walking transects on the roads along the southern edges of panel rows. Based on a review of the predominant wind direction in the Project Area, the area north of each transect was established as the search area for all three seasons (Figure 2). The dog-handlers directed the detection dogs along each transect

at a slow pace. If the detection dog indicated a change in behavior that suggested the presence of a detection, the dog-handler allowed the dog to move into the panel rows to follow the scent if it was safe to do so. If the handler deemed it was unsafe to allow the detection dog to follow the scent cone to its source off-leash, a Global Positioning System (GPS) point was taken at the point of the change of behavior and the detection dog was directed to follow the scent cone from a safer trajectory. The dog-handler alternated surveying transects east to west and west to east. Between transects, the dog-handler team walked along the outer edge of the block, thereby surveying some fence line between each searched row (Figure 2).

3.1.2 Survey Plots

Throughout the study, standing vegetation within the Project ranged between 1 centimeter (cm) and 100 cm tall, with average vegetation heights between 30–61 cm tall. To manage vegetation, site-wide mowing occurred twice during the study period between May and October.

Scent detection varies with humidity level and wind speed, as well as carcass size (Barrientos et al. 2018). The degree of carcass decomposition will also impact detection rates; however, the results of an initial pilot study indicated that some large and small birds could be detected out to a range of 45 m (Rodriguez et al. 2021). Therefore, to calculate the area necessary to search 20% of the Project, WEST assumed that up to half of a panel row would be effectively searched by a detection dog walking perpendicularly to panels along the edge of each block (i.e., cross-row sampling). The area up to 45 m north of the transect was considered a survey plot. The area required to search 20% of the Project, or approximately 134 ac, was divided across 25 survey plots in blocks F, K, O, P, and Q (Figure 3).

3.1.3 Data Collection

All detections found were recorded. Detections were not collected, but spatial locations were recorded to ensure no double-counting would occur. Each detection was assigned a unique identification number based on the species identification, location, and date found. For each detection, the dog-handler recorded information on a data sheet, including the date and time, species, sex and age (when possible), observer, block, measured distance from nearest Project component, distance to nearest PV panel, distance to end of the row, location of detections as Universal Transverse Mercator or latitude/longitude coordinates, habitat surrounding detections, condition of detections (i.e., intact, scavenged, dismembered, feather spot, or injured), and estimated time of death (i.e., less than one day, 2–3 days, 4–7 days, 8–14 days, >14 days, or unknown).

All detections were assigned to a size class (i.e., small bird or large bird), a taxonomic family, an ecological guild and weight categories (i.e., 0–100 grams; 101–999 grams; and 1,000+ grams). Both body length and wingspan were used to inform the size class. Large birds were defined as birds greater than 30 cm in length or between 23 and 30 cm with a wingspan of more than 46 cm. Small birds were defined as birds less than or equal to 23 cm in length or between 23 and 30 cm with a wingspan less than or equal to 46 cm. Detections were categorized as water associates or water obligates following methods outlined by Kosciuch et al. 2021: species that

require water to take flight were categorized as water obligates, and species that rely on water for foraging, roosting, and/or reproduction were categorized as water associates.



Figure 2. Example illustration of cross-row survey at Phase 1 of the Badger Hollow Solar Farm, Iowa County, Illinois.

Note: Assuming that winds were flowing from the north or northwest, the surveyed area along the fence is represented by green shading.

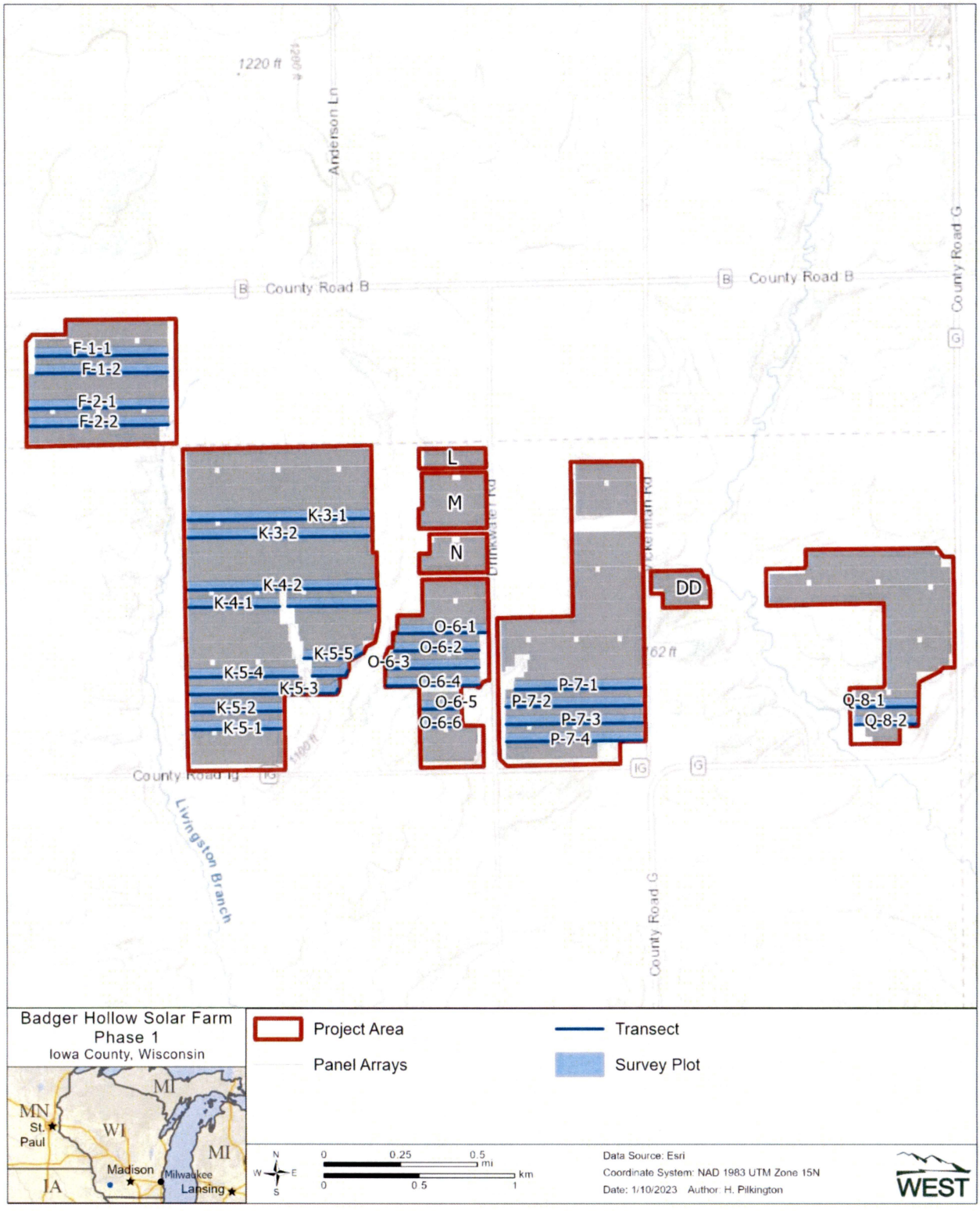

Figure 3. Survey plots at Phase 1 of the Badger Hollow Solar Farm in Iowa County, Wisconsin.
Note: Each individually fenced area is labeled according to an identifying letter assigned during development.

Digital photographs were taken of the detections *in situ* to document any visible injuries, identification, surrounding habitat and any visible imprints or marks on surrounding infrastructure. The condition of each detection found was recorded using the following categories:

- Intact – a carcass that is complete, not badly decomposed, and shows no sign of being fed upon by a predator or scavenger.
- Scavenged – an entire carcass that shows signs of being fed upon by a predator or scavenger, or a portion(s) of a carcass in one location (e.g., wings, skeletal remains, portion of a carcass, etc.), or a carcass that has been heavily infested by insects.
- Dismembered – an entire carcass that is found in multiple pieces distributed more than 1.0 m (3.3 ft) apart from one another due to scavenging or other reasons.
- Injured – a bird found alive.
- Feather spot – Ten or more feathers (excluding down), or two or more primary feathers or five or more tail feathers within a 2.0-square meter (21.5-square foot) area indicating predation or scavenging of a bird carcass.

Potential causes of death were recorded using the following definitions:

- Collision – Signs of blunt trauma, blood, imprints, or fecal smears on panels or infrastructure
- Electrocution – Singed or burnt feathers or flesh
- Predation – Observed or cached
- Unknown – Scavenged or intact carcass with no apparent sign of injury

Detections found outside survey plots (e.g., south of a transect or more than 45 m north of a transect), or outside of the scheduled search time, were coded as incidental discoveries and were documented following the same protocol for those found during standard searches. All species identifications were confirmed by a biologists with significant field experience in identification of birds and their feathers. When feather spots were unable to be identified to species, detections were identified to the closest genus or group possible (e.g., unidentified sparrow). Injured birds would have been recorded and evaluated for potential rehabilitation.

3.2 **Bias Trials**

Bias trials were conducted throughout the study period to estimate the percentage of detections found by dog-handler teams and the likelihood a detection persisted long enough to be found during searches. WEST coordinated with the site managers weekly during the study period to determine where and when mowing was scheduled to occur in the upcoming weeks to ensure that mowing would not interfere with or interrupt bias trials.

For all bias trials, commercially-obtained surrogates, including hen mallards (*Anas platyrhynchos*) and hen ring-necked pheasants (*Phasianus colchicus*) were used for large birds, and juvenile

coturnix quail (*Coturnix coturnix*) were used for small birds. Primary feathers were clipped to help distinguish bias trials from other detections found at the Project. However, in the spring, mallard carcasses used in bias trials were rapidly scavenged, raising concern that feather spots would be found without primaries and could be mistaken for detections; therefore, at the start of the summer, WEST began using ring-necked pheasants in place of mallards for large bird trials. Due to supply issues in the fall, biologists used mallards again for bias trials, but clipped both the body feathers and the primaries to help distinguish bias trials from other detections found at the Project.

3.2.1 Searcher Efficiency Trials

Searcher efficiency trials were conducted in the same areas where carcass searches occurred. A minimum of 20 carcasses per size class (i.e., small and large birds) were dropped per season. Searcher efficiency trial carcasses were placed over three to four dates during each season, thereby spreading the trials throughout the survey period to incorporate the effects of varying weather, climatic and vegetation conditions. A biologist not involved in the standard surveys placed the trial carcasses. Dog-handler teams did not know when trials were occurring or where trial carcasses were located within the Project. Trial carcasses were dropped from waist high or higher, and allowed to land in a random posture. Each bias trial carcass was discreetly marked with electrical tape wrapped around one leg, so it could be identified as a bias trial if found by searchers or facility personnel. Documentation of each location included GPS coordinates and notes about the substrate and carcass placement. The number and location of bias trial carcasses found by searchers was recorded and compared to the total number placed. The number of trial carcasses available for detection was determined immediately after the conclusion of the trial. The dog-handler team had one opportunity to discover trial carcasses. Any missed trial carcasses were recovered as quickly as possible after surveys were complete.

All trial carcasses were placed according to a sampling plan that randomly allocated carcasses of each size class (i.e., large bird and small bird) across different transects and different distances from the search transects. Each trial carcass was dropped in a random preselected row along a transect, and at a random preselected distance into panel row (e.g., 25 m north of the transect). Searcher efficiency trial carcasses were placed out to the maximum assumed detection distance of 45 m, based on a pilot study conducted at a PV solar facility with similar ground conditions (Rodriguez et al. 2021).

3.2.2 Carcass Persistence Trials

A minimum of twelve trial carcasses per size class were monitored within the Project in each season. Carcass persistence trial carcasses were monitored for 28 days or until the carcass had deteriorated to a point where it would no longer qualify as a documentable fatality. Trial carcasses were monitored using motion-triggered digital trail cameras and in-person checks by WEST biologists (e.g., WEST 2017, 2018a, 2018b). Two trail camera models were used for carcass persistence trials, the Browning Dark Ops HD Pro X Trail Game Camera and Bushnell Trophy Cam, Model 119717CW. All cameras were configured with similar settings to take a photograph when motion occurred in front of the camera, 24-hours a day. Trial carcasses were placed 0.3–0.9 m in front of the camera and the motion-trigger for all cameras was set for a distance greater than 0.9 m in order to capture scavenger activity around the trial carcass.

Biologists checked the cameras multiple times throughout a trial to replace batteries and memory cards, and record whether the carcass was intact, scavenged, or missing. If a trial carcass was not found at the original placement location, the biologist searched in all directions up to 30 m out from the placement location in an effort to locate any scavenged remains. If the detection dog team was available, they conducted these checks to increase the chance of finding the carcass. If any remains were found, the camera was moved to the new location. Trial carcasses were left at their location until they were removed by scavenging or other means, completely decomposed, or at the end of the carcass persistence trial, whichever occurred first. At the end of the 28-day period, any evidence of the carcasses was removed from the site. To minimize potential bias caused by scavenger swamping (Smallwood 2007, Smallwood et al. 2010), trial carcasses were distributed throughout the Project, not just within survey plots. Trials were placed at least twice a season to incorporate effects of weather, scavenging types and densities. Likewise, to reduce possible biases related to leaving scent traces or visual cues that may unnecessarily alert potential scavengers, all trial carcasses were handled with latex gloves. Scavenger species, including insects, were recorded during in-person checks and during photos review.

3.3 Data Management

3.3.1 Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers were responsible for ensuring that all information was recorded correctly and datasheets were submitted in a timely manner. Irregular codes or data suspected as unusual were discussed with the observer and/or project manager. Errors, omissions, or problems were traced back to the field documentation, and appropriate changes were made.

Prior to analysis, the locations of mallard carcasses or feather spots without signs of clipped feathers were reviewed to exclude potential bias trial remains. Placement timing and locations of unrecovered bias trials were reviewed against potential fatalities. Detections of mallards found within 100 m of unrecovered bias trials were assumed to be the same and were excluded from the dataset. Mallard detections outside of 100 m of previously placed bias trials were considered detections for the purposes of analysis.

3.3.2 Data Compilation and Storage

A Microsoft SQL Server was used to store, organize, and retrieve survey data. Data in the electronic database followed a pre-defined format to facilitate subsequent QA/QC and data analysis. All field collected data, and electronic data files will be retained for reference.

3.4 Statistical Analysis

Detections were included in fatality estimation if they were found within the selected survey plots and had an estimated time of death within the study period. Per the Project's study plan (Rodriguez et al. 2021), fatality estimates were only calculated if at least 10 detections were found and included in analysis for a given category (e.g., all birds, large birds, large birds in fall), as

estimates become unstable when fewer than 10 detections are adjusted for an estimate (Korner-Nievergelt et al. 2011). Furthermore, it should be underscored that detections included in the fatality estimation data set are often represented by feather spots and partial carcasses in addition to intact carcasses, many of which cannot be attributed to identifiable causes (e.g. collision). Thus, reported fatality estimates should be interpreted carefully and do not necessarily represent the actual number of avian collisions that could have occurred during the study period.

