June 18, 2018

The Honorable James R. Mortenson
Minnesota Office of Administrative Hearings
600 North Robert Street
P.O. Box 64620
St. Paul, MN 55164-0620

Re: Freeborn Wind Energy LLC Post-Hearing Reply Comments
In the Matter of the Application of Freeborn Wind Energy LLC for a Route Permit for the Freeborn Wind Farm to Glenworth Substation 161 kV Transmission Line Project in Freeborn County
OAH Docket No. 5-2500-35036
PUC Docket No. IP6946/TL-17-322

Dear Judge Mortenson:

Freeborn Wind Energy LLC ("Freeborn Wind") submits these post-hearing reply comments in response to comments from the public which were received at the public hearing (held on May 31, 2018 at Riverland Community College in Albert Lea, Minnesota) and also during the public comment period ending on June 12, 2018.

The Freeborn Wind Farm to Glenworth Substation 161 kilovolt ("kV") Transmission Line Project (the "Project" or "Transmission Line") is needed to interconnect the up to 200 megawatt ("MW") proposed Freeborn Wind Farm (the "Wind Farm") in Worth County, Iowa and Freeborn County, Minnesota. Freeborn Wind has been committed, since the beginning, to finding a route that minimizes impacts to the natural and human environments. As I stated at the public hearing, Freeborn Wind believes the Orange Route and Purple Parallel Route[1]

[1] The "Purple Parallel Route" refers to the Orange Route as modified by the Purple Parallel Route Segment. *See* EA at 100-101.

options are the best routes to minimize human and environmental impacts and avoid the need to place any right-of-way on non-participating landowners. The record fully supports both route options. Freeborn Wind has a slight preference for the Purple Parallel Route because it would place the Project closer to the existing transmission line and reduce impacts on the landowner's property.

Freeborn Wind does not support the Gold Route[2] or Purple Overbuild Route.[3] As the record shows, the Gold Route options and Purple Overbuild Route option involve greater impacts to human settlement and the environment and to non-participant landowners. Comments at the public hearing and in writing indicated significant opposition to route options that would require constructing the Project on non-participants' land. This would weigh against either the Gold Route or the Purple Overbuild Route because they would involve constructing the Project on non-participants' land. On the Purple Overbuild Route specifically, overbuilding for the first half mile north of 120th could be done all on participating land. The remaining half mile towards 130th Street would require two new transmission easements which Freeborn Wind Energy has not been able to voluntarily obtain through negotiations.

Freeborn Wind recognizes that there are opponents to the Project and the Minnesota Public Utilities Commission ("Commission") has received comments requesting that the route permit not be issued or the decision delayed. These requests are not well-founded and should be rejected. Freeborn Wind responds to these comments as well as public comments on other topics, and provides additional comments on the Environmental Assessment ("EA") below.

---

[2] The "Gold Route" refers to the Orange Route as modified by the Gold Route Segment. The "Gold Parallel Route" refers to the Orange Route as modified by the Gold Parallel Route Segment. The "Gold Overbuild Route" refers to the Orange Route as modified by the Gold Overbuild Route Segment. *See* EA at 100-101.

[3] The "Purple Overbuild Route" refers to the Orange Route as modified by the Purple Overbuild Route Segment. *See* EA at 100-101.

Freeborn Wind carefully reviewed the State requirements for high voltage transmission lines ("HVTL") and developed a route for the Project to meet those requirements. The record evidence, including the Application and EA, demonstrate compliance with requirements that have been established by law and the Commission should issue a Route Permit for the Project along the Purple Parallel Route, or in the alternative, the Orange Route.

I. DISCUSSION

A repeated request at the public hearing was to defer a decision on the Route Permit in this docket in light of the Administrative Law Judge's ("ALJ") recommendation in the Freeborn Wind Farm Site Permit docket (IP-6946/WS-17-410). Other topics discussed at the public hearing and in public comments generally focused on the potential impacts of the Project. Some members of the public voiced their support for the Project.[4] They described the benefits the Project and the associated Wind Farm would bring to the community, such as tax revenue, jobs, economic development, stable, reliable income for landowners, and the growth of clean, sustainable energy sources.[5] There were also opponents who provided comments regarding concerns, including about the timing of the Route Permit decision, land rights, aesthetics, avian impacts, property values, karst, concrete, habitat, and interconnection capacity.[6] The record evidence shows that none of these comments raised any material issue that would weigh against

[4] *See, e.g.,* Pub. Hrg. Tr. at 13-15 (Hammersly); Pub. Hrg. Tr. at 36-41 (Rauenhorst); Pub. Hrg. Tr. at 18-19 (Kramer); Comment by Lioba Forman (June 12, 2018) (eDocket No. 20186-143755-01); Comment by O'Connor (June 4, 2018) (eDocket No. 20186-143559-01); Comment by Valerie Wolff Cipra and Clark Cipra (May 23, 2018) (eDocket No. 20185-143283-01); Public Comment Batch 1 (June 13, 2018) (eDocket No. 20186-143782-01) (Don Burns, John Forman, Devonlee Haugebak, Mark Haugebak, Glen Mathiason, Jennifer Vogt-Erickson).

[5] *See, e.g.,* Pub. Hrg. Tr. at 14-15 (Hammersly); Comment by O'Connor (June 4, 2018) (eDocket No. 20186-143559-01); Public Comment Batch 1 (June 13, 2018) (eDocket No. 20186-143782-01) (Don Burns, John Forman, Glen Mathiason).

[6] *See, e.g.,* Pub. Hrg. Tr. at 33 (Hansen); Pub. Hrg. Tr. at 43-44 (Richter); Comment by Linda Herman (June 12, 2018) (eDocket No. 20186-143740-01).

issuing a Route Permit for the Project as detailed below. The Commission should, therefore, issue a Route Permit for the Project.

A. Benefits of the Project.

Members of the public spoke at the public hearing or submitted written comments expressing support for the Project. These comments emphasized the important and substantial benefits the Project would bring to the community.[7] Freeborn Wind agrees and would like to highlight the multiple reasons for their support of the Project; for example: increased tax revenue from the Wind Farm that would be enabled by the Project;[8] good-paying jobs;[9] increased economic development and activity in the community as a result of the Project;[10] stable, reliable income for landowners;[11] and the growth of clean, sustainable energy sources.[12]

[7] *See, e.g.,* Pub. Hrg. Tr. at 13-15 (Hammersly); Pub. Hrg. Tr. at 36-41 (Rauenhorst); Pub. Hrg. Tr. at 18-19 (Kramer); Comment by Lioba Forman (June 12, 2018) (eDocket No. 20186-143755-01); Comment by O'Connor (June 4, 2018) (eDocket No. 20186-143559-01); Comment by Valerie Wolff Cipra and Clark Cipra (May 23, 2018) (eDocket No. 20185-143283-01); Public Comment Batch 1 (June 13, 2018) (eDocket No. 20186-143782-01) (Don Burns, John Forman, Devonlee Haugebak, Mark Haugebak, Glen Mathiason, Winnebago-Worth Counties Betterment Council, Jennifer Vogt-Erickson); Public Comment (June 13, 2018) (eDocket No. 20186-143803-01).

[8] *See, e.g.,* Public Comment (June 13, 2018) (eDocket No. 20186-143803-01); Public Comment Batch 1 (June 13, 2018) (eDocket No. 20186-143782-01) (John Forman, Glen Mathiason, Winnebago-Worth Counties Betterment Council, Jennifer Vogt-Erickson); Comment by Lioba Forman (June 12, 2018) (eDocket No. 20186-143755-01).

[9] *See, e.g.,*Public Comment (June 13, 2018) (eDocket No. 20186-143803-01); Public Comment Batch 1 (June 13, 2018) (eDocket No. 20186-143782-01) (Devonlee Haugebak; John Forman, Glen Mathiason, Winnebago-Worth Counties Betterment Council, Jennifer Vogt-Erickson); Comment by Lioba Forman (June 12, 2018) (eDocket No. 20186-143755-01).

[10] *See, e.g.,* Comment by Lioba Forman (June 12, 2018) (eDocket No. 20186-143755-01); Public Comment Batch 1 (June 13, 2018) (eDocket No. 20186-143782-01) (John Forman, Devonlee Haugebak; John Forman, Glen Mathiason, Winnebago-Worth Counties Betterment Council).

[11] *See, e.g.,* Public Comment (June 13, 2018) (eDocket No. 20186-143803-01); Public Comment (June 13, 2018) (eDocket No. 20186-143803-01); Public Comment Batch 1 (June 13, 2018) (eDocket No. 20186-143782-01) (Glen Mathiason, Devonlee Haugebak; Jennifer Vogt-Erickson).

[12] *See, e.g.,* Pub. Hrg. Tr. at 14-15 (Hammersly); Comment by O'Connor (June 4, 2018) (eDocket No. 20186-143559-01); Public Comment Batch 1 (June 13, 2018) (eDocket No. 20186-143782-01) (Don Burns, John Forman, Glen Mathiason). Comment by Lioba Forman (June 12, 2018) (eDocket No. 20186-143755-01)

B. Timing of Route Permit ALJ Recommendation.

Multiple commenters requested that the Route Permit be denied because the ALJ in the Site Permit docket recommended denial of the site permit.[13] At a minimum, commenters argued the decision on the Project should wait until the Commission makes its determination on the Site Permit. These arguments are without merit. Some commenters argued that the May 14, 2018 Report by ALJ LauraSue Schlatter in the Site Permit docket should be a factor in this Route Permit proceeding. Their arguments are misplaced. First, the scope of this proceeding is for the ALJ to issue a recommendation on whether the Commission should issue a Route Permit for the transmission line Project. The scope of this route permit proceeding does not involve any siting questions relating to the Freeborn Wind Farm.

Second, the ALJ Report is subject to review by the Commission and has been widely challenged for its improper interpretation of the Minnesota Noise Standards. Exceptions were filed by Freeborn Wind and other interested parties including Xcel Energy, Wind on the Wires, Clean Energy Economy Minnesota, Fresh Energy, the Center for Energy and Environment, Minnesota Center for Environmental Advocacy, Minnesota Conservative Energy Forum, Laborers District Council for Minnesota & North Dakota, Vestas-American Wind Technology, Inc., American Wind Energy Association, Renewable Energy Systems America Inc., EDF Renewables, and Apex Clean Energy.[14] DOC-EERA also disagreed with the ALJ Report and recommended that a Site Permit be granted for the Freeborn Wind Farm.[15]

---

[13] *See, e.g.,* Comment by Clark Ericksen (June 1, 2018) (eDocket No. 20186-143500-01); Comment by Dorenne Hansen (June 1, 2018) (eDocket No. 20186-143501-01); Pub. Hrg. Tr. at 15 (Olson).