Fatality estimates were calculated using GenEst (a Generalized Estimator of Mortality; Dalthorp et al. 2018, Simonis et al. 2018). To obtain an overall estimate of fatality, each carcass included in the analysis was adjusted for searcher efficiency, carcass persistence, a detection reduction factor (also referred to as "*k*"; see Section 3.4.3), and a search area adjustment equal to the proportion of the facility being searched. Estimates and 90% confidence intervals (CI) were calculated using a parametric bootstrap (Dalthorp et al. 2018). Bootstrapping is a computer simulation technique that is useful for calculating variances and CIs for complicated test statistics. One thousand bootstrap samples were used. The lower 5th and upper 95th percentiles of the 1,000 bootstrap estimates were estimates of the lower limit and upper limit of 90% CI. Fatality estimates per acre were calculated by dividing site wide estimates by the number of acres covered by panels within the Project as calculated in ArcGIS, based on spatial data provided for Badger Hollow.

3.4.1 Searcher Efficiency Estimation

Data collected during searcher efficiency trials were used to model the probability large and small birds were detected by dog-handler teams. Estimates were obtained for each size class separately using a logit regression model (Dalthorp et al. 2018). The season was included as a potential covariate. The appropriate model was selected using an information theoretic approach known as AICc, or corrected Akaike Information Criteria (Burnham and Anderson 2002). The best-supported model was selected as the most parsimonious model (i.e. the model with the fewest parameters) within two AICc units of the model with the lowest AICc value. Model parsimony provides an additional model selection criterion to distinguish models within two AICc units of the model with the lowest AICc value, ranking simple models over more complex models with otherwise similar relative explanatory power.

3.4.2 Carcass Persistence Estimation

Data collected during carcass persistence trials were used to model the amount of time in days that carcasses remained available to be located by the searcher. To adjust detections for removal bias, carcass persistence models were used to calculate the average probability a detection persisted through the search interval (i.e., the time between scheduled searches). The persistence of a detection was modeled using an interval-censored survival regression for each size class, with exponential, log-logistic, log-normal, and Weibull as potential persistence distributions (Dalthorp et al. 2018, Kalbfleisch and Prentice 2002). The season was included in the models as a potential covariate on each persistence distribution parameter. The best-supported model was selected as the most parsimonious model within two AICc units of the model with the lowest AICc value.

3.4.3 Detection Reduction Factor

The change in searcher efficiency between successive searches is defined by a parameter called the detection reduction factor that ranges from zero to one. When *k* is zero, it implies that a detection is missed on the first search and that detection would never be found. A *k* of one implies searcher efficiency remains constant no matter how many times a carcass is missed. The detection reduction factor is a required parameter for GenEst; however, data were not collected to estimate *k* in this study. A value for *k* of 0.67 has been estimated for bats (Huso et al. 2017). In the absence of published data on *k* for birds, this value was used to calculate fatality estimates for birds. A recent simulation study (Rabie et al. 2021) demonstrated that *k* has relatively little influence on estimates in a broad range of circumstances, and assuming a modest value (e.g., 0.67) for *k* is acceptable for typical PCM studies.

4 RESULTS

4.1 Standardized Carcass Searches

4.1.1 Summary of Avian Species Recorded

A total of 617 carcass searches were conducted from March 15 – October 31, 2022. Seventeen avian detections representing six identifiable species were found during the study, including four detections found incidentally outside survey plots (Table1). No water obligates were recorded at the Project. The feather spots of two water associates (11.7% of detections), an unidentified duck and a mallard were recorded during surveys and incidentally, respectively. No evidence of panel collision was observed and the cause of death for all detections was unknown (Table 2). No state- or federally listed species were found, and no injured or stranded birds were found.

Three mourning dove detections (*Zenaida macroura*) were recorded (17.7%), represented by one scavenged remain and two feather spots, one of which was found incidentally. All other identifiable species were represented by one detection each (Table 1). No detections were found intact. Six of the 17 detections (35.3%) were scavenged, 10 (58.8%) were feather spots, and one (5.8%) was dismembered. Nine detections that were found as partial carcasses or feather spots and could not be identified to species.

Of the 17 detections found during the study, 13 were eligible for inclusion in fatality estimates. Four detections were excluded from analysis because they were found incidentally outside survey plots (Table 1).

4.1.2 Temporal Patterns of Avian Fatalities

Detections were found throughout the study period in relatively low numbers; the maximum number of detections found in a single week was two, or approximately 0.003 birds per acre per week (Figure 4). The composition of detections varied by season and no pulses or temporal trends were identified by species or guild (Table 2).

Table 1. Number and percent (%) of detections by species included and excluded from analysis at Phase 1 of the Badger Hollow Solar Farm, Iowa County, Wisconsin, from March 15 – October 31, 2022.

Species	Included in Fatality Estimate		Outside Survey Plots*		Total	
	Total	%	Total	%	Total	%
unidentified large bird	3	23.1	1	25.0	4	23.5
mourning dove	2	15.4	1	25.0	3	17.7
unidentified sparrow	2	15.4	0	0	2	11.8
European starling	1	7.7	0	0	1	5.9
gray catbird	1	7.7	0	0	1	5.9
rock pigeon	1	7.7	0	0	1	5.9
unidentified bluebird	1	7.7	0	0	1	5.9
unidentified duck	1	7.7	0	0	1	5.9
unidentified passerine	1	7.7	0	0	1	5.9
mallard	0	0	1	25.0	1	5.9
northern flicker	0	0	1	25.0	1	5.9
Overall Birds	**13**	**100**	**4**	**100**	**17**	**100**

*Detection not included in analysis.

Sums of values may not add to total value shown, due to rounding.

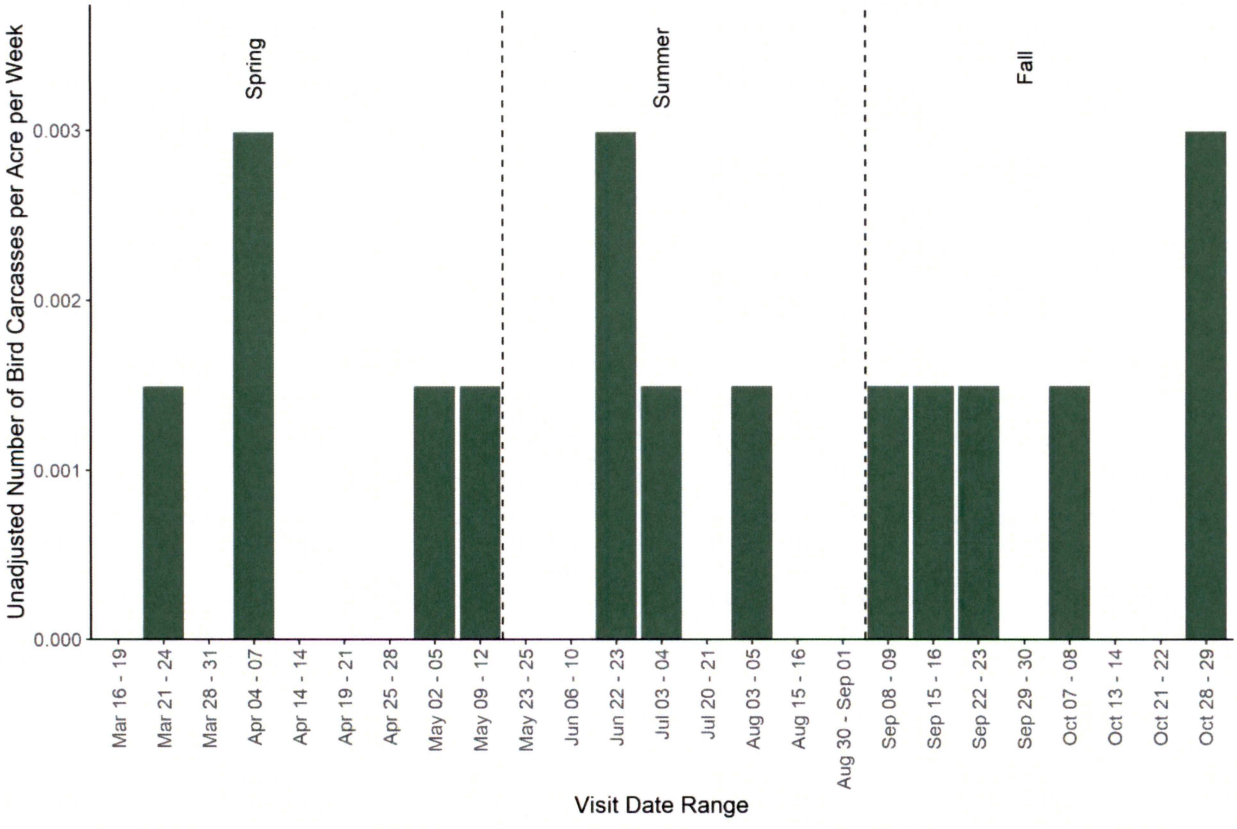

Figure 4. Temporal distribution of all avian detections (unadjusted for searcher efficiency and carcass persistence) at Phase 1 of the Badger Hollow Solar Farm, Iowa County, Wisconsin, March 15 – October 31, 2022.

Table 2. Bird detections found at Phase 1 of the Badger Hollow Solar Farm in Iowa County, Wisconsin, March 15 – October 31, 2022.

Species	Date Found	Guild	Size Class	Condition	Cause	Latitude	Longitude
Spring (March 15 – May 15)							
unidentified large bird	03/24/2022	N/A	large bird	feather spot	unknown	42.93168	-90.37607
unidentified duck[1]	04/04/2022	waterbirds/waterfowl	large bird	feather spot	unknown	42.94627	-90.38507
unidentified passerine	04/04/2022	passerine	small bird	scavenged	unknown	42.94922	-90.38653
mallard[1,2]	04/14/2022	waterbirds/waterfowl	large bird	feather spot	unknown	42.93163	-90.36295
northern flicker[2]	05/05/2022	woodpecker	small bird	feather spot	unknown	42.9459	-90.38083
unidentified large bird	05/09/2022	N/A	large bird	feather spot	unknown	42.93228	-90.35442
unidentified large bird[2]	05/09/2022	N/A	large bird	feather spot	unknown	42.93042	-90.36343
Summer (May 16 – August 31)							
gray catbird	06/23/2022	mimids	small bird	dismembered	unknown	42.93204	-90.35876
unidentified sparrow	06/23/2022	sparrow	small bird	feather spot	unknown	42.93623	-90.36288
mourning dove	07/03/2022	doves/pigeons	small bird	scavenged	unknown	42.93409	-90.37633
unidentified sparrow	08/05/2022	grassland/sparrow	small bird	scavenged	unknown	42.93416	-90.37232
Fall (September 1 – October 31)							
rock pigeon	09/09/2022	doves/pigeons	large bird	scavenged	unknown	42.94925	-90.38557
mourning dove	09/16/2022	doves/pigeons	large bird	feather spot	unknown	42.93334	-90.37684
European starling	09/23/2022	mimids	large bird	scavenged	unknown	42.94145	-90.37371
unidentified blackbird	10/08/2022	blackbirds/orioles	small bird	scavenged	unknown	42.94677	-90.3833
mourning dove[2]	10/28/2022	doves/pigeons	large bird	feather spot	unknown	42.93246	-90.3559
unidentified large bird	10/29/2022	N/A	large bird	feather spot	unknown	42.93251	-90.3773

[1] Denotes a water-associated species, or species that relies on water for foraging, roosting, and/or reproduction, as defined by Kosciuch et al. 2021.

[2] Denotes a detection that was found incidentally.

N/A = not applicable

4.1.3 Spatial Distribution of Avian Detections

Detections were discovered in all of the surveyed blocks except Q. No spatial patterns were evident (Figure 5).

4.2 Searcher Efficiency Trials

During the study period, 86 large and 87 small bird trial carcasses were placed in the solar arrays. Of the carcasses placed, 58 large bird and 60 small bird trial carcasses were available to be found (Table 3). The top searcher efficiency model for each size class was an intercept-only model, suggesting that searcher efficiency did not vary systematically by season (Appendix A). Estimated searcher efficiency for large birds was 0.51 (90% CI: 0.40–0.61) and 0.23 (90% CI: 0.16–0.33) for small birds (Appendix B).

Table 3. Searcher efficiency results at Phase 1 of the Badger Hollow Solar Farm in Iowa County, Wisconsin, March 15 – October 31, 2022.

Size Class	Season	# Placed	# Available	# Found	% Found
Large Bird	Spring	30	21	14	66.7
	Summer	29	21	9	42.9
	Fall	27	16	7	43.8
	Overall	**86**	**58**	**30**	**51.7**
Small Bird	Spring	33	21	7	33.3
	Summer	30	20	3	15.0
	Fall	24	19	4	21.1
	Overall	**87**	**60**	**14**	**23.3**

= number; % = percent.

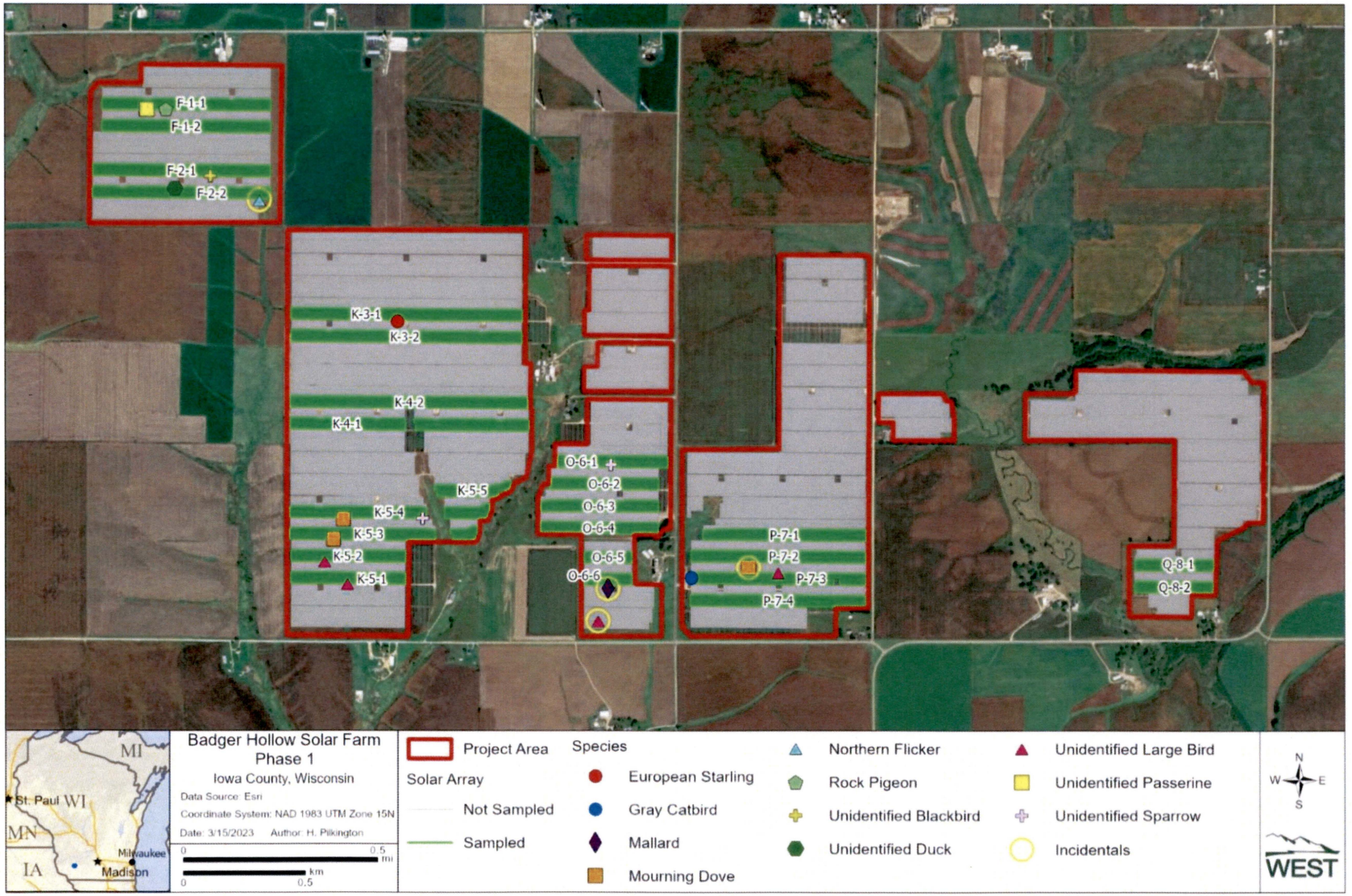

Figure 5. Location of avian detections found at Phase 1 of the Badger Hollow Solar Farm in Iowa County, Wisconsin, March 15 – October 31, 2022.