[14] *See* Xcel Energy Exceptions (June 8, 2018) (eDocket No. 20186-143685-01); Wind on the Wires, Clean Energy Economy Minnesota, Fresh Energy, and the Center for Energy and Environment - Exceptions (June 8, 2018) (eDocket No. 20186-143683-01); Minnesota Center for Environmental Advocacy Exceptions (June 8, 2018) (eDocket No. 20186-143684-01); Minnesota Conservative Energy Forum Exceptions (June 8, 2018) (eDocket No. 20186-143687-01); Laborers District Council of Minnesota & North Dakota Exceptions (June 8, 2018) (eDocket No. 20186-143688-01); Vestas-American Wind Technology, Inc. Exceptions (June 8, 2018) (eDocket No. 20186-

Third, the ALJ Report is not as narrow as opponents represented. The ALJ Report includes an alternative recommendation: to provide Freeborn Wind with a period of time to submit a plan demonstrating how it will comply with the ALJ's interpretation of Minnesota's Noise Standards at all times throughout the footprint of the Freeborn Wind Project.[16]

In addition, the two permits need not be decided at the same time. The proposed Transmission Line is needed to interconnect the Freeborn Wind Farm facilities in Iowa and in Minnesota.[17] The Iowa portion of the Wind Farm has received its necessary approvals from Worth County, Iowa and, just this week, Freeborn Wind received Federal Aviation Administration Determinations of No Hazard for turbine locations in the Wind Farm.[18] Given the ALJ's recommendation in the Site Permit docket, Freeborn Wind finds it necessary to clarify that it would intend to proceed with construction of the Project to support the Worth County wind turbines.[19] Accordingly, Freeborn Wind requests that a Route Permit be granted to allow construction of the Transmission Line irrespective of the Commission's decision in the Site Permit docket.

143670-01); American Wind Energy Association Exceptions (June 8, 2018) (eDocket No. 20186-143675-01); Renewable Energy Systems America Inc. Exceptions (June 8, 2018) (eDocket No. 20186-143669-01); EDF Renewables (June 7, 2018) (eDocket No. 20186-143638-01); Apex Clean Energy Exceptions (June 11, 2018) (eDocket No. 20186-143690-01).

[15] DOC-EERA Exceptions (June 8, 2018) (eDocket No. 20186-143689-01).

[16] *In the Matter of the Application of Freeborn Wind Energy, LLC for a Large Wind Energy Conversion System Site Permit for the 84 MW Freeborn Wind Farm in Freeborn County*, MPUC Docket WS-17-410, Findings of Fact, Conclusions of Law and Recommendation at 2 (May 14, 2018) (eDocket No. 20185-143018-01) (hereinafter "ALJ Report").

[17] Freeborn Wind Route Permit Application at 1 (Sept. 20, 2017) (eDocket No. 20179-135684-02) (hereinafter "Application"); Direct Testimony of Dan Litchfield at 1, 4 (May 24, 2018) (eDocket No. 20185-143327-02) (hereinafter "Litchfield Direct").

[18] The Federal Aviation Administration issued Determinations of No Hazard for the Wind Farm's turbines in Iowa and Minnesota. An exemplar approval is attached as Attachment A.

[19] The Application stated that the transmission line would be constructed only if the Site Permit were granted. Application at 6.

Therefore, the ALJ in this Route Permit docket should not stay his report and recommendation. The ultimate decision on timing for the two dockets rests with the Commission.

C. Route Options.

Freeborn Wind supports the Purple Parallel Route and the Orange Route because both routing options satisfy Minnesota's routing criteria, would minimize impacts, and would enable the transmission line right-of-way to be constructed entirely on participants' land. As described in the EA, impacts along the Orange and Purple Parallel routes are similar. The EA demonstrates that Orange and Purple Parallel routes minimize impacts and are consistent with state routing criteria. For example, overall impacts to agriculture from these route options are expected to be minimal and of a small size. Further, the Purple Parallel Route will not impact wetlands, and the Orange Route is anticipated to have minimal impacts to wetlands. As I noted, Freeborn Wind has a slight preference for the Purple Parallel Route because it would place the Project closer to the existing ITC Midwest transmission line.

Freeborn Wind has, through voluntary agreements, obtained the private land rights necessary to construct the Project within the Orange Route and the Purple Parallel Route. Freeborn Wind would like to point out a small portion of the Purple Route, illustrated on Map 6 of the EA (Landowner Participation – Map 2 of 3), which shows that a small corner of the Purple Route crosses the land of two non-participating landowners. Freeborn Wind would construct the line on ROW belonging to participating landowners. If the Commission approves the Purple Parallel Route, Freeborn Wind would be agreeable to a revision to the route to "clip"

the corner to match the Orange Route, so that the entire route is contained on participating land.[20]

The Commission should reject the Gold Route because of its impacts on the environment and non-participating landowners. As the EA details, impacts along the Gold routing options are unavoidable and will be long-term and significant, and the Gold Route has the most impacts relating to noise, recreation, and land use and zoning. Moreover, it would affect non-participants, four of whom spoke in opposition to the route at the Public Hearing.[21]

One commenter argued that Freeborn Wind has not acquired sufficient property rights to construct the Project. The commenter points to a map submitted with Freeborn Wind's Application as identifying two areas where easements or public road ROW agreements are still needed.[22] However, Freeborn Wind has, through voluntary agreements and careful engineering, obtained the private real estate rights necessary to construct the Project within its proposed routes, the Orange Route and the Purple Parallel Route.[23] Additionally, prior to construction, Freeborn Wind will coordinate with the applicable local and state road jurisdictional authorities to obtain the necessary permits for road access and public road right-of-way use. For example, Freeborn Wind is seeking a utility permit from Freeborn County for the crossing of County Road 108/830th Avenue at one-quarter mile south of 120th Street, where Freeborn Wind has proposed a narrowed right-of-way to maintain the right-of-way for the Project within land owned by participating landowners and within public road right-of-way.[24] Freeborn Wind has

[20] On that same map, Freeborn Wind notes that the parcel immediately south of that corner of the Purple Route is shown as a participating landowner. That landowner has signed a Good Neighbor Agreement but has not granted rights for any transmission line facilities to be located on the property.
[21] *See* Pub. Hrg. Tr. at 31-32 (Sherry Adams); 42 (Brad Nelson); 49-50 (Clark Ericksen); 64 (Travis Jacobsen).
[22] Comment by Dorenne Hansen (June 1, 2018) (eDocket No. 20186-143501-03).
[23] Litchfield Direct at 5; Pub. Hrg. Tr. at 13 (Litchfield).
[24] Application at 17; *see also* Application at 62. Freeborn County notes that AFCL raises an issue regarding the land rights Freeborn Wind would need for this corner crossing. Comment by AFCL at 4-5 (June 12, 2018)

had multiple constructive discussions with Freeborn County staff and Shell Rock Township officials, and is confident a thorough Three Part Agreement will be reached that will address issues related to utility permits for use of public ROW, including the 108/830th Avenue crossing, as well as repair and maintenance of public road and drainage infrastructure.

Further, if additional property rights are required for the Project but negotiated easement agreements cannot be reached, Freeborn Wind would have the power of eminent domain to acquire the required real property rights pursuant to Minnesota Statutes Chapter 117. However, Freeborn Wind does not intend to use this power. As discussed above, Freeborn Wind has, through voluntary agreements, obtained the private real estate rights necessary to construct the Project within the Orange Route and Purple Parallel Route.

D. Environmental Concerns—Avian Impacts.

Comments were submitted expressing concern about potential environmental and wildlife impacts. The EA demonstrates that the Orange and Purple Parallel routes are consistent with the routing criteria, specifically those under the natural resources factor, and best minimize potential impacts to these resources.[25] Two of the specific environmental concerns were avian impacts and impacts to the Shell Rock River.

At the hearing and in follow-up comments, Ms. Hansen, who opposes the Project and the Wind Farm, argued that eagles will be adversely impacted by the Wind Farm and Transmission Line. Her claims are not new. As demonstrated in the EA, the Application, and

(eDocket No. 20186-143756-01). As noted, Freeborn Wind will obtain a utility permit or other approval from Freeborn County which will authorize the construction and operation of the transmission line.

[25] *See, e.g.,* Environmental Assessment at 100-101 (May 14, 2018) (eDocket No. 20185-142993-01) (hereinafter "EA").

in my testimony, the Project has been designed to minimize impacts to eagle and other avian species.[26]

Importantly, the Transmission Line will be constructed in accordance with Avian Power Line Interaction Committee ("APLIC") standards designed to minimize the impacts to avian species. Moreover, Freeborn Wind hired trained biologists to conduct thorough raptor nest surveys and re-mobilized them to the site twice as a sign of good faith to investigate the alleged eagle nests and none were identified.[27] In short, nothing Ms. Hansen offered in her comments supports her claim of adverse eagle impact. Freeborn Wind shares Ms. Hansen's concern for eagles and other avian and bat species, and that is why the Project and the Wind Farm have been designed to minimize impact to wildlife.

As discussed further below, adverse avian impacts such as occurred in Decorah are the result of lines that have not been constructed to APLIC standards. Freeborn Wind has committed to build the Project to APLIC standards. APLIC is a committee of wildlife preservationists and utilities who developed guidance documents identifying causes and minimization methods for avian electrocutions and collisions, and, in conjunction with the USFWS, released Avian Protection Plan ("APP") Guidelines. The APLIC standards provide guidance for developing APPs, as well as designs and other measures aimed at preventing avian electrocutions. The APLIC standards also include Best Management Practices ("BMPs") for conductor spacing and shielding to mitigate impacts to avian species caused by electrocution. The APLIC design standards make the possibility of avian electrocutions nearly impossible. A

[26] *See, e.g.,* EA at 84-85; Litchfield Direct at 8-9; Application at 51; Attachment B (WEST Electrocution Risk Review).
[27] *See, e.g.,* Attachment C (Giampoli Direct Testimony and Schedules 6, 7, 8). Attachment C contains Ms. Giampoli's direct testimony and Schedules 6, 7, and 8 from the Site Permit docket (WS-17-410).

transmission line designed to APLIC standards, such as the Project, will have substantially less risk to avian species.

In response to concerns expressed in public comments about electrocution risk, Freeborn Wind submitted its transmission line specifications to Western EcoSystems Technology's ("WEST") power line Program Manager, who has over 32 years of experience in bird impact assessments to evaluate the design of the Project. The results of that assessment are attached as Attachment B.

WEST confirmed that the Project is designed in accordance with APLIC standards.[28] Specifically, WEST concluded that:

> In summary, no bald eagle electrocution risk would apply to the 161-kV transmission structures proposed to support the Freeborn Wind Energy Facility, based on the structures' design and size. This determination is based on both the guidelines outlined in APLIC's *Suggested Practices* (2006) and WEST's expertise and experience in assessing risk to birds from power line design and operation. At-risk structures for eagle perching typically involve distribution or sub-transmission lines with voltages ≤69 kV. The line voltage of the 2014 electrocution of one of the Decorah, Iowa bald eagle fledglings was identified as 69 kV.[29]

Further, the HVTL would be located adjacent to existing rights-of-way near the Shell Rock River, meaning these effects would largely be limited to one side of the right-of-way and would not create newly fragmented areas.[30] Also, as requested by the MDNR, Freeborn Wind will install bird diverters on the span of its transmission line that will cross the Shell Rock River, which will minimize risk to swans and other waterfowl.[31] In its post-hearing comment, MDNR also recommended that the "wire/border zone method" be applied at the crossing of

[28] *See* Attachment B (WEST Electrocution Risk Review).
[29] Attachment B at 4 (WEST Electrocution Risk Review); *see also id.* at 2.
[30] EA at 86.
[31] *See* EA at 19, 85; Comment by MDNR (June 12, 2018) (eDocket No. 20186-143759-01).