Note: Each individually fenced area is labeled according to an identifying letter assigned during development.

4.3 Carcass Persistence Trials

Ninety carcass persistence trials were placed during the study, with 34 (18 large birds, 16 small birds) placed in spring, 32 (16 large birds, 16 small birds) placed in summer, and 24 (12 large birds, 12 small birds) placed in fall. The selected model for large birds had a lognormal-distribution with a location parameter that varied by season, and no covariates (intercept-only) for the scale parameter, suggesting that median carcass persistence varied by season for large birds (Appendix A). The selected model for small birds had a log-logistic distribution with no covariates, which suggests carcass persistence did not vary by season for small birds (Appendix A).

The estimated median persistence time for large birds was 1.5 days in the spring, 15.2 days in the summer, and 22.4 days in the fall. Estimated median persistence time for small birds was 6.5 days across all seasons. The average probability of persistence as a function of days since placement is provided in Figure 6.

Scavenging or removal was captured on camera for 47 (52.2%) of the carcass persistence trials. The most common scavenger observed at the Project was striped skunk (*Mephitis mephitis*; 59.6% of trials where a scavenger was observed) followed by red fox (*Vulpes vulpes*; 14.9%; Table 4). Other scavengers observed included domestic cat (*Felis catus*), raccoon (*Procyon lotor*), northern harrier (*Circus hudsonius*), Virginia opossum (*Didelphis virginiana*), house fly (*Musca domestica*), an unidentified mouse, an unidentified bird, and an unidentified small carnivore.

Table 4. Scavenger species documented during carcass persistence trials at the Badger Hollow Solar Farm, Iowa County, Wisconsin, March 15 – October 31, 2022.

Scavenger	# of trials where scavenging was observed	# of trials with removal observed	% of trials where scavenging was observed*
striped skunk	28	15	59.6
red fox	7	3	14.9
domestic cat	3	3	6.4
raccoon	3	1	6.4
American crow	1	1	2.1
house fly	1	0	2.1
Virginia opossum	1	0	2.1
unidentified bird	1	1	2.1
unidentified mouse	1	0	2.1
unidentified small carnivore	1	0	2.1
Overall	**47**	**24**	**100**

* "Trials" is the number of trials in which a scavenger was observed on camera, which was 47 of the 90 trials.

= number; % = percent.

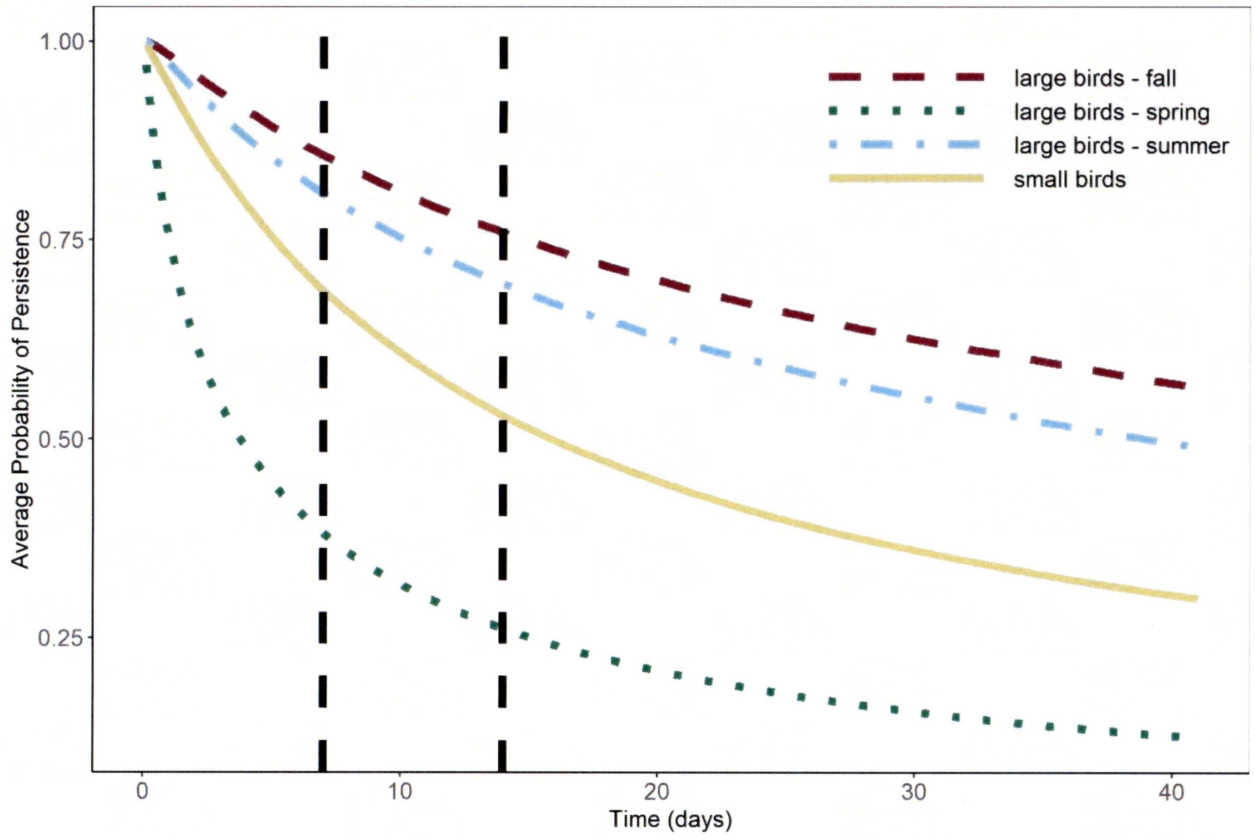

Figure 6. Average probability of persistence for large and small bird carcasses as a function of days since placement and season at Phase 1 of the Badger Hollow Solar Farm, Iowa County, Wisconsin, March 15 – October 31, 2022.

Note: The vertical lines represent the 7 and 14-day search intervals used in this study.

4.4 Estimated Fatality Rates

The estimated fatality rate per acre covered by PV panels was 0.37 birds (90% CI: 0.18–0.65) for the study period. The correction factors used to estimate the fatality rates are presented in Appendix B.

4.5 Comparison Between Projects

No water obligates were recorded at either Project. Twenty-four avian detections representing 12 identifiable species were found at Two Creeks during the study, including ten found incidentally outside survey plots. The composition of water associates varied between Projects; water associates accounted for two detections (11.7%; one unidentified duck feather spot found during surveys and one mallard feather spot found incidentally) at the Project and 50% of detections at Two Creeks (12 of 24; nine found during surveys and three found incidentally). No spatial patterns were evident at either Project. The majority of detections (58.3%; 14 of 24) at Two Creeks were recorded in the spring, while no temporal patterns were recorded at Badger Hollow. Estimated fatality rates for both projects were less than one bird per ac. The full results of PCM at Two Creeks are presented in Rodriguez et al. 2023.

5 CONCLUSIONS

Seventeen detections were recorded across 617 carcass searches. No water obligates were recorded at the Project. The feather spots of two water associates, an unidentified duck and a mallard, were recorded during surveys and incidentally, respectively. No evidence of panel collision was observed and the cause of death for all detections was unknown. No spatial or temporal patterns were recorded across the study.

6 REFERENCES

Barrientos, R., R. C. Martins, F. Ascensão, M. D'Amico, F. Moreira, and L. Borda-de-Água. 2018. A Review of Searcher Efficiency and Carcass Persistence in Infrastructure-Driven Mortality Assessment Studies. Biological Conservation 222: 146-153.

Burnham, K. P. and D. R. Anderson. 2002. Model Selection and Multimodel Inference: A Practical Information-Theoretic Approach. Second Edition. Springer, New York, New York.

Dalthorp, D. H., J. Simonis, L. Madsen, M. M. Huso, P. Rabie, J. M. Mintz, R. Wolpert, J. Studyvin, and F. Korner-Nievergelt. 2018. Generalized Mortality Estimator (GenEst) - R Code & GUI. US Geological Survey (USGS) Software Release. Available online: https://www.usgs.gov/software/genest-a-generalized-estimator-mortality

Delta Waterfowl. 2021. USFWS Report: U.S. Waterfowler Numbers, Duck & Goose Harvest Increased in 2020-2021. September 14th, 2021. Accessed January 2023. Available online: https://deltawaterfowl.org/waterfowl-numbers-up/

Derby, C., K. Chodachek, K. Bay, and A. Merrill. 2010. Post-Construction Fatality Surveys for the Elm Creek Wind Project: March 2009- February 2010. Prepared for Iberdrola Renewables, Inc. (IRI), Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota.

Derby, C., K. Chodachek, and M. Sonnenberg. 2012. Post-Construction Fatality Surveys for the Elm Creek II Wind Project. Iberdrola Renewables: March 2011-February 2012. Prepared for Iberdrola Renewables, LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Bismarck, North Dakota. October 8, 2012.

eBird. 2023. Bird Observations, Iowa; Jan-Dec, 2013-2023. Accessed January 2023. Available online: https://ebird.org/barchart?byr=2013&eyr=2023&bmo=1&emo=12&r=US-WI-049

Electric Power Research Institute (EPRI). 2021. Issues of Background Mortality in Studies of Infrastructure-Caused Mortality. 2021 Technical Update. No. 3002021566. Final Report. EPRI, Palo Alto, California. September 2021. Available online: https://www.epri.com/research/products/000000003002021566

Esri. 2023. World Imagery and Aerial Photos (World Topo). ArcGIS Resource Center. Environmental Systems Research Institute (Esri), producers of ArcGIS software, Redlands, California. Accessed January 2023. Available online: https://www.arcgis.com/home/webmap/viewer.html?useExisting=1&layers=10df2279f9684e4a9f6a7f08febac2a9

Fagen Engineering, LLC. 2014. 2013 Avian and Bat Monitoring Annual Report: Big Blue Wind Farm, Blue Earth, Minnesota. Prepared for Big Blue Wind Farm. Prepared by Fagen Engineering, LLC. May 2014.

Fagen Engineering, LLC. 2015. 2014 Avian and Bat Monitoring Annual Report: Big Blue Wind Farm, Blue Earth, Minnesota. Prepared for Big Blue Wind Farm. Prepared by Fagen Engineering, LLC.

Gruver, J., M. Sonnenberg, K. Bay, and W. Erickson. 2009. Post-Construction Bat and Bird Fatality Study at the Blue Sky Green Field Wind Energy Center, Fond Du Lac County, Wisconsin July 21 – October 31, 2008 and March 15 - June 4, 2009. Unpublished report prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. December 17, 2009.

H. T. Harvey & Associates. 2015. California Valley Solar Ranch Project Avian and Bat Protection Plan Final Post-construction Fatality Report. Prepared for HPR II, LLC, California Valley Solar Ranch, Santa Margarita, California. Prepared by H.T. Harvey and Associates. Project # 3326-03. March 4, 2015.

Huso, M., D. Dalthorp, and F. Korner-Nievergelt. 2017. Statistical Principles of Post-Construction Fatality Monitoring Design. *In:* M. Perrow, ed. Wildlife and Wind Farms, Conflicts and Solutions. Pelagic Publishing, Exeter, United Kingdom. Vol. 2, Onshore: Monitoring and Mitigation.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, and D. A. Shepherd. 2000. Final Report: Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-Year Study. Final report prepared for Northern States Power Company, Minneapolis, Minnesota, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. September 22, 2000. 212 pp.

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, US Fish and Wildlife Service (USFWS), Ashland, Oregon. April 2014. 28 pp.

Kalbfleisch, J. D. and R. L. Prentice. 2002. The Statistical Analysis of Failure Time Data. John Wiley & Sons, Hoboken, New Jersey.

Kerlinger, P. 2000. Avian Mortality at Communication Towers: A Review of the Recent Literature, Research, and Methodology. US Fish and Wildlife Service, Office of Migratory Bird Management. March 2000.

Kerlinger, P., J. Guarnaccia, R. Curry, and C. J. Vogel. 2014. Bird and Bat Fatality Study, Heritage Garden I Wind Farm, Delta County, Michigan: 2012-2014. Prepared for Heritage Sustainable Energy, LLC. Prepared by Curry and Kerlinger, LLC, McLean, Virginia. November 2014.

Korner-Nievergelt, F., P. Korner-Nievergelt, O. Behr, I. Niermann, R. Brinkmann, and B. Hellriegel. 2011. A New Method to Determine Bird and Bat Fatality at Wind Energy Turbines from Carcass Searches. Wildlife Biology 17: 350-363. doi: 10.2981/10-121.

Kosciuch, K., D. Riser-Espinoza, M. Gerringer, and W. Erickson. 2020. A Summary of Bird Mortality at Photovoltaic Utility Scale Solar Facilities in the Southwestern U.S. PLoS ONE 15(4): e0232034. doi: 10.1371/journal.pone.0232034.

Kosciuch, K., D. Riser-Espinoza, C. Moqtaderi, and W. Erickson. 2021. Aquatic Habitat Bird Occurrences at Photovoltaic Solar Energy Development in Southern California, USA. Diversity 13(11): 524. doi: 10.3390/d13110524.

Kosciuch, K., D. Riser-Espinoza, K. Russell, J. Sullivan, and N. Bartok. 2022. Alberta Regional Solar Fatality Analysis. Prepared for Foothills Solar Limited Partnership, Vancouver, British Columbia. Prepared by Western EcoSystems Technology, Inc. (WEST), Calgary, Alberta. August 3, 2022.

Longcore, T., C. Rich, P. Mineau, B. MacDonald, D. G. Bert, L. M. Sullivan, E. Mutrie, S. A. Gauthreaux, Jr., M. L. Avery, R. L. Crawford, A. M. Manville, II, E. R. Travis, and D. Drake. 2012. An Estimate of Avian Mortality at Communication Towers in the United States and Canada. PLoS ONE 7(4): e34025. doi: 10.1371/journal.pone.0034025.

Longcore, T., C. Rich, P. Mineau, B. MacDonald, D. G. Bert, L. M. Sullivan, E. Mutrie, S. A. Gauthreaux, Jr., M. L. Avery, R. L. Crawford, A. M. Manville, II, E. R. Travis, and D. Drake. 2013. Avian Mortality at Communication Towers in the United States and Canada: Which Species, How Many, and Where? Biological Conservation 158: 410-419. doi: 10.1016/j.biocon.2012.09.019.

Manville, A. 2000. Avian Mortality at Communication Towers: Background and Overview. In: W. R. Evans and A. M. Manville, II, eds. Proceedings of the Workshop on Avian Mortality at Communication Towers; 1-5.

Multi-Resolution Land Characteristics (MRLC). 2019. National Land Cover Database (NLCD) 2016. Multi-Resolution Land Characteristics (MRLC) Consortium. US Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center, MRLC Project, Sioux Falls, South Dakota. May 10, 2019. Available online: https://www.mrlc.gov/data

Rabie, P. A., D. Riser-Espinoza, J. Studyvin, D. Dalthorp, and M. Huso. 2021. AWWI Technical Report: Performance of the Genest Mortality Estimator Compared to the Huso and Shoenfeld Estimators. Washington, D.C. March 10, 2021. Available online: https://awwi.org/resources/genest/

Rodriguez, M., A. Ciecka, and D. Riser-Espinoza. 2021. Detection-dog Pilot Study, Grand Ridge Solar Farm, LaSalle County, Illinois. Draft Report. Prepared for Invenergy Services LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Bloomington, Indiana. October 1, 2021. 11 pages.

Rodriguez, M., D. Riser-Espinoza, W. Erickson, and M. Tuma. 2023. Post-Construction Monitoring at the Two Creeks Solar Project, Manitowoc County, Wisconsin. Draft Report: March 15 – October 31, 2022. Prepared for WEC Energy Group, Milwaukee, Wisconsin. Prepared by Western EcoSystems Technology, Inc. (WEST). Bloomington, Indiana. March 1, 2023.

Simonis, J., D. H. Dalthorp, M. M. Huso, J. M. Mintz, L. Madsen, P. Rabie, and J. Studyvin. 2018. Genest User Guide—Software for a Generalized Estimator of Mortality. US Geological Survey Techniques and Methods, Volume 7, Chapter C19, 72 pp. doi: 10.3133/tm7C19. Available online: https://pubs.usgs.gov/tm/7c19/tm7c19.pdf

Smallwood, K. S. 2007. Estimating Wind Turbine-Caused Bird Mortality. Journal of Wildlife Management 71: 2781-2791.

Smallwood, K. S., D. A. Bell, S. A. Snyder, and J. E. DiDonato. 2010. Novel Scavenger Removal Trials Increase Wind Turbine-Caused Avian Fatality Estimates. Journal of Wildlife Management 74: 1089-1097. doi: 10.2193/2009-266.

Western EcoSystems Technology, Inc. (WEST). 2017. Avian and Bat Monitoring at the Desert Sunlight Solar Farm Project Riverside County, California, 2015 - 2016 Annual Report. Prepared for Desert Sunlight 250, LLC and Desert Sunlight 300, LLC, Juno Beach, Florida. Prepared by WEST, Cheyenne, Wyoming.

Western EcoSystems Technology, Inc. (WEST). 2018a. Avian and Bat Monitoring at the Desert Sunlight Solar Farm Project Riverside County, California, 2016 - 2017 Annual Report. Prepared for Desert Sunlight 250, LLC and Desert Sunlight 300, LLC, Juno Beach, Florida. Prepared by WEST, Cheyenne, Wyoming.

Western EcoSystems Technology, Inc. (WEST). 2018b. Post-Construction Monitoring at the Blythe Solar Power Project, Riverside County, California, 2016 - 2017 Annual Report. Prepared for Blythe Solar Energy Center, LLC, 700 Universe Blvd., Juno Beach, Florida. Prepared by WEST, Cheyenne, Wyoming.

Yang, L., S. Jin, P. Danielson, C. Homer, L. Gass, S. M. Bender, A. Case, C. Costello, J. Dewitz, J. Fry, M. Funk, B. Granneman, G. C. Liknes, M. Rigge, and G. Xian. 2018. A New Generation of the United States National Land Cover Database: Requirements, Research Priorities, Design, and Implementation Strategies. ISPRS Journal of Photogrammetry and Remote Sensing 146: 108-123. doi: 10.1016/j.isprsjprs.2018.09.006.

Appendix A. Searcher Efficiency and Carcass Persistence Model Fitting Results for Phase 1 of the Badger Hollow Solar Farm, Iowa County, Wisconsin, from March 15 – October 31, 2022

Appendix A1. Searcher efficiency models for each size class fit to searcher efficiency trial data collected at Phase 1 of the Badger Hollow Solar Farm, Iowa County, Wisconsin, March 15 – October 31, 2022.

Model	Covariates	AICc	ΔAICc
Large Birds	No Covariates	83.84	0*
	Season	84.87	1.03
Small Birds	No Covariates	67.26	0*
	Season	69.63	2.37

*Selected model.

AICc= Akaike Information Criteria; ΔAICc=change in Akaike Information Criteria.

Appendix A2. Top carcass persistence models for each size class fit to carcass persistence data collected at Phase 1 of the Badger Hollow Solar Farm, Iowa County, Wisconsin, March 15 – October 31, 2022.

Model	Location Covariates	Scale Covariates	Distribution	AICc	ΔAICc
Large Bird	Season	No Covariates	lognormal	166.66	0*
	Season	Season	lognormal	167.59	0.93
	Season	No Covariates	log-logistic	168.15	1.49
	Season	No Covariates	Weibull	168.51	1.85
	Season	Season	log-logistic	169.35	2.69
	Season	Season	Weibull	172.58	5.92
	Season	-	exponential	174.83	8.17
	No Covariates	No Covariates	lognormal	178.43	11.77
	No Covariates	Season	lognormal	178.55	11.89
	No Covariates	No Covariates	log-logistic	179.46	12.80
	No Covariates	Season	log-logistic	179.56	12.90
	No Covariates	No Covariates	Weibull	184.28	17.62
	No Covariates	Season	Weibull	188.88	22.22
	No Covariates	-	exponential	204.03	37.37
Small Bird	No Covariates	No Covariates	log-logistic	194.23	0*
	No Covariates	No Covariates	lognormal	194.91	0.68
	No Covariates	No Covariates	Weibull	195.95	1.72
	Season	No Covariates	log-logistic	196.99	2.76
	Season	No Covariates	lognormal	197.53	3.30
	No Covariates	-	exponential	197.68	3.45
	No Covariates	Season	log-logistic	198.50	4.27
	Season	No Covariates	Weibull	198.60	4.37
	No Covariates	Season	lognormal	199.21	4.98
	Season	-	exponential	199.53	5.30
	No Covariates	Season	Weibull	200.14	5.91
	Season	Season	log-logistic	201.49	7.26
	Season	Season	lognormal	201.92	7.69
	Season	Season	Weibull	203.01	8.78

* Selected model.

AICc= Akaike Information Criteria; ΔAICc=change in Akaike Information Criteria.

Appendix A3. Carcass persistence top models with covariates, distributions, and model parameters for the Badger Hollow Solar Farm, Iowa County, Wisconsin, from March 15 – October 31, 2022.

Size Class	Season	Distribution	Predicted Median Removal Times (days)	Parameter 1	Parameter 2
Large bird	fall	lognormal*	22.4	meanlog = 3.107	sdlog = 1.788
Large bird	spring	lognormal*	1.5	meanlog = 0.381	sdlog = 1.788
Large bird	summer	lognormal*	15.2	meanlog = 2.724	sdlog = 1.788
Small bird	all	log-logistic**	6.5	shape = 0.903	scale = 1.867

* Parameterization follows the base R parameterization for this distribution.

** Parameterization follows the FAdist parameterization for this distribution.

Appendix B. Correction adjustment factors for studies conducted at the Badger Hollow Solar Farm, Iowa County, Wisconsin, from March 15 – October 31, 2022.

Appendix B. Estimated adjustment factors, with 90% confidence intervals (CI) for fatality estimates at Phase 1 of the Badger Hollow Solar Farm, Iowa County, Wisconsin, from March 15 – October 31, 2022.

	Spring		Summer		Fall	
	Estimate	**90% CI**	**Estimate**	**90% CI**	**Estimate**	**90% CI**
Searcher Efficiency						
Large Bird	0.51	0.40 - 0.61	0.51	0.40 - 0.61	0.51	0.40 - 0.61
Small Bird	0.23	0.16 - 0.33	0.23	0.16 - 0.33	0.23	0.16 - 0.33
Average Probability of a Carcass Persisting Through the Search Interval*						
Large Bird	0.38	0.25 - 0.52	0.70	0.53 - 0.83	0.86	0.71 - 0.94
Small Bird	0.69	0.59 - 0.78	0.53	0.45 - 0.62	0.69	0.59 - 0.79
Probability of Available and Detected						
Large Bird	0.20	0.11 - 0.31	0.53	0.38 - 0.66	0.57	0.42 - 0.71
Small Bird	0.21	0.13 - 0.30	0.21	0.13 - 0.30	0.21	0.13 - 0.30

*The search interval was twice per month in summer and weekly in spring and fall.

From: Mueller, Elisha K.
To: Holven, Adam
Cc: Link, Greg W.; Kreft, Bruce L.; Christina Martens; Gorman, Kim; McGinnis, Katie
Subject: RE: Flickertail Solar
Date: Wednesday, January 3, 2024 12:53:11 PM
Attachments: image002.png
image003.png
image004.png
image005.png
image006.png

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That works... Let me know if you would like to me to check on conference room availability (if you plan to meet in person).

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Tuesday, January 2, 2024 5:08 PM
To: Mueller, Elisha K. <ekmueller@nd.gov>
Cc: Link, Greg W. <glink@nd.gov>; Kreft, Bruce L. <bkreft@nd.gov>; Christina Martens <cmartens@savionenergy.com>; Gorman, Kim <Kim.Gorman@tetratech.com>; McGinnis, Katie <KATIE.MCGINNIS@tetratech.com>
Subject: RE: Flickertail Solar

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Happy New Year Elisha,

We would like to schedule a call for January 30th at 2:00 pm CDT. Please let me know if that still works for you and your staff.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | **www.tetratech.com**
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From: Mueller, Elisha K. <ekmueller@nd.gov>
Sent: Friday, December 22, 2023 8:32 AM
To: Holven, Adam <adam.holven@tetratech.com>
Cc: Link, Greg W. <glink@nd.gov>; Kreft, Bruce L. <bkreft@nd.gov>; Christina Martens <cmartens@savionenergy.com>; Gorman, Kim <Kim.Gorman@tetratech.com>; McGinnis, Katie <KATIE.MCGINNIS@tetratech.com>
Subject: RE: Flickertail Solar

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Hi Adam,

We could do the afternoon of the 24th or 25th or anytime on the 30th or 31st.

Elisha

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Thursday, December 21, 2023 4:18 PM
To: Mueller, Elisha K. <ekmueller@nd.gov>
Cc: Link, Greg W. <glink@nd.gov>; Kreft, Bruce L. <bkreft@nd.gov>; Christina Martens <cmartens@savionenergy.com>; Gorman, Kim <Kim.Gorman@tetratech.com>; McGinnis, Katie <KATIE.MCGINNIS@tetratech.com>
Subject: RE: Flickertail Solar

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Hi Elisha,

I hope your week is going well. Would your team be open to a meeting in mid- to late January (week Jan 22 or Jan 29)?

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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From: Holven, Adam
Sent: Thursday, December 14, 2023 4:04 PM
To: Mueller, Elisha K. <ekmueller@nd.gov>
Cc: Link, Greg W. <glink@nd.gov>; Kreft, Bruce L. <bkreft@nd.gov>; Christina Martens <cmartens@savionenergy.com>; Gorman, Kim <Kim.Gorman@tetratech.com>
Subject: RE: Flickertail Solar

Hi Elisha,

Thank you for your agency's response. We would like to have call to discuss the items outlined in the letter. Would you and staff have availability in mid- to late January (week Jan 22 or Jan 29)?

I would like to try to have USFWS join the call so we can fully understand both agencies' concerns. Please let me know if you would have any concerns with USFWS participating.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager

Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

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From: Mueller, Elisha K. <ekmueller@nd.gov>
Sent: Thursday, December 14, 2023 3:34 PM
To: Holven, Adam <adam.holven@tetratech.com>
Cc: Link, Greg W. <glink@nd.gov>; Kreft, Bruce L. <bkreft@nd.gov>
Subject: Flickertail Solar

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From:	Mueller, Elisha K.
To:	Holven, Adam
Cc:	Link, Greg W.; Kreft, Bruce L.
Subject:	Flickertail Solar
Date:	Thursday, December 14, 2023 3:34:17 PM
Attachments:	image002.png image003.png image004.png image005.png image006.png Flickertail Solar Guidance Letter1214.pdf

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Hi Adam,

Attached is The North Dakota Game and Fish Department's comments on the proposed Flickertail Solar Project. Please feel free to reach out if you have any questions.

Elisha Mueller
Conservation Biologist

(701) 328-6348 • ekmueller@nd.gov • gf.nd.gov



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December 14, 2023

Adam Holven
Tetra Tech, Inc
2001 Killebrew Drive, Suite 141
Bloomington, MN 55425

RE: Proposed Flickertail Solar Project, Richland County, ND.

Dear A. Holven:

Thank you for meeting with the North Dakota Game and Fish Department (Department) to introduce the proposed Flickertail Solar Project (Project), a 300 MW solar facility requiring approximately 2,500 acres. We appreciate the coordination and opportunity to provide recommendations and feedback.

The Project is a unique case, as it is one of the first solar projects to be introduced in North Dakota. There is much uncertainty of the risk solar projects pose to wildlife of the Great Plains, as much of the research focused on solar/wildlife interactions has taken place in the desert southwest. North Dakota hosts many rare and declining species, during migration and year-round, such as the Whooping Crane, the Northern Long Eared Bat, and our state bird, the Western Meadowlark. It is quite difficult to minimize risk, when so little about the risk is known. In the absence of state specific guidelines or best management practices, general recommendations can be made to avoid/minimize impacts based on the best science available at the time.