Shell Rock River and its associated floodplain/wetlands.[32] The wire/border zone method allows for different types and heights of vegetation based on whether the vegetation is directly underneath the conductor (wire zone) or elsewhere in the right-of-way (border zone).[33] Freeborn Wind will follow this recommendation.

The multiple claims and comments by Ms. Hansen regarding alleged eagle nests in the Project and Freeborn Wind Farm area are unsubstantiated and should be rejected.[34] Freeborn Wind already investigated and addressed all of these locations in the Site Permit docket.[35] For example, the nest Ms. Hansen claims is located between a proposed Freeborn Wind Farm turbine and the Project (to the west of 840th Avenue and north of 110th Street in Glenville, Minnesota) is a small, inactive raptor nest, not an eagle nest.[36] Freeborn Wind has conducted thorough wildlife studies documenting avian use of the Freeborn Wind Farm Project area, which includes the proposed transmission line route. There are no raptor nests or bald eagle nests within the transmission line route. The closest bald eagle nest is located approximately 0.3 miles west of the Orange Route centerline along the Shell Rock River and is also located approximately 130 feet from an existing 161 kV transmission line.

Some public commenters expressed concern about impacts on aesthetics and recreation along the Shell Rock River.[37] The river crossing is unavoidable, however, and as the EA explains, the Orange Route and the Purple Parallel Route best minimize impacts to recreation at

[32] Comment by MDNR (June 12, 2018) (eDocket No. 20186-143759-01).
[33] EA at 86.
[34] *See* Comments by Dorenne Hansen (June 1, 2018) (eDocket Nos. 20186-143501-01; 20186-143501-02; 20186-143501-03). Notably, Ms. Hansen merely restates many of the same alleged nest locations she has already submitted during previous comment periods in this proceeding and the Freeborn Wind Farm Site Permit proceeding. Freeborn Wind has diligently surveyed the area and has followed up on reports, such as from Ms. Hansen, alleging additional eagle nests.
[35] *See, e.g.*, Attachment C at 11-12 and Schedules 6, 7, and 8 (Giampoli Direct and Schedules 6, 7, 8).
[36] *See* Attachment C at 11-12 (Giampoli Direct and Schedules 6, 7, 8).
[37] Comment by Stephanie Richter (June 1, 2018) (eDocket No. 20186-143507-01).

the river crossing. In contrast, the Gold Route has the most impacts relating to recreation, and its impacts cannot be minimized as well as other routing options.[38] Crossing the Shell Rock River along the Gold Route would require additional clearances achieved through either increasing the right-of-way width or decreasing the span length, and larger overbuild structures.[39]

E. Response to Dorenne Hansen's written comments.

In her letter dated May 31, 2018, Ms. Hansen expressed concern about potential disruption of forest dwellers, wetland and water quality impacts, eagle nests, and avian impacts.[40]

There is no evidence in the record that the Project would disrupt interior forest dwellers. Freeborn Wind conducted site characterization studies and mapped the land cover throughout the Project area.[41] Over 96 percent of the Project area is made up of cultivated cropland or developed areas.[42] The Project does not contain significant areas of forest.[43] Further, construction impacts to trees and woodlands will be minimized because the Project area is primarily agricultural, and any tree clearing activity will be minimized.[44] Therefore, the Project will not disrupt interior forest dwellers.

Freeborn Wind does not propose to build any wind turbines in wetlands and believes that the transmission line poles can be sited outside of wetlands. A detailed in-field wetland delineation study and report is in-progress and Freeborn Wind will propose final pole placement after incorporating this information and getting an approved route from the Commission. If it is

[38] *See, e.g.*, EA at 42.
[39] *See* EA at 20.
[40] Comment by Dorenne Hansen (June 1, 2018) (eDocket No. 20186-143501-01).
[41] *See* Application at 49.
[42] *See* Application at 49; *see also* EA at 86.
[43] *See* EA at 41, 68, 75.
[44] *See* Application at 50.

impossible to avoid wetlands, Freeborn Wind will work with applicable regulatory authorities to obtain any necessary permits that govern the construction techniques in these areas.[45] Freeborn Wind will comply with all environmental laws. The Project will comply with its Stormwater Pollution Prevention Plan. The Project will not affect the area's water quality.[46]

Ms. Hansen's comments should also be scrutinized carefully. As part of the Site Permit proceeding, a significant portion of Ms. Hansen's testimony was ruled inadmissible in the Site Permit docket and stricken from the record due to the impermissible use of hearsay and unqualified opinion of a lay person on complex technical issues.[47] The unredacted version of this testimony was submitted by Clark Ericksen as a comment without providing any information about this context.[48] Freeborn Wind believes that the ALJ should not consider the unredacted version of the testimony for the same reasons. Ms. Hansen's redacted testimony is available on edockets.[49]

F. Community Opinions.

Multiple commenters in this docket, at the public hearing and in writing, have cited a poll/petition that allegedly concludes that "Nearly 80% of people living in this proposed project don't want to see our lands destroyed."[50] The questions that were asked of residents were not put in the record and should be given little to no consideration by the ALJ. First, I am familiar with opponents' efforts and know that it was not a scientific poll. Further, those individuals

[45] *See, e.g.,* Application at 21-22, 48.
[46] *See* Comment by MPCA (Oct. 4, 2017) (eDocket No. 201710-136085-01) and Freeborn Wind Reply Comments on Completeness at 2 and Attachment A (Oct. 31, 2017) (eDocket No. 201710-137023-02); *see also* Application at 49 and EA at 74-75.
[47] *See* Order on Motions by the Minnesota Department of Commerce and Freeborn Wind Energy LLC to Exclude and Strike Testimony (February 12, 2018) (eDocket No. 20182-140011-01).
[48] *See* Comment by Clark Ericksen (June 1, 2018) (eDocket No. 20186-143500-02).
[49] *In the Matter of the Application of Freeborn Wind Energy, LLC for a Large Wind Energy Conversion System Site Permit for the 84 MW Freeborn Wind Farm in Freeborn County*, MPUC Docket WS-17-410, Direct Testimony of Dorenne Hansen (Redacted) (Feb. 21, 2018) (eDocket No. 20182-140345-01).
[50] Comment by Kathy Nelson (June 12, 2018) (eDocket No. 20186-143734-01).

who sponsored the petition were anti-wind opponents who Freeborn Wind believes provided inaccurate and negative information regarding the Wind Farm to encourage signatures. Moreover, the proposed Wind Farm went through a full contested case process and the Project is being reviewed under the appropriate routing procedures. The State of Minnesota has vested the Commission with authority to determine transmission routing decisions based on a defined set of criteria. Freeborn Wind has appropriately addressed the specific concerns that have been raised and met the identified criteria. Generalized claims of public opinion based on the alleged poll should be disregarded.

G. Application Completeness.

Comments were submitted arguing that the Application is not complete.[51] Completeness has been decided by the Commission. On December 5, 2017, the Commission issued an Order finding the Application complete.[52] The Commission's Order is not subject to collateral attack.

H. Interconnection Queue.

Carol Overland, attorney for the Association of Freeborn County Landowners ("AFCL"), asked about the project's interconnection queue positions at the public hearing. Freeborn Wind owns two interconnection queue positions associated with the Project: J407 for 200 MW and J885 for 64 MW. The first queue position, J407, was filed for study by MISO on November 14, 2014. The desired point of interconnection was initially the Hayward substation but was moved to the Glenworth substation due to increased wildlife activity observed near the

[51] *See* Comment by Dorenne Hansen for AFCL (June 12, 2018) (eDocket No. 20186-143738-01); Comment by Allie Olson (June 12, 2018) (eDocket No. 20186-143739-01).
[52] Order Finding Application Complete, Varying Scoping Time Frame, and Referring the Matter to the Office of Administrative Hearings (Dec. 5, 2017) (eDocket No. 201712-137952-01).

Hayward substation, which is much closer to Albert Lea Lake.[53] This queue position has completed its study and Freeborn Wind has executed a Large Generator Interconnection Agreement with MISO and the Transmission Owner, ITC Midwest LLC.

Upon execution of the Purchase and Sale Agreement with Xcel Energy in September 2016, Freeborn Wind began its work to complete development of the site and Xcel Energy began its work to seek regulatory approval for this project and others in a portfolio. Ms. Overland has pointed to the one reference in Xcel Energy's filings that mention a project size of 150 MW, which is in error. Every other citation of the project size in that docket and Freeborn Wind's dockets references the correct project size of 200.[54]

Freeborn Wind filed a new queue position, J885, that would allow for a potential 64 MW expansion of the project solely in Worth County and that would connect to the grid via the Wind Farm's project substation.

There are additional grid access points in Worth County that Invenergy is evaluating for additional development in the future, but none is suitable for use as part of this Project.

I. AFCL Proposed Conditions.

AFCL proposes a list of conditions for the Route Permit, the same list of conditions it included in Scoping Comments.[55] While Freeborn Wind is agreeable to a condition limiting the

---

[53] *See In the Matter of the Application of Freeborn Wind Energy, LLC for a Large Wind Energy Conversion System Site Permit for the 84 MW Freeborn Wind Farm in Freeborn County*, MPUC Docket WS-17-410, Freeborn Wind Proposed Findings of Fact at Finding No. 241 (March 30, 2018) (eDocket No. 20183-141214-03).

[54] *See, e.g., In the Matter of the Petition of Xcel Energy for Approval of the Acquisition of Wind Generation from the Company's 2016-2030 Integrated Resource Plan*, MPUC Docket E-002/M-16-777, Order Approving Petition, Granting Variance, and Requiring Compliance Filing at 2 (Sept. 1, 2017) (eDocket No. 20179-135205-01); *In the Matter of the Petition of Xcel Energy for Approval of the Acquisition of Wind Generation from the Company's 2016-2030 Integrated Resource Plan*, MPUC Docket E-002/M-16-777, Xcel Energy Supplement – Wind Generation Acquisition at 9 (May 11, 2018) (eDocket No. 20185-142979-02); *see also* Application at 5.

[55] *See* AFCL Comments at 15-16 (June 12, 2018) (eDocket No. 20186-143756-01); AFCL EA Scoping Comments at 8-9 (Jan. 3, 2018) (eDocket No. 20181-138611-01).

Purple Parallel Route to participating landowners, Freeborn Wind opposes the other conditions because they are either redundant of standard Route Permit conditions or unsupported by the record. For example, Sections 5.3.16 and 5.3.19 of the Generic Route Permit Template requires Freeborn Wind to restore all disturbed areas and to fairly compensate landowners for damage to crops, fences, landscaping, drain tile, or other damages sustained during construction. Therefore, there is no need for conditions 2-4 on the AFCL list relating to drain tile damages and restoration. Similarly, Section 5.4.3 addresses television and radio interference. As for magnetic fields, there is no legal basis or factual evidence in the record to support any limit. The same is true for the proposed condition to limit the transferability of the permit to a public service corporation.

In sum, the record does not support any of the AFCL conditions and should be rejected.

J. Responses to Other Public Comments and Additional Comments on the EA.

In addition to the comments on the EA provided in my testimony, Freeborn Wind offers these additional comments on portions of the EA and responses to other concerns raised in written public comments.