1. Site Selection
    a. Adhere to criteria laid out in 69-06-08-01 of the North Dakota Administrative Code, which specifies areas of exclusion and avoidance for energy conversion facilities (https://www.ndlegis.gov/information/acdata/pdf/69-06-08.pdf).
    b. Select a site with minimal risk to wildlife. Refer to Figure B11, Key Native Wildlife and Habitat Areas, in *Wind Energy Development in North Dakota – Best Management Practices*, to assess the potential risk of the site selected (https://gf.nd.gov/node/4800).
    c. Avoid areas of unstable land surfaces such as slopes and areas prone to erosion.
    d. Avoid state or federally owned/operated land (including, but not limited to, Wildlife Management Areas, Private Land Open To Sportsmen, National Wildlife Refuges, etc.)
2. Micro-sitting
    a. Habitat loss:
        i. Focus on avoidance: micro-sitting sites away from native/unbroken habitat (grasslands, woodlands, and wetlands), before moving to mitigation strategies. Impacts to rare, unique, and declining species will be much greater if the habitat they depend on is disturbed or lost.

ii. Avoid installing new drain tile systems that may drain or hinder replenishment of adjacent wetlands or that flood adjacent wetlands during drastic precipitation events.

b. Habitat fragmentation:
   i. Consolidate all facilities and roads to the extent possible as to reduce habitat fragmentation.

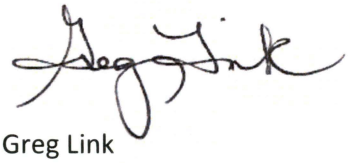
c. Threatened and Endangered species
   i. Coordinate with the US Fish and Wildlife Service to assess and minimize risk to species listed under the Endangered Species Act.

3. Storm Water Management
   a. The Department recommend a storm water management plan be put into place and the developer should work closely with the Department of Environmental Quality on any required permits or pollution prevention plans.
4. Pre-construction Monitoring
   a. The Department recommends the developer consult *Wind Energy Development in North Dakota – Best Management Practices* for a list of applicable monitoring protocols to be done prior to construction. This will allow for a better understanding of the site's use by rare, unique, and declining species and, therefore, the risk.
5. Construction
   a. Wildlife safe fencing should be used, and efforts should be taken to ensure wildlife is not trapped within the facility, such as constructing structures installed to allow animals to escape or checking for entrapped animals routinely.
   b. Any lighting installed should be designed to minimize light pollution and initiatives that aim to reduce impacts to wildlife should be considered.
   c. A plan for managing noxious weeds should be created and approved by the local weed board/s.
   d. Wildlife friendly plantings should be utilized to the extent possible (I.e. native wildflower and grass seed mixes over non-native mixes and natural hedgerows versus fencing).
6. Post-construction Monitoring
   a. A minimum of 2 years post-construction fatality monitoring should be completed.
7. Pollinator Opportunities
   a. Solar farms offer a unique opportunity to incorporate pollinator habitat to energy development. The Bee & Butterfly Habitat Fund offers cost share opportunities for seed and monitoring for solar projects. We recommended investigating this opportunity further, as it may be a good fit for this project. https://www.beeandbutterflyfund.org/solar.html
8. Voluntary Offsets
   a. It is recommended that when impacts to unbroken grasslands, wetlands, and woodlands cannot be avoided, suitable replacements be applied back onto the landscape. Ensuring these habitats remain on the landscape is the only way to stem the decline of our state's rare and sensitive species and prevent listings through the Endangered Species Act, which could impact both the state and its citizens. The Department recommends that any acre of habitat broken due to development be replaced at a 1:1 ratio. For example, if 100 acres of native grasslands are going to be developed for solar energy, 100 acres of grasslands should be planted within the county to offset that impact. These plantings should also be protected for the life of the project.

As the project moves forward, the Department requests to remain informed. To accurately analyze the project and provide valuable feedback to the Public Service Commission, it is important that the Department receives all documents, including wildlife surveys, spatial data, and any voluntary offsets being proposed 100 days prior to the hearing date.

Thank you for the opportunity to comment on the proposed project.

Sincerely,



Greg Link
Chief, Conservation and Communications Division

Cc: Heidi Riddle, US Fish and Wildlife Service
ND Public Service Commission

Governor Doug Burgum | Director Jeb Williams | Deputy Director Scott A. Peterson

100 North Bismarck Expressway | Bismarck ND, 58504-5095 | (701) 328-6300 | Fax: (701) 328-6352

North Dakota Geological Survey

Holven, Adam

From: Anderson, Fred J. <fjanderson@nd.gov>
Sent: Wednesday, October 25, 2023 9:30 AM
To: Holven, Adam
Subject: N.D. Geological Survey: Flickertail Solar Project Comments

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Mr. Holven,

The North Dakota Geological Survey appreciates the notification and opportunity to review and provide comment on this proposed energy development project. The comment solicitation letter for the project, dated October 19, 2023, was reviewed by our office on October 25, 2023.

Regarding the proposed project we would offer the following general comments related to the shallow subsurface geology present at the proposed project site.

The areas outlined for the project are in the southern portion of the lake plain of the former Glacial Lake Agassiz. As such, shallow drilling records, which are sparse in this area, indicate that the site is likely underlain by offshore glacial lake sediments which can contain as much as 40-ft of soft glacial lake clay of the Argusville Formation, occurring at depths of around 20 to 30 feet. The soft clays of the Argusville Formation can make for difficult construction conditions for surface engineered works. These glacial lake sediments mantle subglacial till of the Goose River Formation and other similar glacial sediments down to shale bedrock at depths reaching approximately 300 feet.

Site-specific geotechnical engineering and materials testing in a manner consistent with the current standard-of-care for similar construction projects in the Red River Valley would be recommended given the scope and extent of this project.

Please feel free to contact us at any time if there are any additional questions or comments.

Regards,

Fred J. Anderson
Geologist, North Dakota Geological Survey

701.328.8000 (Survey Main Office) • 701.328.8037 (Office Direct) • fjanderson@nd.gov • www.dmr.nd.gov/ndgs

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701.328.8020 (Front Office) • oilandgasinfo@nd.gov • www.dmr.nd.gov • 600 E Boulevard Ave, Dept. 405 • Bismarck, ND 58505

North Dakota Parks and Recreation Department

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November 16, 2023

Adam Holven
Tetra Tech, Inc
2001 Killebrew Drive, Suite 141
Bloomington, MN 55425

Re: Flickertail Solar Project

Dear Adam,

The North Dakota Parks and Recreation Department (NDPRD) has reviewed the above-proposed Flickertail Solar project in Richland County, North Dakota.

NDPRD's scope of authority and expertise covers properties that NDPRD owns, leases, or manages; properties protected under Section 6(f) of the Land and Water Conservation Fund (LWCF); rare plants; and ecological communities established through the Natural Heritage Program.

The project does not appear to affect properties NDPRD owns, leases, or manages.
The projects does not appear to affect properties protected under Section 6(f) of the LWCF.

A North Dakota Natural Heritage biological conservation database query determines if any current or historical plant or animal species of concern or other significant ecological communities are known to occur within an approximate one-mile radius of the project area. Based on this review, no known plant and animal species of concern or significant ecological communities are documented within or immediately adjacent to the project site.

We appreciate your commitment to rare plant, animal, and ecological community conservation, management, and inter-agency cooperation. For additional information, contact Natural Resources Division Chief Kathy Duttenhefner at 701-328-5370, 701-220-3377 (cell), or kgduttenhefner@nd.gov.

Thank you for the opportunity to comment on the proposed project.

Sincerely,
Kathy Duttenhefner
Kathy Duttenhefner, Chief Natural Resources Division

604 E Boulevard Ave Dept. 750 | Bismarck, ND 58505
PHONE: 701-328-5357 | FAX: 701-328-5363 | EMAIL: parkrec@nd.gov | WEBSITE: www.parkrec.nd.gov

North Dakota Soil Conservation Committee

From: Christina Martens
To: Nick Schuler
Cc: Holven, Adam
Subject: Fw: Flickertail solar project and State Soil Conservation Committee
Date: Monday, January 22, 2024 10:14:14 AM
Attachments: Outlook-Savion-Ene.png

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Please see the response below from the SSCC.

Christina Martens | Director of Permitting & Environmental
M: 816.266.6384 | Savion, LLC

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From: Delozier, Jodi <jodi.delozier@ndsu.edu>
Sent: Monday, January 22, 2024 11:07 AM
To: Christina Martens <cmartens@savionenergy.com>
Subject: Flickertail solar project and State Soil Conservation Committee

You don't often get email from jodi.delozier@ndsu.edu. Learn why this is important
[EXTERNAL MESSAGE] Please be mindful when clicking on links, opening attachments, and replying.

Good Morning Christina,

Thank you, again, for providing such detailed information on the Flickertail Solar Project. I did share the documents with the board which resulted in some interesting conversation. The Committee decided after reviewing the information that it was not necessary for you to attend our spring board meeting. They were pleased to see that Savion was coordinating with the local Weed Mgmt. board, Richland County Board of Commissioners, NRCS ,and Richland County SCD. If we have future questions, however, I will reach out to you.

Again, I appreciate your assistance on providing the Committee with a better understanding of the project.

Jodi

Jodi Delozier, Ph.D.
Extension Program Director and Specialist, Soil and Water Leadership Development
NORTH DAKOTA STATE UNIVERSITY

Morrill Hall, Room 307C
Dept. 7390, PO Box 6050
Fargo, ND 58108-6050
office: 701.231.1861/cell: 701.951.9904
jodi.delozier@ndsu.edu
Soil Conservation District Resources Google Drive

From:	Christina Martens
To:	Delozier, Jodi
Cc:	Nick Schuler; Bob Martin; Holven, Adam
Subject:	Re: State Soil Conservation Committee meeting - Flickertail solar project
Date:	Thursday, January 18, 2024 5:41:30 PM
Attachments:	image001.png Outlook-Savion-Ene.png Flickertail-Project Info_Soils_20240118.pdf

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Jodi,

I hope the weather is tolerable there. It has been a little rough here in MI the past week or so, but then again it was pretty mild until then. In preparation for your meeting tomorrow, I am providing you with a few informational pieces and links to more project information.

Attached, please find a PDF that has some general project information that was presented to the Abercrombie Township Board of Commissioners at the project public hearing this past November. This provides you with a little bit of information on Savion itself, the Flickertail Solar Project location and preliminary site plan, and how the project complies with the NDPSC requirements and the Abercrombie Township zoning requirements. We also have a project website (https://www.flickertailsolarproject.com/) that contains a lot of information about the project, the process, the CUP application that was submitted to the township, general solar information, and FAQs for solar and battery storage.

Here is a general description of the project and its environmental studies:
The project will be completing on-site field studies this spring for wetlands, threatened and endangered species, grasslands, tree surveys, Phase 1 ESA, cultural and architectural reviews, Geotech, and hydrology studies. Once all of this information has been compiled, we will update the site plan accordingly. We are also working on gathering all of this information to complete our application to the NDPSC now that we have our conditional use permit from Abercrombie Township.

As part of the application process to the NDPSC, they will seek feedback and comments from the agencies, so we also seek it in advance of the application to address any and all concerns or comments prior to formal application. The state's process also requires us to coordinate with the local Weed Management board and to have an approved vegetation management plan. We will also need to obtain all permits required for the construction of the project, such as soil erosion and sedimentation control, wetlands,

and any others needed. Knowing this, we have had preliminary discussions with Perry Miller (Richland County Board of Commissioners and Weed Board representative), the local Natural Resources Conservation Service (NRCS) USDA office, and the Richland Soil Conservation District (SCD) office. We will continue to coordinate with them on the vegetation management plan.

The vegetation management plan will include temporary and permanent seeding guidelines for site preparation, seed mixes, installation standards, and permanent management. It will also include noxious weed control with a focus on those that the weed board is most concerned about. Solar projects, in general, are considered to have a great benefit to the soil. It allows the soils to rest from traditional agricultural practices and provides biomass and nutrients through its permanent native ground cover. The permanent vegetation is chosen site-specific and will consist of a mixture of native grasses, forbs, and wildflowers. In addition, there will be some tree removal along some existing fence rows, but trees will be replaced in accordance with the state's requirements. All of the specific details have not been finalized as we need to wait for spring to conduct many of the filed surveys, but that information will guide our final plans.

As for your preliminary questions here are some thoughts:

- Should the SCD or SSCC get involved?
    - We plan to coordinate and ask for feedback and potential seed mix suggestions with both the local USDA and the Richland County SCD. We had a preliminary call with Jonathan Quast from the USDA; he also suggested including Jan Klostreich from the Richland SCD. In addition, we plan to also coordinate with the Richland County Weed Board. Between the 3 groups, we will make sure to get feedback and suggestions for the Vegetation Management Plan and the noxious weed control within that plan since this project plans to benefit soil conservation efforts.
- Do we need a lawyer?
    - I do not think that the SDC or the SSCC should need a lawyer for any reason. As we coordinate, if there was an issue that arose that we could not resolve, or you planned to intervene in the PSC process due to unsolved issues, you might want to consider it. I don't see this being an issue, and there should not be any legal agreements between the project and the SCD needed.
- Are there certain environmental/legal questions we should be asking the project lead?
    - If you or any of the committee members have any follow-up questions after

reviewing the information provided, please don't hesitate to reach out. The main project contacts are Nick Schuler, the Development Director, and myself; we are both on this email. In addition, I have also cc'd Adam Holven from Tetra Tech as they will be leading the environmental work and the application for us.

FAQ's

Here are a few of the soils related questions that are on the FAQ's. You can find the entire FAQ for both solar and battery storage on the project website.

- Vegetation management / weed control practices / pollinator perimeter?
    - Though it is standard industry practice to have a vegetation management plan in place to facilitate operation and maintenance of the project over the long-term it is also required by the Public Service Commission of North Dakota and requires local buy-in and approval. The project has worked with the township board to help determine who the contact is at the local level. Savion has already spoken with the local Natural Resources Conservation Service (NRCS) USDA office and the Richland Soil Conservation District (SCD) and are committing to a pollinator perimeter within the project fence. The NRSC and the SCD will be involved with selecting and creating seed mixes appropriate for the site and reviewing and approving the proposed vegetation management plan for the project.
- Is there any contamination/leakage from the solar modules that affects the soil, or ground water/water table?
    - Savion and Flickertail will only utilized tier 1 module manufactures that have undergone and passed the EPA's Toxicity Characteristic Leachate Procedure (TCLP) test. This EPA test is required prior to delivery of the panels, and Flickertail is committing to providing the township the results of those test prior to delivery. The test shows that there are no hazardous materials within or on the panels, so there is no concern of leakage from the panels into the soil or the ground water.
- Can chemicals that might be contained in solar PV threaten public drinking water systems and/or wetland resources?
    - All solar panels are contained in a solid matrix, are insoluble, and are enclosed. Therefore, releases are not a concern. (MA Department of Energy Resources, et al.) Rules are in place to ensure that ground-mounted solar arrays are installed in a way that protect public water supplies, wetlands, and other water resource areas.

Thank you for reaching out and I look forward to the opportunity to attend your spring meeting. In the meantime, do not hesitate to reach out to the team if you or any board member has any questions or concerns.

Christina Martens | Director of Permitting & Environmental
M: 816.266.6384 | Savion, LLC

SAVION
A RENEWABLE ENERGY COMPANY

FLICKERTAIL
SOLAR PROJECT

January 2024

North Dakota State Soil Conservation Committee

Flickertail Solar Project
General Project Information




SAVION INTRODUCTION

About Savion

Savion, a Shell Group portfolio company operating on a stand-alone basis, is an industry-leading solar and energy storage organization built on a foundation of specialized experience and mastery in the craft of development.

With a growing portfolio of more than 36.5 GW, Savion is currently one of the country's largest and most technologically advanced utility-scale solar and energy storage project development companies.

Savion's diverse team provides comprehensive services at each phase of renewable energy project development, from conception through construction. Savion is committed to helping decarbonize the energy grid by replacing electric power generation with renewable sources and delivering cost-competitive electricity to the marketplace.



About Us

FLICKERTAIL SOLAR PROJECT



Founded in 2019, the Savion team is comprised of utility-scale solar and energy storage development experts.



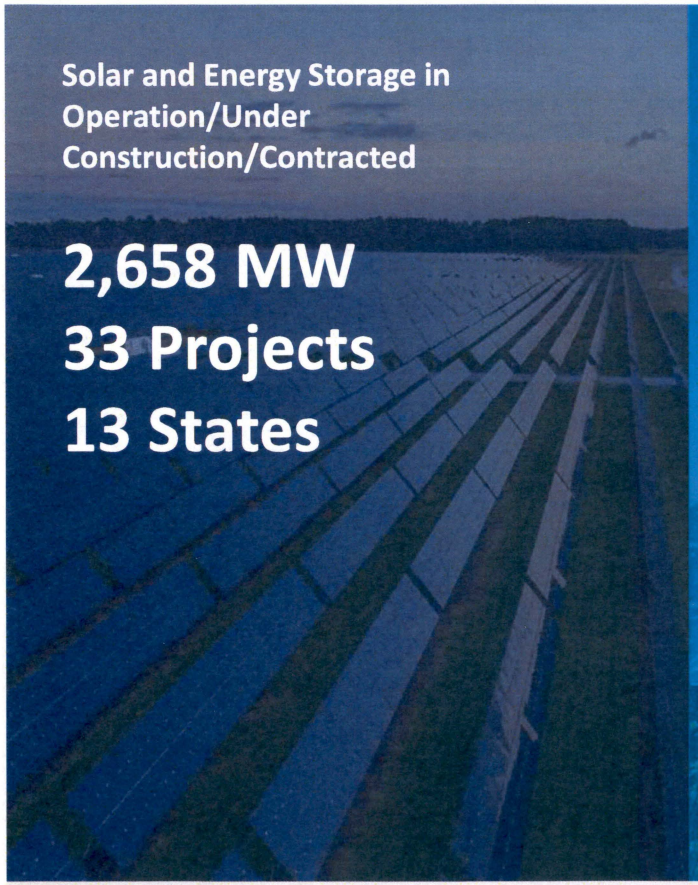
U.S. based company headquartered in Kansas City, MO, with projects in various phases across 33 states.



Over 190 employees providing comprehensive services at each phase of renewable energy project development.

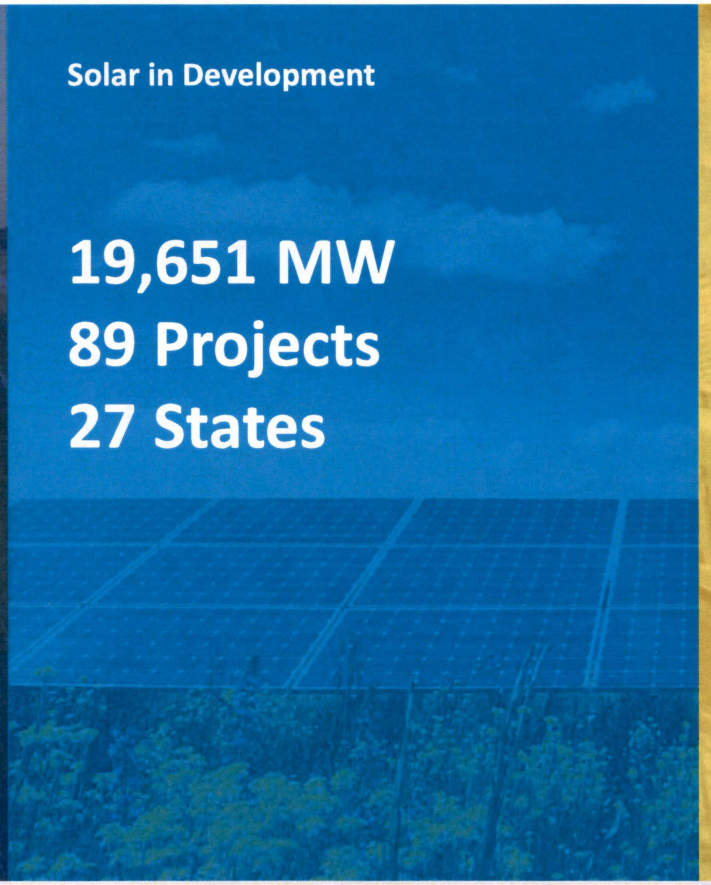
Projects Portfolio

FLICKERTAIL SOLAR PROJECT



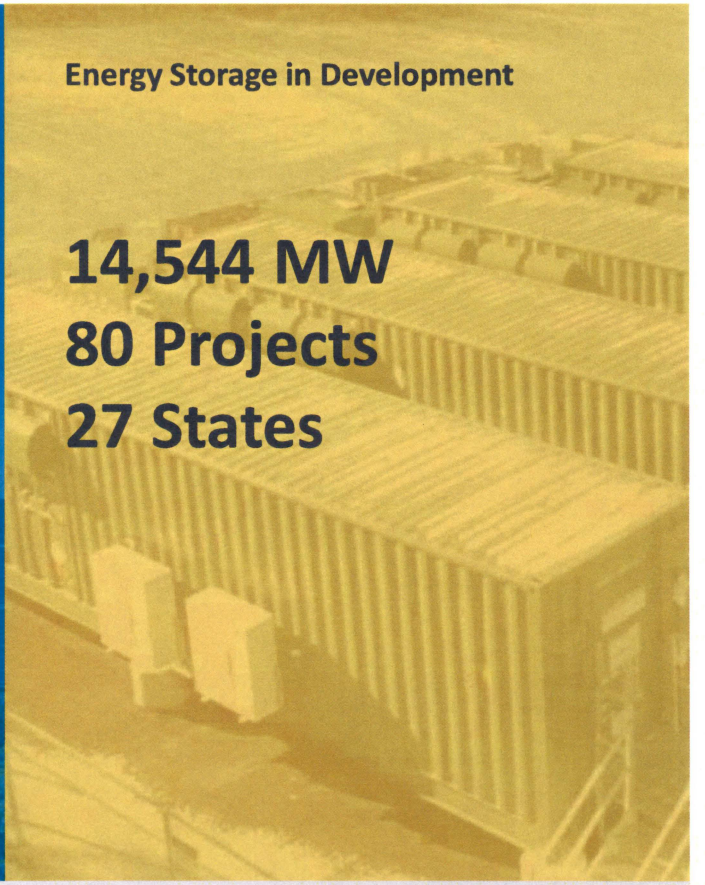
Solar and Energy Storage in Operation/Under Construction/Contracted

2,658 MW
33 Projects
13 States



Solar in Development

19,651 MW
89 Projects
27 States



Energy Storage in Development

14,544 MW
80 Projects
27 States


PROJECT OVERVIEW

Project Quick Facts

FLICKERTAIL SOLAR PROJECT

Up To 300 MW

2018
Start of development efforts

$300M+
Capital investment

Up To 300
Jobs during construction

~3,487.5
Acres under agreement

Q4 2027
Estimated commercial operation

~$23-25M
Production & Nameplate Taxes paid over the 35-year life of the Project

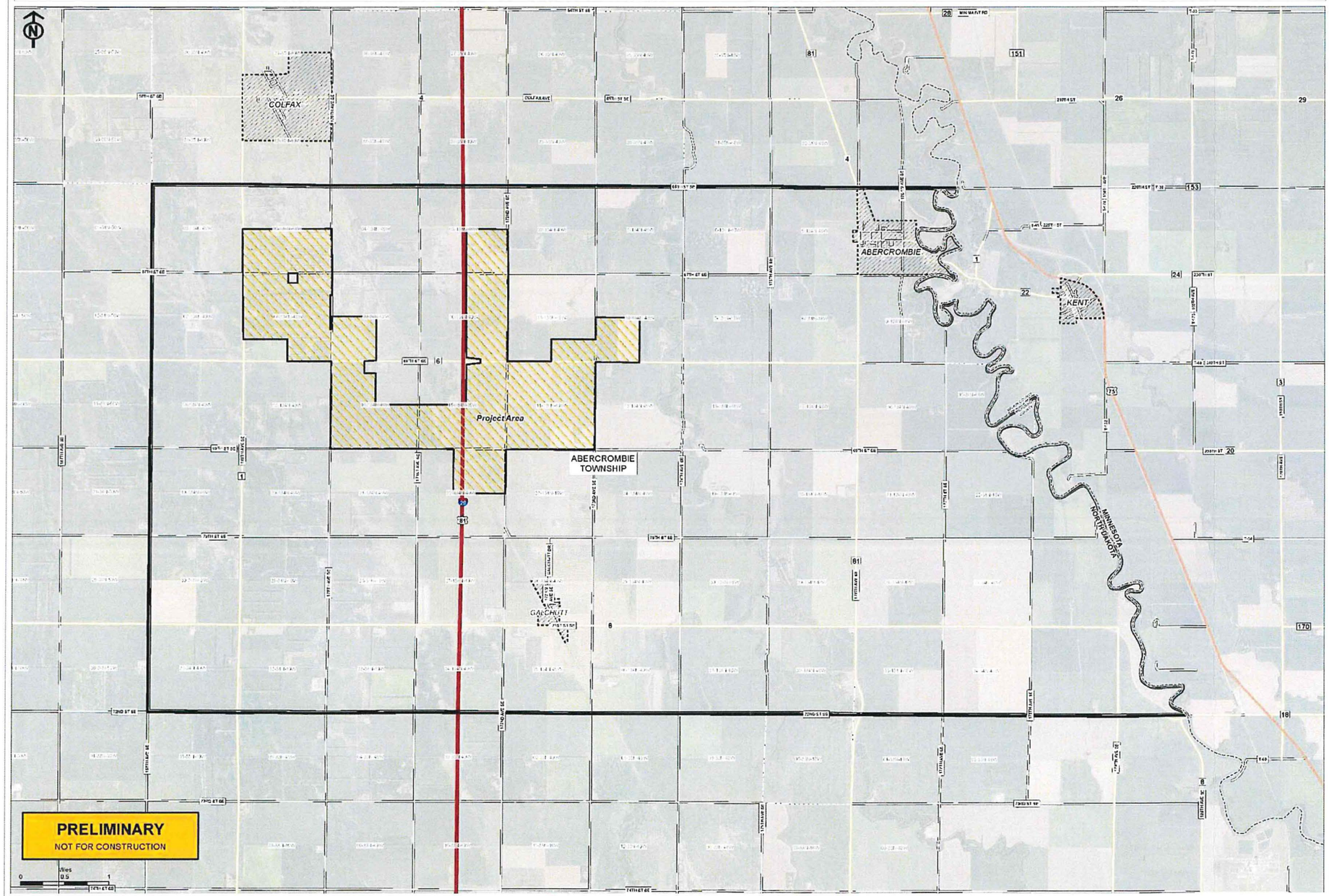
~50,900
North Dakota homes powered

35+
Years of operation


PROJECT LOCATION &
PRELIMINARY SITE PLAN

FLICKERTAIL SOLAR PROJECT

ABERCROMBIE TOWNSHIP | RICHLAND COUNTY, NORTH DAKOTA

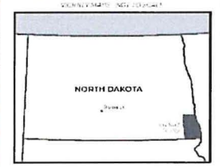


FLICKERTAIL SOLAR PROJECT, LLC

FIGURE 1 - SITE LOCATION MAP

- Project Area
- Interstate Highway
- US Highway
- County Highway
- Township Road
- State
- County
- Abercrombie Township
- City / Town
- Section

SAVION
A RENEWABLE ENERGY COMPANY





PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

FLICKERTAIL

SAVION, LLC

LINDSEY WEISMAN

6/30/2023

1 INCH : 2,500 FEET

FIGURE 1 - SITE LOCATION MAP (24 X 36)

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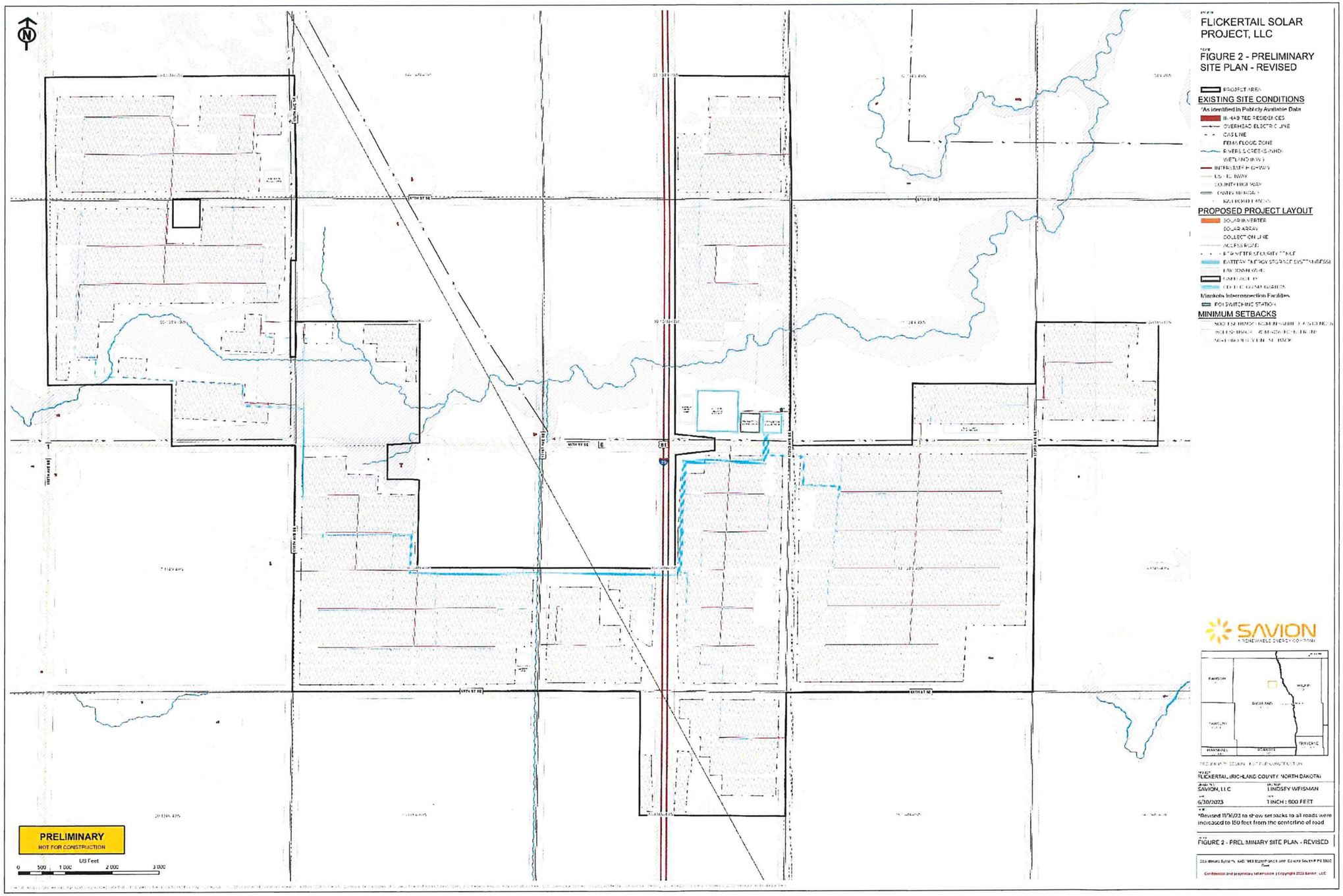