Noise: At the public hearing, Andrew Levi from the Minnesota Department of Commerce stated that construction noise might exceed state noise standards.[56] Freeborn Wind does not believe this statement is supported by the record.[57] The Project will comply with all applicable Minnesota noise standards. During construction of the Project, intermittent and infrequent noise from construction vehicles and equipment will occur in the Project area

[56] Pub. Hrg. Tr. at 12 (Levi). The EA states that any such exceedance of noise standards would be short-term and confined to daytime hours. EA at 37.

[57] *See, e.g.,* Application at 35, 36 and EA at Appendix 3 (Freeborn Wind response to Information Inquiry #3); Attachment D (May 2, 2018 Hankard Environmental Letter). The Hankard Environmental Letter was referenced in Freeborn Wind's response to Information Inquiry No. 3 in Appendix C of the EA but was not included therein.

specific to the particular construction activity.[58] Construction activities for the Project will generate noise similar to agricultural activities such as operating tractors, combines or grain dryers.[59] Noise impacts from intermittent and infrequent construction activities will be mitigated by the distance of the activity from a receptor (e.g., construction activities will not be near residences, farmsteads, etc.), using sound control devices on vehicles and equipment, conducting construction activities during daylight hours as much as possible during normal business hours, and not running vehicles and equipment when not needed.[60] Approving either the Orange Route or Purple Parallel Route that have maximum distances from adjacent residences will help minimize any noise impacts.

Property Values: One commenter at the public hearing requested a property value guarantee.[61] This request is unsupported by the record evidence. The EA provides a thorough discussion of peer-reviewed literature that demonstrates that any impacts to property values are anticipated to be minimal.[62] While the research demonstrates that property value impacts vary, the majority indicate that HVTLs have "no significant impact or a slight negative impact on residential properties."[63]

Land Rights: The EA refers to "permanent" easements when describing the land rights Freeborn Wind has acquired to construct the Project.[64] While the transmission line is expected to have a useful life beyond 30 years, the easements are for at most a 50-year operating term.

[58] Application at 36.
[59] Application at 36.
[60] Application at 36.
[61] Pub. Hrg. Tr. at 60 (Van Pelt).
[62] *See* EA at 38-40.
[63] EA at 38 (citing Pitts, Jennifer, and Jackson, Thomas (2007) Power Lines and Property Values Revisited, The Appraisal Journal 75(4):323-325, Retrieved May 9, 2018, from: http://www.real-analytics.com/.).
[64] *See* EA at 15.

Should the transmission line continue in operations beyond this time, additional land rights would be required.

Cumulative Aesthetic Impacts: The EA discusses the potential cumulative impact on aesthetics for the four residences along the Orange Route that are within 1,600 feet of the Freeborn Wind Project and the Transmission Line.[65] All four of these residences are participants in the Project. Two of them are hosts to potential wind turbines that would be within 1,600 feet of their homes. They have signed up for the Project and its aesthetic impacts and the terms of the land agreements with them compensate them adequately. There are no un-mitigated aesthetic impacts. Additionally, all of these homes have some form of shelter belt of trees around their properties that will minimize or eliminate the view of turbines and/or the transmission line.

Karst: Public comments raised concerns about karst in the Project area.[66] However, the record demonstrates that karst is not anticipated in the Project area. The Minnesota Department of Natural Resources ("MDNR") maintains several GIS layers about karst topography. The first is an inventory of features such as sinkholes, springs, and stream sinks extracted from the karst feature database of Southeastern Minnesota. The second is a GIS layer that outlines areas where karst features can form on the land surface and where karst conditions are present in the subsurface. DOC-EERA staff reviewed these layers and determined that no karst features or areas were identified within the route width of any routing option.[67] However, Minnesota Regions Prone to Surface Karst data set indicates that the Project area is located near a region prone to karst. In recognition of this, Freeborn Wind undertook a geotechnical evaluation to

[65] EA at 89.
[66] *See, e.g.*, Comment by Kathy Nelson (June 12, 2018) (eDocket No. 20186-143734-01); Comment by Allie Olson (June 12, 2018) (eDocket No. 20186-143739-01).
[67] EA at 63.

evaluate the likelihood of karst in the proposed turbine locations in the Wind Farm docket.[68] The geotechnical evaluation explored for voids and examined soil borings. This investigation confirmed there is no karst bedrock within 50 feet of the soil surface and that the proposed turbine locations would not impact any karst areas.[69] While this evaluation focused on the proposed turbine locations, based on the data presented by the geotechnical evaluation and MDNR information, it can be confidently concluded that the Transmission Line is not likely to impact karst. Freeborn Wind will conduct a geotechnical investigation for the transmission line structure locations when a route is determined.

Concrete: Public comments raised concerns that "leaching" from concrete used for structure foundations may cause surface and groundwater impacts.[70] However, leaching of concrete would only be a concern (if at all) prior to setting and hardening of the concrete, meaning that cured (hardened) concrete does not leach chemicals.[71] Dewatering is not anticipated to be necessary, and would only be necessary where a bentonite slurry cannot be utilized to create a seal against groundwater. The concrete mix used for the Project follows the building code requirements for concrete exposure and thus is very similar to any exterior concrete in constant contact with the ground, such as foundations for houses, barns, offices, and sidewalks. Additionally, the chemical properties of the groundwater are investigated during the subsurface investigation, and if the groundwater is determined to be acidic or potentially corrosive to concrete (which could potentially cause leaching), the concrete would be designed with a chemically resistant mix to increase the concrete durability and resistance to chemical attack. If dewatering is required, Freeborn Wind will implement dewatering strategies to

[68] *See* EA at 63. The Geotechnical Report is attached as Attachment E.
[69] *See* Attachment E at 9 (Geotechnical Report).
[70] *See, e.g.*, Comment by Kathy Nelson (June 12, 2018) (eDocket No. 20186-143734-01).
[71] EA at 67.

prevent potential contamination from the portion of uncured concrete that comes into contact with the soil. Further, if dewatering is required, Freeborn Wind will work with the Minnesota Pollution Control Agency ("MPCA") to ensure to the extent practicable that Minnesota Administrative Rule 7050.0210 and other applicable rules are be adhered to minimize the potential for runoff to surface and groundwater.[72]

Bats: Public comments raised concerns about the potential impacts to bats, including assertions about the risk of collision and electrocution.[73] Commenters referenced risks from wind turbines as a basis for concern regarding bat collisions and electrocution; a concern Freeborn Wind addressed fully in the Site Permit docket and which does not concern the transmission line. Commenters presented no credible support for their assertions relating to bat electrocution and collisions. Freeborn Wind has conducted a number of wildlife studies for the Wind Farm documenting bat use of the Project area, including the different HVTL routing options.[74] The EA found that impacts to the northern long-eared bat are anticipated to be negligible.[75] Further, Freeborn Wind has taken numerous measures, as outlined in the Application, EA, and Draft Avian and Bat Protection Plan, to minimize the risk of fatalities to birds and bats.[76]

Wildlife Habitat: Some commenters expressed concern about impacts to wildlife habitat.[77] As the EA explains, a majority of the Project area is classified as developed or cultivated cropland; therefore, any impacts to wildlife habitat will be limited to areas near the Shell Rock River, and quality habitat conversion will be minimal given the proximity to U.S.

[72] *See* EA at 68.
[73] *See, e.g.*, Comment by Linda Herman (June 12, 2018) (eDocket No. 20186-143740-01).
[74] *See* EA at 82.
[75] *See* EA at 70.
[76] *See* EA at 70, 95; Application at 51-52 and Appendix F (Draft Avian and Bat Protection Plan).
[77] *See* Comment by Dorenne Hansen (June 1, 2018) (eDocket No. 20186-143501-01); Comment by AFCL (June 12, 2018) (eDocket No. 20186-143756-01).

Highway 65.[78] As noted, the MDNR has reviewed the Shell Rock River crossing and recommended actions to minimize impacts. Freeborn Wind will implement these recommendations.

Allied Radio Matrix for Emergency Response ("ARMER"): AFCL raised concerns about the ARMER system.[79] As the EA explains, the Statewide Maintenance and Operations Manager with the Minnesota Department of Transportation's ("MnDOT") Office of Statewide Radio Communications reviewed the Project and concluded that "MnDOT has no concerns with the new transmission line affecting the ARMER system."[80] There is no support for AFCL's assertion that MnDOT's determination is insufficient by itself.

II. CONCLUSION

Freeborn Wind respectfully requests that the ALJ issue a recommendation that the Commission grant the Route Permit for the Project along the Purple Parallel Route, modified to be contained on participating landowners' land, or in the alternative, the Orange Route..

Please feel free to contact me if you have any questions.

Sincerely,

Dan Litchfield
Director, Renewable Development
(773) 318-1289

Enclosures:
Attachment A – Exemplar Federal Aviation Determination of No Hazard for the Freeborn Wind Farm turbines.
Attachment B - WEST Electrocution Risk Review.
Attachment C - Direct Testimony of Andrea Giampoli and Schedules 6, 7, and 8.
Attachment D - May 2, 2018 Hankard Environmental Letter.
Attachment E – Geotechnical Report.

[78] EA at 86.
[79] Comment by AFCL at 11 (June 12, 2018) (eDocket No. 20186-143756-01).
[80] EA at 34.

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

ATTACHMENT A

Aeronautical Study No.
2017-WTE-8849-OE

Issued Date: 06/11/2018

Daniel Birmingham
FREEBORN WIND ENERGY LLC
1 S. Wacker Dr
Suite 1800
Chicago, IL 60606

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Wind Turbine 49
Location:	Northwood, MN
Latitude:	43-30-04.26N NAD 83
Longitude:	93-08-42.35W
Heights:	1239 feet site elevation (SE)
	494 feet above ground level (AGL)
	1733 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities. Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is(are) met:

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 L Change 1, Obstruction Marking and Lighting, white paint/synchronized red lights - Chapters 4,12&13(Turbines).

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

This determination expires on 12/11/2019 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is subject to review if an interested party files a petition that is received by the FAA on or before July 11, 2018. In the event a petition for review is filed, it must contain a full statement of the basis upon which it is made and be submitted to the Manager of the Airspace Policy Group. Petitions can be submitted via mail to Federal Aviation Administration, 800 Independence Ave, SW, Room 423, Washington, DC 20591, via email at OEPetitions@faa.gov, or via facsimile (202) 267-9328.

This determination becomes final on July 21, 2018 unless a petition is timely filed. In which case, this determination will not become final pending disposition of the petition. Interested parties will be notified of the grant of any review. For any questions regarding your petition, please contact Airspace Policy Group via telephone – 202-267-8783.

This determination is based, in part, on the foregoing description which includes specific coordinates and heights. This determination is valid for coordinates within one (1) second latitude/longitude and up to the approved AMSL height listed above (provided the AGL height does not exceed 499 feet). If a certified 1A or 2C accuracy survey was required to mitigate an adverse effect, any change in coordinates or increase in height will require a new certified accuracy survey and may require a new aeronautical study.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

Additional wind turbines or met towers proposed in the future may cause a cumulative effect on the national airspace system. All information from submission of Supplemental Notice (7460-2 Part 2) will be considered the final data (including heights) for this structure. Any future construction or alteration, including but not limited to changes in heights, requires separate notice to the FAA.