FLICKERTAIL SOLAR PROJECT, LLC
FIGURE 2 - PRELIMINARY SITE PLAN - REVISED
PROJECT AREA
EXISTING SITE CONDITIONS
*As identified in Publicly Available Data
IN-HABITED RESIDENCES
OVERHEAD ELECTRIC LINE
GAS LINE
FEMA FLOOD ZONE
RIVERS & CREEKS (NHD)
WETLAND (NWI)
INTERSTATE HIGHWAY
US HIGHWAY
COUNTY HIGHWAY
OWNS HIGHWAY
RAILROAD TRACKS
PROPOSED PROJECT LAYOUT
SOLAR INVERTER
SOLAR ARRAY
COLLECTION LINE
ACCESS ROAD
PERIMETER SECURITY FENCE
BATTERY ENERGY STORAGE SYSTEM (BESS)
LAYDOWN YARD
CAMP FACILITY
COLLECTION SUBSTATION
Minnkota Interconnection Facilities
POI SWITCHING STATION
MINIMUM SETBACKS
PRELIMINARY
NOT FOR CONSTRUCTION
US Feet
0 500 1,000 2,000 3,000
SAVION
A RENEWABLE ENERGY COMPANY
KANSON
RICHLAND
WILKIN
TRAVERSE
MARSHALL
ROBERTS
PRELIMINARY DESIGN - NOT FOR CONSTRUCTION
FLICKERTAIL (RICHLAND COUNTY, NORTH DAKOTA)
SAVION, LLC
LINDSEY WEISMAN
6/30/2023
1 INCH : 800 FEET
*Revised 11/16/23 to show setbacks to all roads were increased to 150 feet from the centerline of road
FIGURE 2 - PRELIMINARY SITE PLAN - REVISED
Coordinate System: NAD 1983 StatePlane North Dakota South FIPS 3302 Feet
Confidential and proprietary information | Copyright 2023 Savion, LLC

Compliance with Applicable Requirements

FLICKERTAIL SOLAR PROJECT

North Dakota PSC Setbacks & Voluntary Commitments

PSC Regulatory Setback Requirement	Project Commitment	Explanation
Areas within 1,200 feet of the geographic center of an ICBM launch facility or launch control facility	N/A	N/A
Areas within 30 feet (9.14 meters) on either side of a direct line between an ICBM launch facility and a missile alert or launch control facilities to avoid microwave interference	N/A	N/A
Areas within 500 feet of an inhabited rural residence*	Aboveground Project components, including fencing, will be located at least 500 feet from any inhabited rural residence, unless a waiver is obtained	N/A
Areas within 500 feet of an inhabited rural residence*	The BESS will be set back at least 1,320 feet (1/4 mile) from an inhabited rural residence, unless a waiver is obtained	As requested, Flickertail will apply a 1,320 (1/4-mile) setback for the BESS, unless waived

* As set forth in NDCC Section 49-22-05.1(3), the setback may be waived by the owner.

Compliance with Applicable Requirements

FLICKERTAIL SOLAR PROJECT

Abercrombie Township Setbacks & Voluntary Commitments

Township Ordinance Setback Requirement	Project Commitment	Explanation
All buildings and structures shall be placed at least 100 feet from county and state highway rights-of-way	Aboveground Project components, including fencing, will be set back at least 150 feet from the centerline of county roads and state highways	As requested, Flickertail will apply a 150-foot setback from the centerline of county roads and state highways
All buildings and structures shall be placed at least 75 feet from the township road rights-of-way	Aboveground Project components, including fencing, will be set back at least 150 feet from the centerline of township roads	As requested, Flickertail will apply a 150-foot setback from the centerline of township roads
Tree plantings and shelterbelts shall be planted 120 feet from center of N and W roads and 100 feet from the center of S and E roads	Tree planting and shelterbelts, including screening, will be set back at least 120 feet from the centerline of any road Any trees planted as part of the Project will be located outside of the Project fence and will be set back 120 feet from the centerline of a road	As requested, Flickertail will apply a 120-foot setback from the centerline of any road for tree plantings
The minimum front yard, measured from the front lot line, shall not be less than 75 feet for properties abutting township roads and 100 feet for properties fronting on other rights-of-ways	Aboveground Project components, including fencing, will be set back at least 150 feet from the centerline of township road and other rights-of-way	As requested, Flickertail will apply a 150-foot setback from the centerline of township road and other rights-of-way for front yards
The minimum rear yard, measured from the rear lot line, shall not be less than 50 feet	Aboveground Project components will comply with this setback requirement	N/A
The minimum side yard, measured from the side lot line, shall not be less than 50 feet	Aboveground Project components will comply with this setback requirement	N/A

Compliance with Applicable Requirements

FLICKERTAIL SOLAR PROJECT

Abercrombie Township – Additional Voluntary Commitments

Township Ordinance Setback Requirement	Project Commitment	Explanation
N/A	The Project Area will be at least 1 mile from the Village of Galchutt (measured at the northern boundary of the SW ¼ of Section 26-134N-49W)	As requested, Flickertail will apply a 1-mile setback from the Village of Glachutt, described as one mile from the northern boundary of the SW ¼ of Section 26-13N-49W
N/A	No laydown areas in Section 26-134N-49W	As requested, Flickertail will not locate any laydown areas in Section 26-134N-49W
N/A	Flickertail will not utilize the portions of Galchutt Drive, 172 ½ Avenue SE, Galchutt Street, or Galchutt Avenue located within Section 26 for construction traffic	As requested, Flickertail will not utilize the portions of these roads within Section 26 for construction traffic

Compliance with Applicable Requirements

FLICKERTAIL SOLAR PROJECT

The Project complies with the requirements for utilities (Ordinance Section 6.6.2)

Ordinance Section(s)	Requirement	Project Compliance
6.6.2.3	All underground pipelines, natural gas, petroleum pipelines and other energy transfer lines shall be placed deep enough in the ground so as to not interfere with or become hazardous to normal farming operations	The Project's underground electric collection and communication lines/cables will be installed in trenches or ploughed into place at a depth of at least three (3) feet and will not interfere with or become hazardous to normal farming operations.
6.6.2.4	Excavation for tunneling of any pipelines under roads, farm drains, group drains and local drains shall be done by the company owning or leasing said pipelines and the cost of said excavation and damages to be born by the said company	N/A – the Project will not include installation of any pipelines
6.6.2.5	The utility company will coordinate with each applicable road authority to obtain any permits or authorizations required to modify/improve or haul oversize/overweight loads on state or local roadways during construction	Flickertail will coordinate with applicable road authorities to obtain any permits or authorizations required to modify/improve or haul oversize/overweight loads on state or local roadways during construction, as needed

---

From: Delozier, Jodi <jodi.delozier@ndsu.edu>
Sent: Wednesday, January 10, 2024 1:58 PM
To: Christina Martens <cmartens@savionenergy.com>
Subject: RE: State Soil Conservation Committee meeting - Flickertail solar project

> You don't often get email from jodi.delozier@ndsu.edu. Learn why this is important

Thank you , Christina.

Jodi

From: Christina Martens <cmartens@savionenergy.com>
Sent: Wednesday, January 10, 2024 12:32 PM
To: Delozier, Jodi <jodi.delozier@ndsu.edu>
Cc: Bob Martin <whoabob@hotmail.com>
Subject: Re: State Soil Conservation Committee meeting - Flickertail solar project

Jodi,

I will gather some information and responses to your questions and get that to you prior to your meeting on Friday. I will happily come to the spring meeting g if that makes more sense to you and the committee.

Christina Martens, PLA
816-266-6384
Savion

From: Delozier, Jodi <jodi.delozier@ndsu.edu>
Sent: Wednesday, January 10, 2024 1:17:53 PM
To: Christina Martens <cmartens@savionenergy.com>

Cc: Bob Martin <whoabob@hotmail.com>
Subject: RE: State Soil Conservation Committee meeting - Flickertail solar project

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[EXTERNAL MESSAGE] Please be mindful when clicking on links, opening attachments, and replying.

Christina,

I spoke with the chair of the State Soil Conservation Committee and we agreed that it might be better to have you attend our spring board meeting. It will probably be held in April; hopefully, that is not too late to have a conversation with you about the project.

In the meantime, if you could summarize the project and list any environmental impacts that the project may have, I will share this with the Committee. We can have a brief discussion at our January meeting and perhaps come up with some questions for you to address in the spring. Typically, the SSCC does not get involved in these types of projects, but we are often contacted by Soil Conservation Districts with questions like, "Should the SCD or SSCC get involved?", "Do we need a lawyer?", or "Are there certain environmental/legal questions we should be asking the project lead?"

I appreciate any information which would help us become a more informed Committee. Thank you,

Jodi

Jodi Delozier, Ph.D.
Extension Program Director and Specialist, Soil and Water Leadership Development
NORTH DAKOTA STATE UNIVERSITY

Morrill Hall, Room 307C
Dept. 7390, PO Box 6050
Fargo, ND 58108-6050
office: 701.231.1861/cell: 701.951.9904
jodi.delozier@ndsu.edu
Soil Conservation District Resources Google Drive

From: Christina Martens <cmartens@savionenergy.com>
Sent: Tuesday, January 2, 2024 9:35 AM
To: Delozier, Jodi <jodi.delozier@ndsu.edu>
Cc: Holven, Adam <adam.holven@tetratech.com>
Subject: State Soil Conservation Committee meeting - Flickertail solar project

Jodi,

Happy New Year!

I wanted to introduce myself and follow up with you regarding your meeting coming up on January 19th.

I am the Savion permitting and environmental lead for the Flickertail Solar Project that is being pursued in Abercrombie Township, Richland County, MD. We have been working on this project in some form since 2018. It started to the north in Colfax Township and has, over the years, migrated to the south a few miles into Abercrombie Township. Adam and Tetra Tech are our lead consultants for the project. They have been and will be completing all the environmental field studies and assisting with the Public Service Commission application.

I would be happy to attend the meeting to discuss the project and any questions that you may have. Are there any specific questions or concerns that you have at this time? Would you like a brief project/company presentation? I can prepare whatever you would like for this meeting. We have recently received our conditional use permit from Abercrombie Township, so we have all of our application and presentation materials from that process, and we are currently working on the remaining items needed as we work towards our PSC application.

Christina Martens | Director of Permitting & Environmental
M: 816.266.6384 | Savion, LLC



From: Delozier, Jodi
To: Holven, Adam
Subject: State Soil Conservation Committee meeting - Flickertail solar project
Date: Monday, December 11, 2023 2:10:56 PM

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Hello Adam,

I wanted to get back to you regarding the Flickertail Solar Project being proposed in Richland County (Abercrombie). The State Soil Conservation Committee would be interested in having a Tetra Tech representative attend our board meeting as this would be an excellent opportunity for your company to explain the solar project and for SSCC members to ask questions.

We are meeting on Friday, January 19th, in Bismarck at Lincoln Oakes Nursery (3310 University Dr). Although the meeting is scheduled from noon to 3pm, please arrive at 1pm as that is when the partner section of our meeting begins. If this is agreeable to you, please let me know who will be representing your company. Thank-you,

Jodi Delozier, Ph.D.
Extension Program Director and Specialist, Soil and Water Leadership Development
NORTH DAKOTA STATE UNIVERSITY

Morrill Hall, Room 307C
Dept. 7390, PO Box 6050
Fargo, ND 58108-6050
office: 701.231.1861/cell: 701.951.9904
jodi.delozier@ndsu.edu
Soil Conservation District Resources Google Drive

State Historical Society of North Dakota

TETRA TECH, INC.

September 17, 2024

Andrew Robinson, State Archaeologist
Archaeology and Historic Preservation Division
State Historical Society of North Dakota
612 East Boulevard Avenue
Bismarck, North Dakota 58505-0830

Subject: **SHPO Reference #: 24-9003**
Class III Cultural Resource Inventory Submittal
Flickertail Solar Project
Richland County, ND

Dear Mr. Robinson,

Tetra Tech, Inc., on behalf of Flickertail Solar Project, LLC, is pleased to submit this Class III Cultural Resource Inventory for the proposed Flickertail Solar Project located in Richland County, North Dakota. The Project will require a Certificate of Site Compatibility from the North Dakota Public Service Commission (PSC); therefore, the Project is subject to review by the State Historical Society of North Dakota (SHSND) under North Dakota Century Code (NDCC) 49-22-09 – Factors to be considered in evaluating application and designations of sites, corridors, and routes.

The electronic version of the report and associated survey area shapefile have been uploaded to the ND SHPO FTP under the following names:

- *Flickertail Solar Project_Class III CRM_Report 2024-09-17.pdf*
- *Flickertail Solar Project_Class III CRM_Report 2024-09-17.shp*

We appreciate your time and effort. If you have any questions, please contact me at 612-643-2237 or by email at adam.holven@tetratech.com.

Sincerely,

Adam Holven
Project Manager

Enclosures

Tetra Tech Inc.
2001 Killebrew Drive, Suite 141, Bloomington, MN 55425
Tel 612-643-2200 Fax 612-643-2201 tetratech.com

From: Meidinger, Lorna B.
To: Holven, Adam
Subject: 24-9003 Flickertail Solar
Date: Wednesday, November 22, 2023 1:58:48 PM
Attachments: 24-9003 class I.pdf

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Adam,

Attached is our letter for the initial review request of SHSND #24-9003 Flickertail Solar.