Obstruction marking and lighting recommendations for wind turbine farms are based on the scheme for the entire project. ANY change to the height, location or number of turbines within this project will require a reanalysis of the marking and lighting recommendation for the entire project. In particular, the removal of previously planned or built turbines/turbine locations from the project will often result in a change in the marking/lighting recommendation for other turbines within the project. It is the proponent's responsibility to contact the FAA to discuss the process for developing a revised obstruction marking and lighting plan should this occur.

In order to ensure proper conspicuity of turbines at night during construction, all turbines should be lit with temporary lighting once they reach a height of 200 feet or greater until such time the permanent lighting configuration is turned on. As the height of the structure continues to increase, the temporary lighting should be relocated to the uppermost part of the structure. The temporary lighting may be turned off for periods when they would interfere with construction personnel. If practical, permanent obstruction lights should be installed and operated at each level as construction progresses. An FAA Type L-810 steady red light fixture shall be

used to light the structure during the construction phase. If power is not available, turbines shall be lit with self-contained, solar powered LED steady red light fixture that meets the photometric requirements of an FAA Type L-810 lighting system. The lights should be positioned to ensure that a pilot has an unobstructed view of at least one light at each level. The use of a NOTAM (D) to not light turbines within a project until the entire project has been completed is prohibited.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

This aeronautical study considered and analyzed the impact on existing and proposed arrival, departure, and en route procedures for aircraft operating under both visual flight rules and instrument flight rules; the impact on all existing and planned public-use airports, military airports and aeronautical facilities; and the cumulative impact resulting from the studied structure when combined with the impact of other existing or proposed structures. The study disclosed that the described structure would have no substantial adverse effect on air navigation.

An account of the study findings, aeronautical objections received by the FAA during the study (if any), and the basis for the FAA's decision in this matter can be found on the following page(s).

If we can be of further assistance, please contact Brian Barnes, at (816) 329-2524, or brian.a.barnes@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2017-WTE-8849-OE.

Signature Control No: 348431593-367368555 (DNH -WT)
Mike Helvey
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information
Map(s)

Abbreviations:
AGL, Above Ground Level
AMSL, Above Mean Sea Level
ASN, Aeronautical Study Number
CAT, Category
CFR, Code of Federal Regulations
NM, Nautical Mile
RWY, Runway
TPA, Traffic Pattern Airspace

The proposed wind turbines are part of a larger wind turbine farm that would be located 5.02 (NM) north, then clockwise to a point 1.59 NM southeast of the Airport Reference Point for the Northwood Municipal Airport (5D2) Northwood, IA. The wind farm then extends east of the airport to a point approximately 7.8 NM. For the sake of efficiency, the narrative below contains all of the proposed turbines within this project that have similar impacts. Separate determinations are being made for each turbine and are available on our website at http://oeaaa.faa.gov.

The proposed structures would exceed the obstruction standards of 14 CFR Part 77 as follows:

Section 77.17(a)(2): A height that is 200 feet AGL, or above the established airport elevation of 2,275 feet AMSL, whichever is higher, within 3 NM miles of the established reference point of 2G9, and that height increases in the proportion of 100 feet for each additional NM from the airport up to a maximum of 499 feet. The following ASN' exceed by:

2017-WTE-8845-OE by 274 feet
2017-WTE-8849-OE by 195 feet
2017-WTE-8850-OE by 294 feet
2017-WTE-8851-OE by 294 feet
2017-WTE-8852-OE by 281 feet

2017-WTE-8853-OE by 263 feet
2017-WTE-8854-OE by 242 feet
2017-WTE-8855-OE by 221 feet
2017-WTE-8856-OE by 192 feet
2017-WTE-8857-OE by 117 feet

2017-WTE-8869-OE by 294 feet
2017-WTE-8870-OE by 294 feet
2017-WTE-8871-OE by 294 feet
2017-WTE-8872-OE by 294 feet
2017-WTE-8873-OE by 291 feet

2017-WTE-8874-OE by 235 feet
2017-WTE-8882-OE by 294 feet
2017-WTE-8883-OE by 294 feet
2017-WTE-8884-OE by 287 feet
2017-WTE-8885-OE by 241 feet

2017-WTE-8886-OE by 196 feet
2017-WTE-8887-OE by 176 feet
2017-WTE-8888-OE by 139 feet
2017-WTE-8902-OE by 294 feet
2017-WTE-8903-OE by 293 feet

2017-WTE-8904-OE by 284 feet
2017-WTE-8905-OE by 283 feet
2017-WTE-8906-OE by 250 feet
2017-WTE-8907-OE by 200 feet
2017-WTE-8920-OE by 292 feet

The following lie within the 5D2 TPA climb and descent area for RWY 17/35 for CAT C/D aircraft. They are located outside the lateral limits of the TPA conical surface and in the climb and descent area that is the greater of 350 feet above the airport elevation of 1,226 feet or the section 77.17 (a)(2) calculation. They would exceed the 5D2 TPA climb and descent area by:

2017-WTE-8845-OE by 159 feet
2017-WTE-8849-OE by 157 feet
2017-WTE-8850-OE by 164 feet
2017-WTE-8851-OE by 159 feet
2017-WTE-8852-OE by 163 feet

2017-WTE-8853-OE by 150 feet
2017-WTE-8854-OE by 152 feet
2017-WTE-8855-OE by 142 feet
2017-WTE-8856-OE by 136 feet
2017-WTE-8857-OE by 117 feet

2017-WTE-8869-OE by 164 feet
2017-WTE-8870-OE by 158 feet
2017-WTE-8872-OE by 144 feet
2017-WTE-8873-OE by 145 feet
2017-WTE-8874-OE by 134 feet

2017-WTE-8882-OE by 152 feet
2017-WTE-8883-OE by 147 feet
2017-WTE-8884-OE by 140 feet
2017-WTE-8885-OE by 133 feet
2017-WTE-8886-OE by 125 feet

2017-WTE-8887-OE by 131 feet
2017-WTE-8888-OE by 122 feet
2017-WTE-8902-OE by 144 feet
2017-WTE-8903-OE by 143 feet
2017-WTE-8904-OE by 134 feet

2017-WTE-8905-OE by 141 feet

2017-WTE-8906-OE by 129 feet
2017-WTE-8907-OE by 124 feet
2017-WTE-8920-OE by 142 feet

Note: Aircraft categories are based on approach speed, CAT A = less than 91 knots, CAT B = 91- 120 knots, CAT C = 121-140 knots, CAT D = 141-165 knots.

In order to facilitate the public comment process, the proposals were circularized under ASN 2017-WTE-8849-OE on April 02, 2018, to all known aviation interests and to non-aeronautical interests that may be affected by the proposal. One letter of objection was received as a result of the circularization.

The responder expressed a concern for 8 of wind turbines that would be within the "approach" of the airport, but did not have any concerns for the remainder of the wind turbines in the project. They expressed they would like any of the structures within 5 NM of 5D2 airport be lit.

The sponsor agreed to terminate the 8 wind turbines that were in question by the responder. The lighting and marking of the wind turbines will be addressed later in the narrative.

Aeronautical study disclosed that the proposed structures would have no effect on any existing or proposed arrival, departure, or en route IFR operations or procedures.

Study for possible VFR effect disclosed that the proposals would have no effect on existing or proposed VFR arrival or departure operations. No information was received to indicate these proposed structures would be a problem for aircraft operating in the traffic pattern. Therefore, the proposal would not have a substantial adverse effect on VFR traffic pattern operations at 5D2 or any other known public use or military airports. The proposals would have no substantial adverse effect on existing or proposed VFR arrival or departure operations. At 494 feet AGL they would have no effect on VFR en route flight operations.

The proposed structures would be appropriately obstruction marked/lighted to make them more conspicuous to airmen should circumnavigation be necessary.

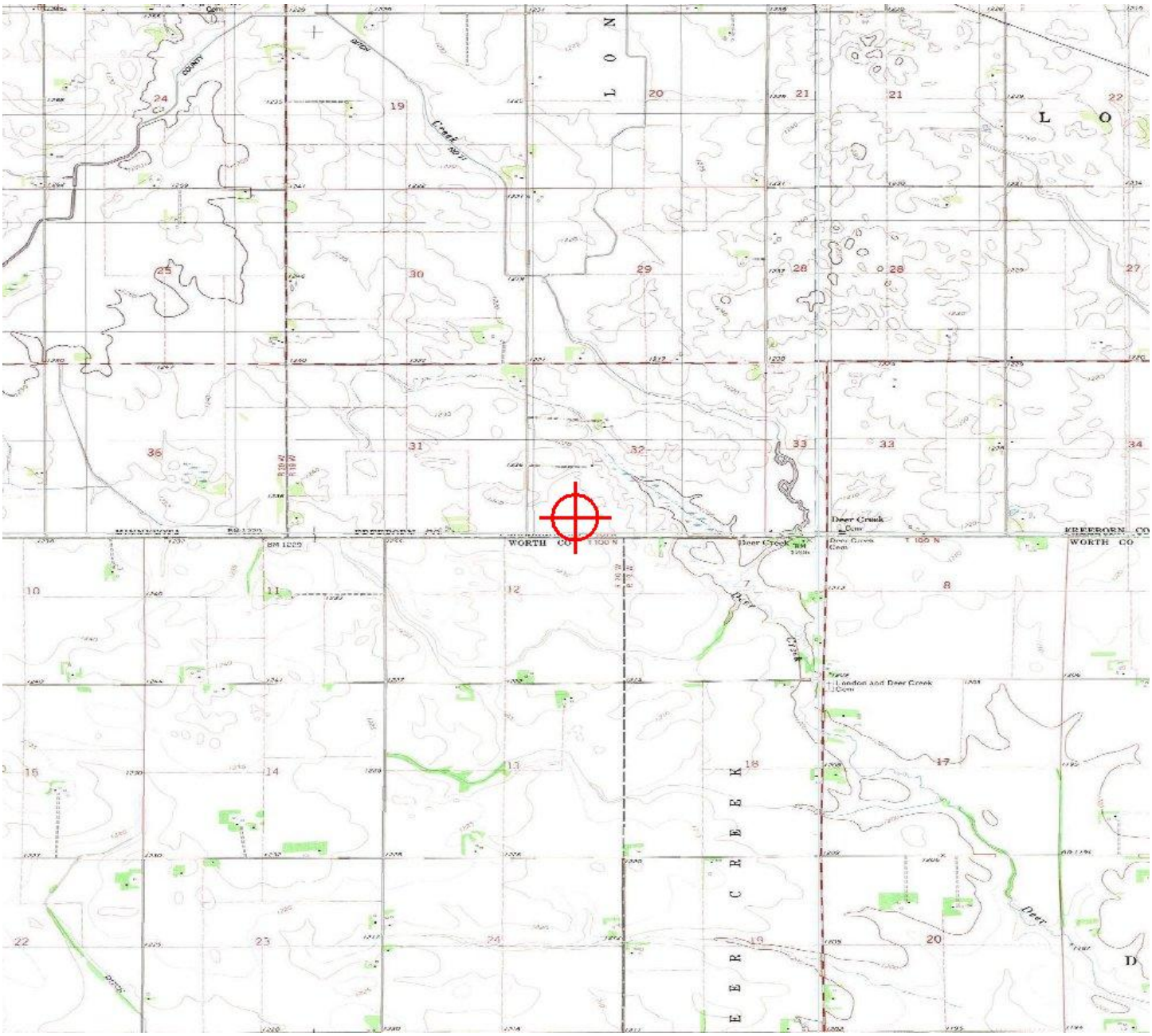
The cumulative impact of the proposed structures, when combined with other proposed and existing structures, is not considered to be significant. Study did not disclose any significant adverse effect on existing or proposed public-use or military airports or navigational facilities, nor would the proposal affect the capacity of any known existing or planned public-use or military airport.