Respectfully,

Lorna Meidinger
Lead Historic Preservationist
State Historical Society of North Dakota
612 E Boulevard Ave
Bismarck, ND 58505
701.328.2089

November 22, 2023

Adam Holven
Tetra Tech, Inc
2001 Killebrew Drive, Suite 141
Bloomington, MN 55425
Adam.holven@tetratech.com

SHSND Ref.: 24-9003 Flickertail Solar in portions of [T134N R49W Sections 3, 5, 8-16, and 22] in Richland County, North Dakota

Dear Adam,

We reviewed SHSND Ref.: 24-9003 Flickertail Solar in portions of [T134N R49W Sections 3, 5, 8-16, and 22] in Richland County, North Dakota. We recommend a detailed Class I literature review including discussions on known and unknown historic and prehistoric resources and recommendations as to Class III survey areas. Once we have reviewed the Class I report, we will be able to make a recommendation if a Class III (pedestrian survey) of cultural resources in the project area is needed. The Class I literature search must follow "North Dakota SHPO Guidelines Manual for Cultural Resource Inventory Projects," which is available at https://www.history.nd.gov/hp/hpforms.html.

Thank you for the opportunity to review this project to date. We look forward to reviewing the Class I report. If you have any questions please contact Lorna Meidinger, Lead Historic Preservation Specialist at (701) 328-2089 or lbmeidinger@nd.gov.

Sincerely,

for William D. Peterson, PhD
Director, State Historical Society of North Dakota

24-9003

Richland County Soil Conservation District

From: Holven, Adam
To: Quast, Jonathan - FPAC-NRCS, ND; Klostreich, Jen - FPAC-NRCS, ND; Christina Martens
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management
Date: Monday, October 7, 2024 1:06:00 PM
Attachments: image001.png
Final_Flickertail_VegetationManagementPlan_2024-10-07.pdf

Hi Jon and Jen,

Please find attached the revised vegetation management plan for Flickertail Solar. After some internal discussion, the Project choose to remove the trees from the pollinator mix (outside array). These were initially included as visual screening, but have been removed and replaced with side oats gamma and little bluestem. Tree planting, if required, will comply with the North Dakota Public Service Commission's tree and shrub mitigation plan. Species composition and placement will be coordinated with the North Dakota Forest Service and participating landowners, and adhere to setbacks outlined by Abercrombie Township. The Project may also explore options within the surrounding community to coordinate on tree/shrub planting or engage in other activities that would provide long-term wildlife habitat and conservation benefits.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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From: Klostreich, Jen - FPAC-NRCS, ND
To: Holven, Adam; Quast, Jonathan - FPAC-NRCS, ND; Christina Martens
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management
Date: Thursday, October 3, 2024 1:28:43 PM
Attachments: image001.png

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Both of those species would be fine. Ponderosa Pine would be another alternative. I would use several of these species. Black Hills and Colorado Spruce can be alternated... Better to have a little variety. Ponderosa Pine would need to be planted by itself due to growth pattern differences.

Just my thoughts

From: Holven, Adam <adam.holven@tetratech.com>
Sent: Thursday, October 3, 2024 1:02 PM
To: Klostreich, Jen - FPAC-NRCS, ND <Jen.Klostreich@nd.nacdnet.net>; Quast, Jonathan - FPAC-NRCS, ND <jonathan.quast@usda.gov>; Christina Martens <cmartens@savionenergy.com>
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management

Hi Jen and Jon,

We have addressed nearly all your edits and a question regarding a replacement for Arborvitae. As an alternative, we are considering black hills white spruce (*Picea glauca var. densata*) or Colorado spruce (*Picea pungens*), though the former appears to do better in wetter areas and is resistant to some diseases. Are there any concerns with either of these species?

Jen, you mentioned below other conifer species, where there any that you had in mind?

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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From: Klostreich, Jen - FPAC-NRCS, ND
To: Quast, Jonathan - FPAC-NRCS, ND; Holven, Adam; Christina Martens
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management
Date: Friday, September 27, 2024 9:47:34 AM
Attachments: image001.png

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Good morning Adam,

Outside Array Vegetation mix - I agree with Jon that the Eastern Red Cedar may be problematic in this area. While they may grow well in more difficult sites, it may become a problem with adjacent landowners with ERC volunteering in pastures/road ditches. They may also pose a problem with management, definitely limit your ability to clip the new pollinator planting, which are usually in need of maintenance. With all the flowers/broadleaf in your mix you will need to utilize the clipping method since Broadleaf spray will eradicate much of your mix.

In my experience Arborvitae are not well suited for our soil types or zone. There are other conifer species that will give you benefits, and thought will have to be put into how these will be planted, in a row or sporadic which may limit your ability to control weeds. We have had very limited experience with Arborvitae in Richland County but has not been positive.

Thank you for reaching out,
Jennifer

Jennifer Klostreich
Watershed Coordinator/
District Manager

Richland Soil Conservation District
1725 17th Ave N
Wahpeton, ND 58075
Office: 701-642-5997 ext 3
Cell: 701-640-3340
Fax: 855-813-7554

From: Quast, Jonathan - FPAC-NRCS, ND <jonathan.quast@usda.gov>
Sent: Friday, September 27, 2024 8:58 AM
To: Holven, Adam <adam.holven@tetratech.com>; Christina Martens <cmartens@savionenergy.com>; Klostreich, Jen - FPAC-NRCS, ND <Jen.Klostreich@nd.nacdnet.net>
Cc: Quast, Jonathan - FPAC-NRCS, ND <jonathan.quast@usda.gov>

Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management

Morning Adam,

I've finished reviewing your vegetation management plan and overall, I think it looks good, but I do have a few minor suggestions.

First, on your Tall Prairie Grazing Mix, I would maybe reduce the percentage of prairie cord grass just because once mature, you might have avoidance issues and then you'll have selective overgrazing on more desirable species. I think you could slightly raise the percentage of other grass species other than big bluestem.

Second, your Wet Prairie Mixes (grazing & mowing) have smooth brome in them. I would highly recommend not planting smooth brome, as it will inevitably move in on its own and it tends to take over and reduce species composition and move toward monoculture. Due to saline and wet conditions, a possible alternative which you have in another mix is Western Wheatgrass. I would consider adding to the mix and either keeping the same percentage or bring it in at 10 percent and modifying other grass percentages except big bluestem.

Third, more continuity than anything, you have Ratibida columnifera under 2 different common names (prairie coneflower & upright coneflower). I would suggest only using one common name throughout the mix list to avoid confusion.

Lastly, consideration should be given to management of tree seedlings long term as I see Eastern Red Cedar and Arborvitae in the mix. The district would be better suited for comment but from past experience, ERC can be prolific and will need management to keep the pollinator habitat open and functional while also providing the reduction in wind.

Thank you for providing the opportunity for comment.

Jon

Jonathan Quast
NRCS District Conservationist
Wahpeton Field Office
1725 17th Ave N
Wahpeton, ND 58075
Work: (701) 892-3222
Cell: (701) 971-3123
jonathan.quast@usda.gov

From: Holven, Adam
To: Jen.Klostreich@nd.nacdnet.net
Cc: Christina Martens
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management
Date: Friday, September 27, 2024 7:55:00 AM
Attachments: Flickertail Solar Project_Vegetation Management Plan_2024-09-17.pdf
image001.png

Good morning, Jen

Based on the information provided by the Richland County Soil Conservation District and the NRCS, Flickertail Solar Project has developed a vegetation management plan for the Project (attached). The Project would like to offer the Richland County Soil Conservation District an opportunity and comment on the document.

The Project is preparing to submit its Certificate of Site Compatibility to the North Dakota Public Service Commission in the upcoming weeks. The Project will continue to work with the Richland County Soil Conservation District and submit any additional comments from your office to the North Dakota Public Service Commission.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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See Appendix K – Vegetation Management Plan

From: Christina Martens
To: Holven, Adam
Subject: Fwd: [External Email]Re: Flickertail Solar Project Vegetation Management
Date: Monday, June 17, 2024 11:55:13 AM
Attachments: image001.png

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Here is a response from Jen.

Christina Martens, PLA
816-266-6384
Savion

From: Klostreich, Jen - FPAC-NRCS, ND <Jen.Klostreich@nd.nacdnet.net>
Sent: Monday, June 17, 2024 10:13:30 AM
To: Christina Martens <cmartens@savionenergy.com>
Subject: RE: [External Email]Re: Flickertail Solar Project Vegetation Management

[EXTERNAL MESSAGE] Please be mindful when clicking on links, opening attachments, and replying.

Christina,

Thanks for reaching out. Just a few thoughts:

This site is a very high salt area. This is something that should be taken into consideration when planning the seed mix. Kochia and leafy spurge most likely will be your weed pressure. I would suggest barley nurse crop when seeding. The clover and flowers will probably get taken out with your first pass of chemical spray, so site prep is going to be key.

Hope this helps.

Jennifer

Jennifer Klostreich
Watershed Coordinator/District Manager

Office: 701-642-5997 ext 3
Cell: 701-640-3340
Fax: 855-813-7554

Richland Soil Conservation District
1687 Bypass Road
Wahpeton, ND 58075

From: Christina Martens <cmartens@savionenergy.com>
Sent: Monday, June 17, 2024 8:14 AM
To: Quast, Jonathan - FPAC-NRCS, ND <jonathan.quast@usda.gov>; Klostreich, Jen - FPAC-NRCS, ND <Jen.Klostreich@nd.nacdnet.net>
Cc: Holven, Adam <adam.holven@tetratech.com>
Subject: [External Email]Re: Flickertail Solar Project Vegetation Management

You don't often get email from cmartens@savionenergy.com. Learn why this is important

[External Email]
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Trying a resend as Jan was kicked back to me....

Jon and Jan,

I am reaching out on behalf of Savion and the Flickertail Solar Project (attached is the Abercrombie Township approved draft site plan). I have talked to Jon previously regarding this upcoming PSC application. I just wanted to reach out again and introduce myself and Adam Holven from Tetra Tech.

I am the permitting and environmental lead for the Flickertail Solar project here at Savion, and we are working with Tetra Tech to gather all the field data and create the required application pieces for our PSC application. Adam is our contact there and cc'd on this email.

We are anticipating a mid-July application and wanted to reach out to see if there was any input or thoughts that either of you had when it comes to the Vegetation Management Plan, seed mixes, management, weed control, or anything else. The plan is to seed the solar array with a "native" type seed mix that contains clover, low growing grasses, and flowers. There will then be trees planted for screening and replacements in strategic places outside the perimeter fence along with pollinator habitat. The weed board has already indicated the weed they are most concerned about is leafy spurge. Any other insight you may have on these aspects would be appreciated as we draft the plan.

Once the plan is drafted, we plan to send it to you for review and comment. However, given the short timeframe before the planned submission, if you know of any concerns or requests we can incorporate up front, please let us know.

I appreciate your time in this manner.

Christina Martens | Director of Permitting & Environmental

Future PTO June 17 - July 12, 2024 - Limited availability

M: 816.266.6384 | Savion, LLC



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RICHLAND SOIL CONSERVATION DISTRICT

1687 BYPASS ROAD
WAHPETON, ND 58075
☎ PHONE (701) 642-5997 OPT. 3 ♦ FAX 1-855-813-7554

conserving natural resources
for our future

SUPERVISORS

MICHAEL HAVERLAND – WALCOTT
DAVID MUEHLER – HANKINSON
CARSON KLOSTERMAN - WYNDMERE
CHRIS WALBERG - LEONARD
KELLY KLOSTERMAN – MOORETON

February 20, 2024

Adam Holven
Tetra Tech, Inc.
2001 Killebrew Drive, Suite 141
Bloomington, MN 55425

Subject: Comments on Flickertail Solar Project in Richland County, North Dakota

Dear Adam Holven,

The Richland Soil Conservation District Board requests that Tetra Tech, Inc takes measures to assure that soil and water erosion standards are met using NRCS specifications. You may reach out to the Richland County NRCS office at 701-642-5997 ext. 3 to speak with the District Conservationist, Jon Quast, about the specifications. We also ask that weed control is taken into account.

Sincerely,

Billi Jo Hinders

Richland Soil Conservation District
District Clerk

All programs and services of the Richland Soil Conservation District are offered on a non-discriminatory basis, without regard to race, color, national origin, religion, sex, age or handicap.

Richland County Noxious Weed Board

From: Holven, Adam
To: ginsbachfarm@yahoo.com
Cc: Christina Martens
Subject: RE: Flickertail Solar - Request for Comment
Date: Monday, October 7, 2024 1:16:00 PM
Attachments: Final_Flickertail_VegetationManagementPlan_2024-10-07.pdf

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Hello Mr. Ginsbach,

Please find attached the revised Flickertail Solar Vegetation Management Plan. We incorporated some comments from the USDA-NRCS and the Richland County Soil Conservation District.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | **www.tetratech.com**
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From:	Holven, Adam
To:	ginsbachfarm@yahoo.com
Cc:	Christina Martens
Subject:	RE: Flickertail Solar - Request for Comment
Date:	Friday, September 27, 2024 8:03:00 AM
Attachments:	Flickertail Solar Project_Vegetation Management Plan_2024-09-17.pdf

Good morning, Mr. Ginsbach,

Based on the information provided by the NRCS and the Richland County Soil Conservation District, Flickertail Solar Project has developed a vegetation management plan for the Project (attached). The Project would like to offer the Richland County Noxious Weed Board an opportunity and comment on the document.

The Project is preparing to submit its Certificate of Site Compatibility to the North Dakota Public Service Commission in the upcoming weeks. The Project will continue to work with the Richland County Noxious Weed Board and submit any additional comments from your office to the North Dakota Public Service Commission.

Thanks,
Adam

Adam C. Holven | Senior Archaeologist/Project Manager
Direct: 612.643.2237 | Main: 612.643.2200 | Fax: 612.643.2201
adam.holven@tetratech.com

Tetra Tech
2001 Killebrew Drive, Suite 141 | Bloomington, Minnesota 55425 | www.tetratech.com
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See Appendix K – Vegetation Management Plan

From: Christina Martens
To: Holven, Adam
Subject: Richland County Weed Board Discussion
Date: Friday, September 27, 2024 11:04:55 AM
Attachments: Outlook-Savion-Ene.png

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Adam,

On November 20, 2023 after the Abercrombie Township Public Hearing for the Flickertail Solar Project I had discussions with the weed board members about their potential concerns.

County Commissioner and Weed Board member Perry Miller was in attendance at the Public Hearing. After the meeting, we discussed the weed board's concerns and our request of their review and input into the vegetation management plan.

Perry indicated that the biggest concern that the weed board had for this area was leafy spurge.

Christina Martens | Director of Permitting & Environmental
M: 816.266.6384 | Savion, LLC

SAVION
A RENEWABLE ENERGY COMPANY