Therefore, it is determined that the proposed structures would not have a substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on any air navigation facility and would not be a hazard to air navigation providing the conditions set forth in this determination are met.

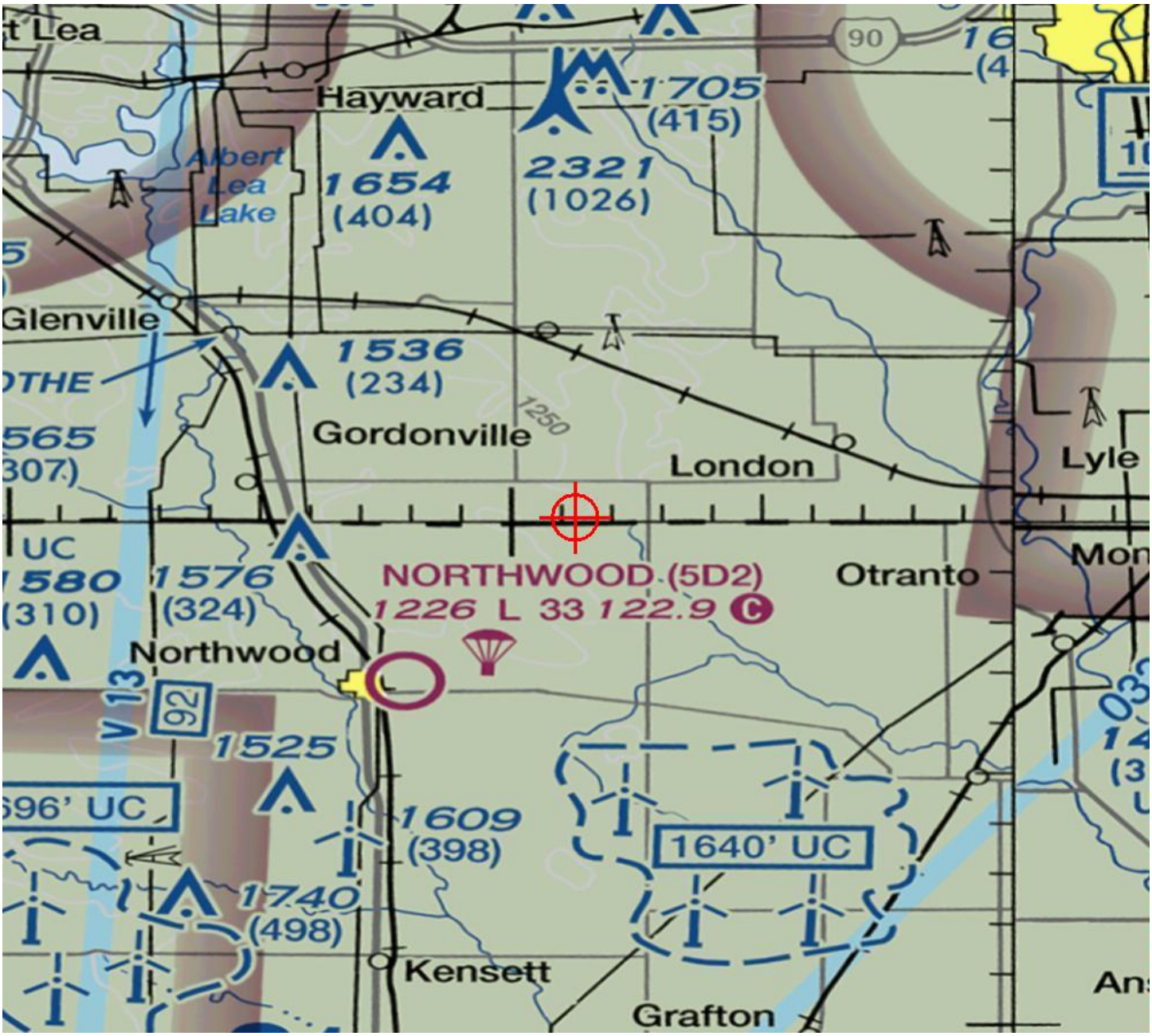
Additional conditions:

NOTE: A recommendation for white paint/synchronized red lights will be made for all turbines until such time as the proponent confirms that the layout is final (no changes, no additions, no removals) and all turbines can and will be built at their determined location and height. At that time, the proponent may contact this office and request a re-evaluation of the marking and lighting recommendations for the turbines within this project and a portion of the turbines may qualify for the removal of the lighting recommendation.

TOPO Map for ASN 2017-WTE-8849-OE



Sectional Map for ASN 2017-WTE-8849-OE



ATTACHMENT B

ENVIRONMENTAL & STATISTICAL CONSULTANTS

2121 Midpoint Drive, Suite 201, Fort Collins, CO 80525
Phone: 307-431-3849 ◆ lnielsen@west-inc.com ◆ www.west-inc.com

June 8, 2018

Andrea Giampoli
Senior Manager
Environmental and Wildlife Permitting
Invenergy LLC
One South Wacker Drive, Suite 1800
Chicago, IL 60606

RE: Electrocution Risk Review to Bald Eagles on the Freeborn 161-kV Transmission Line

Dear Ms. Giampoli,

Western EcoSystems Technology (WEST) would like to present our findings on the Freeborn Wind Energy Project's 161-kilovolt (kV) transmission line structure design relative to potential avian electrocution risk. The goal of this assessment was to compare proposed transmission line design and operation to potential electrocution risks to resident and migratory bald eagles (*Haliaeetus leucocephalus*), based on the Avian Power Line Interaction Committee's (APLIC) *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* (APLIC 2006) and WEST's expertise in this area.

Avian Power Line Interaction Committee

APLIC was created in 1989 and is comprised of a consortium of over 50 large and small utilities across the United States (US) and Canada; the Edison Electric Institute; federal agencies, such as the US Fish and Wildlife Service (USFWS); and organizations, such as the Electric Power Research Institute (EPRI). APLIC has developed a compendium of guidance documents to minimize interactions between birds and power lines (i.e., electrocution, collision, nesting), including the definitive work on assessing and resolving risk from raptor electrocutions (i.e., *Suggested Practices*). APLIC and the USFWS also released national Avian Protection Plan (APP) Guidelines in 2005, and the organization leads a number of research efforts related to avian/power line interactions and conservation. The APLIC guidelines are voluntary, but are structured to provide guidance to any entity that owns and operates power lines in order to minimize potential violations under Bald and Golden Eagle Protection Act (BGEPA), Migratory Bird Treaty Act (MBTA), and Endangered Species Act (ESA).

Power Lines – Avian Electrocution Risk

The electrocution risk to birds (including eagles) on power line structures is directly related to the line's voltage, structure configuration, and clearances combined with biological and site-specific factors. A perching bird's dimensions compared to a structure's size and configuration are integral in assessing the potential for a bird to make phase-to-phase (i.e., energized-to-energized) or phase-to-ground (i.e., energized-to-ground) contact, both of which may result in an electric shock or bird electrocution.

APLIC's (2006) established guidelines to minimize electrocution risk to large, perching birds on power line structures is delineated by voltage. For distribution voltages 7.2 kV-60 kV, dimensions are 60 inches (in; 152 centimeters [cm]) horizontal clearance and 40 in (102 cm) vertical clearance. These dimensions are based on the wrist-to-wrist distance (i.e., fleshy part of an eagle's wing) and an eagle's height, respectively (APLIC 2006). However, as voltage increases over 60 kV to transmission voltages, additional clearances are necessary. Table 1 summarizes the recommended phase-to-phase and phase-to-ground clearance for voltages up to 345 kV. As shown for 161 kV, the phase-to-phase clearances increase by 20 in (51 cm) and the phase-to-ground clearances increase by 7 in (18 cm) over distribution voltages.

Table 1. Recommended avian clearances by voltage for phase-to-phase and phase-to-ground contact points.

Phase-to-Phase (+0.2 in x 1 kV >60 kV)			Phase-to-Ground (Phase-to-Phase Voltage / 1.732) (+0.2 in x 1 kV >60 kV)		
Line Voltage kV	**Horizontal Spacing In (cm)**	**Vertical Spacing In (cm)**	**Nominal Voltage kV**	**Horizontal Spacing In (cm)**	**Vertical Spacing In (cm)**
≤60	60 (152)	40 (102)	35	60 (152)	40 (102)
69	62 (157)	42 (107)	40	60 (152)	40 (102)
115	71 (180)	51 (130)	66	61 (155)	41 (105)
138	76 (191)	56 (141)	80	64 (162)	44 (112)
161	**80 (203)**	**60 (152)**	**93**	**67 (170)**	**47 (119)**
230	94 (237)	74 (187)	133	75 (189)	55 (139)
345	117 (297)	97 (246)	199	88 (224)	68 (173)

Sources: APLIC 2006; WEST 2017

Freeborn 161-kV Transmission Line - Avian Electrocution Risk Review

The Freeborn Wind Energy Project proposes to transfer power from the new Freeborn Wind Facility Substation, via a 7-mile, 161-kV transmission line, to the existing Glenworth Substation, located southeast of Glenville, Minnesota in Freeborn County. Figures 1, 2, and 3 depict the three-phase, single-circuit tangent braced-post; deadend horizontal post; and tangent running angle structure designs, respectively, proposed for this 161-kV transmission line.

Power lines ≥161 kV typically maintain sufficient distances between phase-to-phase and phase-to-ground contact points, based on clearances established by the National Electrical Safety Code (NESC). As shown on Figures 1 and 2, there is no potential for birds to contact phase-to-phase points (i.e., energized conductors) on either of these structures, based on the vertical, offset configuration of the braced-post insulators (Figure 1) and the vertical clearance of 11 ft (132 in [335 cm] between conductors on the deadend structure (Figure 2). The 132 in (335 cm) far exceed the 60 in (152 cm) vertical phase-to-phase clearance needed for 161-kV voltage (Table 1). Additionally, the running angle structure shown in Figure 3 would not present a risk, based on the downward sloping insulators, which would not present a platform for an eagle to perch. WEST's review focused on the phase-to-ground clearances (i.e., distance from the energized conductor to any potential grounding on the structure, such as bonded and grounded hardware; Figures 1 and 2, red arrows). If this distance was less than 67 in (170 cm) on a 161-kV structure, a bald eagle attempting to perch on these horizontal post insulators could be at risk. However, as shown in Figures 1 and 2, the braced-post and horizontal post insulators have a length of 6 ft 6 in (78 in [198 cm]). This distance exceeds the 67 in (170 cm) horizontal phase-to-ground clearance needed on 161-kV voltage (Table 1), allowing bald eagles to safely perch on these horizontal post insulators (Figure 4).

ENVIRONMENTAL & STATISTICAL CONSULTANTS
2121 Midpoint Drive, Suite 201, Fort Collins, CO 80525
Phone: 307-431-3849 ◆ lnielsen@west-inc.com ◆ www.west-inc.com

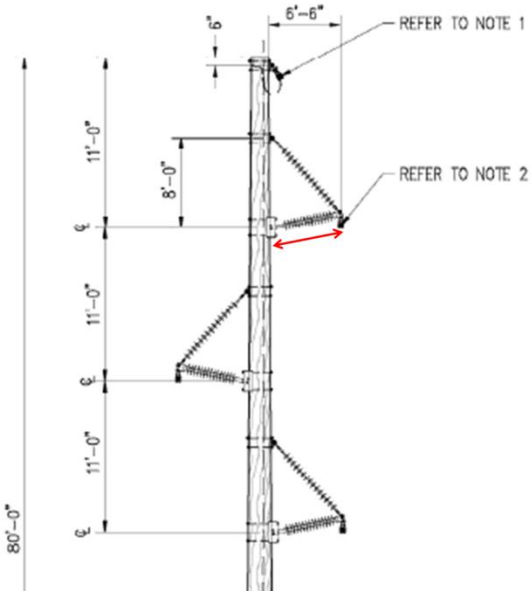


Figure 1. Three-phase, single-circuit tangent, braced-post 161-kv transmission structure.

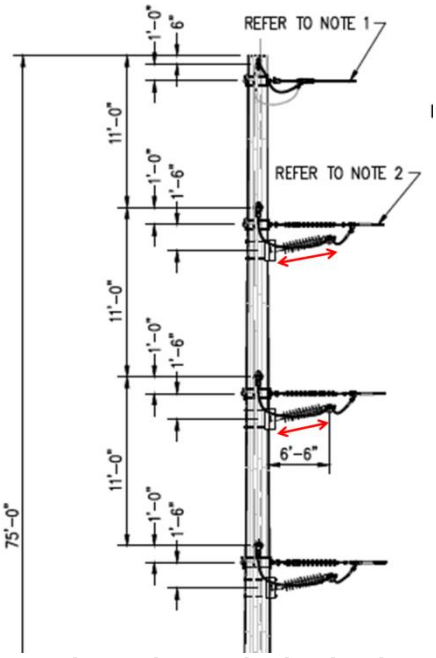


Figure 2. Three-phase, single-circuit deadend, horizontal post 161-kv transmission structure.

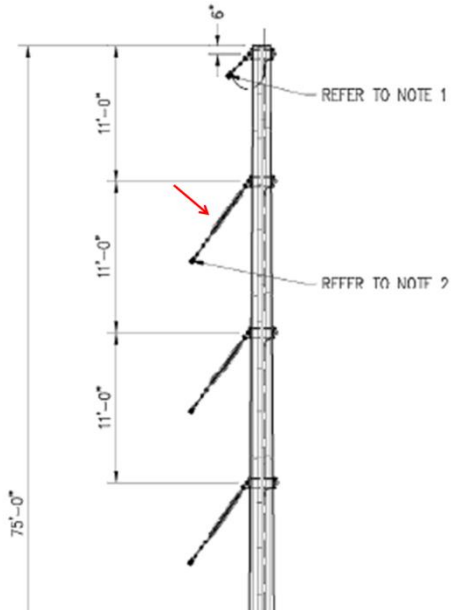


Figure 3. Three-phase, single-circuit running angle 161-kv transmission structure.

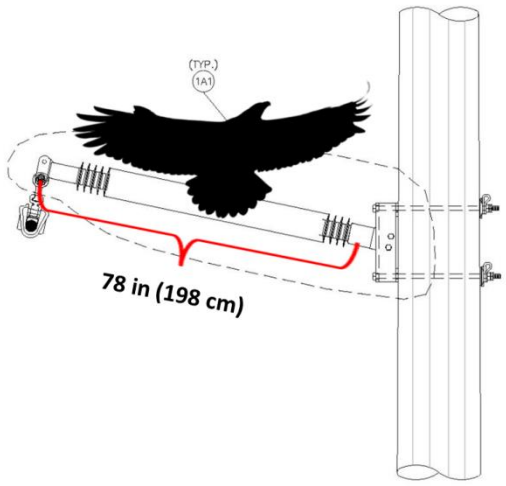


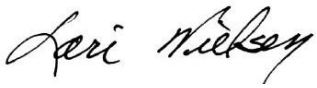
Figure 4. Example of sufficient horizontal post insulator length relative to perching eagle.

Summary

In summary, no bald eagle electrocution risk would apply to the 161-kV transmission structures proposed to support the Freeborn Wind Energy Facility, based on the structures' design and size. This determination is based on both the guidelines outlined in APLIC's *Suggested Practices* (2006) and WEST's expertise and experience in assessing risk to birds from power line design and operation. At-risk structures for eagle perching typically involve distribution or sub-transmission lines with voltages ≤69 kV. The line voltage of the 2014 electrocution of one of the Decorah, Iowa bald eagle fledglings was identified as 69 kV.
https://www.usatoday.com/story/news/nation/2014/07/10/decorah-eagle-electrocuted-dies/12471781/

WEST's personnel credentials are provided below, as needed. Please let me know if you have any questions on this assessment and supporting materials.

Sincerely,



Lori Nielsen
Research Biologist / Project Manager

CC: Scott Ehmke – WEST
Sandra Simon – WEST

WEST Staff Qualifications

Lori Nielsen is WEST's power line Program Manager with over 32 years of experience in bird impact assessments. Since 2001, she has specialized in risk assessments for bird interactions (i.e., electrocution, collision, nesting) with electric infrastructure (generation, transmission, distribution) for all voltage classes, across the US, Canada, and Mexico. She has managed over 60 Avian Protection Plans (APPs) and other avian studies, ranging from a statewide initiative for 22 Colorado electric cooperatives to multi-year, interstate APP projects for large investor-owned utilities; government agencies (US Department of Defense, USFWS); and organizations (APLIC, state wildlife agencies). Lori also conducts training sessions, with over 50 presentations to date at national, international, and regional meetings, primarily addressing avian interactions with power lines and options for addressing these issues.

Scott Ehmke, a WEST associate, has over 40 years of electric utility experience, including over 25 years as an Operations Manager and Engineering and Operations Manager in the US. Scott addresses complex issues, such as developing new construction standards with company engineering personnel, construction recommendations, and detailed substation retrofitting and design. Scott also has applied his electrical knowledge to projects and issues that have been previously precedent setting within the electric utility industry.

ATTACHMENT C

FREEBORN WIND ENERGY LLC

MINNESOTA PUBLIC UTILITIES COMMISSION

MPUC DOCKET NO. IP-6946/WS-17-410

DIRECT TESTIMONY OF ANDREA GIAMPOLI

December 22, 2017

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Andrea Giampoli. My business address is One South Wacker Drive, 1800, Chicago, Illinois 60606.

Q. With whom are you employed?

A. I am employed by Invenergy LLC ("Invenergy"), which is the sole member and manager of the applicant entity, Freeborn Wind Energy LLC ("Freeborn Wind").

Q. What is your position with Freeborn Wind Energy LLC?

A. I am an Environmental Permitting Manager. I manage environmental permitting and compliance with federal, state, and local laws and policies for development and operation of wind and solar projects in the United States. I also oversee teams of environmental consultants at project sites during the preparation and execution of field studies through to the editing of final technical reports.

Q. Please describe your background.

A. I obtained a Bachelor of Arts Degree from the University of Wisconsin-Madison in 2006 with a double major in Communication Arts and Spanish. I worked as a writer and editor for four years before starting law school in 2010 at Rutgers University School of Law. I graduated in December 2013, and briefly worked as an associate. I joined Invenergy as a specialist in my current position in September 2014 and was promoted to manager in March 2016. My resume is attached as Schedule 1.

Q. Describe your familiarity with the Project.

A. I am the Freeborn Wind environmental manager overseeing the wildlife and wetlands survey work and permitting for the Freeborn Wind Farm ("Wind Farm") to be located in Freeborn County, Minnesota and Worth County, Iowa. The Wind Farm will include up to 200 MW in Minnesota and Iowa. There will be up to 84 MW in Freeborn County (the "Project"). As part of my responsibilities, I supervised the work

of Western EcoSystems Technology, Inc. ("WEST") which conducted a site characterization and wildlife field studies for the Wind Farm. I also supervised Merjent, Inc., which completed a limited wetlands analysis for the Project.

II. OVERVIEW

Q. What is the purpose of your Direct Testimony?

A. The purpose of my testimony is to: (1) describe the environmental studies and surveys conducted for the Project; (2) respond to comments from the Minnesota Department of Natural Resources ("MDNR") concerning the Project; (3) discuss the siting of one Project turbine with respect to Freeborn County's Type III wetland setbacks; and (4) describe the Raptor Nest Survey, Freeborn Expansion Area Avian Study Report and Freeborn 2017 Avian Use Study Report completed for the Project after the submission of Freeborn Wind's Site Permit Application for a Large Wind Energy System ("Application").

Q. What schedules are attached to your Direct Testimony?

A. The following schedules are attached to my Direct Testimony:

- Schedule 1: Resume
- Schedule 2: Eagle Nest Survey Freeborn Wind Energy Project (September 9, 2016)
- Schedule 3: Raptor Nest Survey Freeborn Wind Energy Project (September 2, 2016)
- Schedule 4: Memorandum, Limited Wetland Delineation Summary (April 28, 2017) (Merjent)
- Schedule 5: Bat Acoustic Study Freeborn Wind Energy Project (September 9, 2016)
- Schedule 6: Raptor Nest Survey Freeborn Wind Energy Project Expansion Area (October 13, 2017)
- Schedule 7: Avian Use Study Freeborn Wind Energy Project Expansion Area (November 17, 2017)

- Schedule 8: Avian Use Study Freeborn Wind Energy Project Final Report Addendum (November 27, 2017)

Q. What sections of the Application are you sponsoring?

A. I am sponsoring Section 8 (Environmental Impacts), Sections 8.16-8.20, and Section 11 (Identification of Other Permits) of the Application. I am also sponsoring the following appendices:

- Appendix A: Agency Correspondence
- Appendix F: Tier III Wildlife Studies
- Appendix G: Tier I/Tier II Study
- Appendix H: Draft Avian and Bat Protection Plan ("ABPP")

Q. Are there any corrections or additions you would like to make to the Application?

A. Yes. In preparing my testimony, I noticed that the Native Prairie Evaluation (September 2015) and the Water Resource Evaluation reports were listed in the Tier III appendix, Appendix F. They should have been included in the Tier I/II appendix, Appendix G.

III. PROJECT ENVIRONMENTAL SURVEYS/STUDIES

Q. Discuss the environmental surveys and/or studies Freeborn Wind conducted with respect to the Project.

A. Invenergy acts in accordance with the U. S. Fish and Wildlife Service's Land-based Wind Energy Guidelines ("WEG"). The tiered approach outlined in the WEG provides a process for collecting information regarding wildlife resources that are pertinent to the siting and operation of the Project. Tier I/II (Appendix G) and Tier III (Appendix F) studies have been completed for the Project. The Tier I/II Studies were preliminary site evaluations and site characterizations whose purposes were to identify and characterize habitat and biological resources present within and

surrounding the Project Area. The Tier I/II Studies also summarize potential species of interest and sensitive ecological areas in the region.

The following Tier III study, which included more extensive field surveys, was included as part of the Application: Avian Use Study (September 12, 2016), included in Appendix F.

In addition, Freeborn Wind completed the following surveys and studies:

- Eagle Nest Survey Freeborn Wind Energy Project (September 9, 2016). (Schedule 2.)
- Raptor Nest Survey Freeborn Wind Energy Project (September 2, 2016). (Schedule 3.)
- Memorandum, Limited Wetland Delineation Summary (April 28, 2017) (Merjent). (Schedule 4.)
- Bat Acoustic Study Freeborn Wind Energy Project (September 9, 2016). (Schedule 5.)
- Raptor Nest Survey Freeborn Wind Energy Project Expansion Area (October 13, 2017). (Schedule 6.)
- Avian Use Study Freeborn Wind Energy Project Expansion Area (November 17, 2017). (Schedule 7.)
- Avian Use Study Freeborn Wind Energy Project Final Report Addendum (November 27, 2017). (Schedule 8.)

Q. How has Freeborn Wind incorporated the results of those surveys and/or studies into Project design?

A. In the initial design of the Project, we sited all turbines more than 1,000 feet from suitable summer bat habitat and, with one exception, more than 3 rotor diameters from wetland resources. We also located all turbines more than one-half mile from any active eagle nests. The study results were also incorporated into Project location and design to avoid and minimize Project impacts. For example, as I

discuss in more detail below, the Project footprint was modified to avoid certain native prairie resources.

Q. Has Freeborn Wind conducted any additional environmental studies since submitting the Application?

A. Yes. As described in more detail below, since submitting the Application in June 2017, Freeborn Wind has completed additional environmental studies: Raptor Nest Survey Freeborn Wind Energy Project Expansion Area (October 13, 2017) (Schedule 6); Avian Use Study Freeborn Wind Energy Project Final Report Addendum (November 27, 2017) (Schedule 8); and Avian Use Study Freeborn Wind Energy Project Expansion Area (November 17, 2017) (Schedule 7). Freeborn Wind is also updating its ABPP to incorporate the most recent survey results. The final ABPP will be submitted in to the docket prior to hearing.

Q. Does Freeborn Wind plan to conduct any additional environmental surveys and/or studies in the Project Area?

A. Freeborn Wind anticipates undertaking wetland delineation work in 2018. Freeborn Wind will also conduct post-construction monitoring in accordance with the plan described in its ABPP.

IV. MDNR COMMENTS

Q. Did Freeborn Wind seek input from MDNR concerning the Project before submitting the Application?

A. Yes. MDNR provided Freeborn Wind with several letters, which are included in Appendix A to the Application. A summary of our consultation with the MDNR is also included in Section 1.5 of the ABPP, Appendix H. Among the meetings listed is one I conducted with the MDNR on January 24, 2017 to review the wildlife and natural resources studies to date and the ongoing and proposed surveys for the second year study.

Q. Was the Project layout modified before the Application was filed to address MDNR concerns?

A. Yes. As discussed in the Application, the Project Area was refined to exclude all MDNR mapped native prairie, native plant communities, and railroad ROW prairie. Also, the initial configuration of the Project included a termination at a substation in Hayward, Minnesota. Freeborn Wind revised the system configuration to connect at the Glenworth Substation due to the increased bird activity near Albert Lea Lake. Freeborn Wind also complied with the bat habitat setbacks recommended by MDNR.

Q. Did MDNR submit additional comments concerning the Project after the Application was filed?

A. Yes. MDNR submitted written comments in this Docket on October 6, 2017. The MDNR comments included the following:

- A suggestion that Section 10.3.3 of the Application include the MDNR utility crossing licensing requirement;
- A clarification regarding the definition of native prairie and a recommendation that a Prairie Protection and Management Plan be prepared for the Project; and
- Recommendations concerning modifications to the ABPP.

Q. Do you have a response to MDNR's October 6, 2017 comments?

A. Yes. With respect to the MDNR utility crossing licensing requirement, only the transmission line that is being reviewed in a separate docket, will cross the Shell Rock River. An application for the transmission line crossing was submitted to the MDNR in October, 2017.

With respect to native prairie, there is only one patch of native prairie in the Project Area, and it is not affected by our facilities. We have designed the Project to avoid any impact to any potential native prairie. The Draft Site Permit prepared by the Department of Commerce, Energy, Environmental Review and Analysis ("EERA") includes a condition for a prairie protection and management plan in Section 4.7.

Freeborn Wind will prepare a plan that documents how the Project avoids native prairie and steps that will be taken to ensure that native prairie is not impacted.

The MDNR also made two recommendations regarding the ABPP. One recommendation was to remove Section 5.2 "Species to be Monitored". The second was that the last bullet on page 38 of the ABPP regarding feathering should be revised to match language in recent site permits. I note that EERA, in its Comments and Recommendations on the Draft Site Permit, also recommended a condition for feathering based on the MDNR.[1] Freeborn Wind is updating the ABPP and will remove Section 5.2 as the MDNR recommended. Freeborn Wind will also revise the feathering provisions as MDNR recommended.

V. COUNTY WETLAND SETBACK

Q. Are you familiar with the Freeborn County, United States Fish and Wildlife Service ("USFWS") Type III wetland setback?

A. Yes. As discussed more in the Direct Testimony of Mr. Litchfield and the Application, the Freeborn County Ordinance includes a three times rotor diameter setback from certain wetlands. For a V116 turbine, this would be 1,141 feet, and for a V110, this would be 1,082 feet.

Q. Does the Project design incorporate this setback?

A. Yes, it generally does. However, Turbine 31 is sited 1,086 feet from three stock ponds that are classified as USFWS Type III wetlands. This means that the tower is 55 feet closer to the wetland than the setback allows, yet more than 95 percent compliant with the requirement.

[1] *See* Comments and Recommendations of Minnesota Department of Commerce Energy Environmental Review and Analysis Staff at 6-7 (proposed permit section 7.5.4) (Dec. 4, 2017) (eDocket No. 201712-137950-01).

Q. In your opinion, is the siting of Turbine 31 adequate to protect the wetlands and wildlife activities supported by the wetlands?

A. Yes. As discussed in Section 8.2.4 of the Application, the wetlands at issue here are man-made excavated ponds. This is confirmed by Merjent's Limited Wetland Delineation Summary which identifies the wetlands as Nos. 7, 8 and 9. Merjent staff spoke with the landowner who stated that the ponds had not been actively used since 1985. (Schedule 4, at 2.)

The wetland provides a very low-quality habitat for wildlife. Because wildlife would not be expected to be attracted to this pond, the proposed location of Turbine 31 is not expected to have an impact on wildlife.

Freeborn Wind must comply with a comprehensive federal, state, and local regulatory scheme to evaluate and avoid impacts to wetlands. Those regulations do not require any setback from wetlands. The Minnesota Public Utilities Commission (the "Commission") specifically evaluated an MDNR request to include a 1,000 foot setback from wetlands in the General Permit Standards docket (Docket No. E,G999/M-07-1102) in 2007.[2] The MPUC declined to adopt such a setback based on insufficient justification. The MPUC noted: "the Commission cannot act on the DNR's recommendation unless and until there is further record development of th[e] issue."[3] The Commission also concluded that a 1,000 foot setback from wetlands would take an unjustifiable amount of land out of wind energy production.[4] The extensive coordination and study that Freeborn Wind has undertaken to assess

[2] *In the Matter of Establishment of General Permit Standards for the Siting of Wind Generation Projects Less than 25 Megawatts*, MPUC Docket No. E,G999/M-07-1102, MPUC Order Establishing General Wind Permit Standards at 3 (Jan. 11, 2008) (eDocket No. 4897855).

[3] *Id.* at 4.

[4] *Id.* at 3-4.

impacts on wildlife, which follows the WEG, provides an effective means to specifically evaluate and minimize impacts to area wildlife.

VI. 2017 AVIAN AND RAPTOR NEST SURVEYS

Q. Freeborn Wind conducted Tier III raptor nest surveys in 2015-2016 which are described in the ABPP and attached hereto as Schedules 2 and 3. Has Freeborn Energy completed any additional raptor surveys?

A. Yes. As described in the Raptor Nest Survey Freeborn Wind Energy Project Expansion Area (October 13, 2017) (Schedule 6), surveys were conducted between March 29 and April 6, 2017 for the Project to document any new nests within the expanded Project Area and ten mile buffer, and any annual changes to the nests recorded in the vicinity of the Project in previous years. A site specific survey was conducted in July 2017, in response to a comment letter dated July 2, 2017, Edockets No. 20177-133470-01, indicating that Freeborn Wind's Draft ABPP prepared for the Project did not identify three nests which occurred within the Project Area. As described in Schedule 6, no active bald eagle nests were identified in the Project Area.

Q. What was the scope of the Raptor Nest Survey Report (Schedule 6)?

A. The objective for this survey was to document bald eagle nests within 10 miles of the Project Area, and survey for and record bald eagle and other raptor nests found within the Project Area and a 2.0-mile buffer. The aerial raptor nest survey was conducted from March 29 – April 6, 2017. In addition, in response to the July 2, 2017 landowner letter identified above, Freeborn Wind contracted with WEST to: 1) review existing nest data from previous nest surveys of the Project; and 2) conduct follow-up nest surveys and monitoring of the three potential nests in question. The objective of the follow-up surveys was to determine if raptor nests were present at these three sites and to document nest status and species for any nests present. The follow-up nest surveys and monitoring were conducted on

July 10, 2017. An additional site visit was conducted in November 2017 and is described later in my testimony.

Q. Please discuss the results of the Raptor Nest Survey Report (Schedule 6).

A. Thirteen occupied and active bald eagle nests and one occupied and inactive bald eagle nest were identified within 10 miles of the Project Area, but all were located outside of the Project Area itself. The Project Area is dominated by cultivated agriculture with no prominent river or lake systems which might provide attractive nesting or foraging opportunities.

On July 10, 2017, WEST also reviewed the three eagle nest locations alleged in the comments in the Docket. Two of the nests were documented during the March 29 – April 6, 2017 raptor nest survey. One was identified as a small, inactive raptor stick nest of an unknown species, not consistent with the size or structure of a bald eagle nest. The second was a identified as a larger, inactive stick nest of an unknown species. The biologists did not encounter or observe the third nest during the field survey. The methodology and results of this survey are documented in the report Raptor Nest Survey Freeborn Wind Energy Project Expansion Area (October 13, 2017), attached as Schedule 6.

Q. Did Freeborn Wind also undertake additional avian studies?

A. Yes. Freeborn Wind hired trained biologists at WEST to complete an Avian Use Study for the Freeborn Wind Energy Project Expansion Area (November 17, 2017) (Schedule 7), and an Avian Use Study Freeborn Wind Energy Project Final Report Addendum (November 27, 2017). (Schedule 8.)

Q. Please summarize the scope and results of these studies?

A. In the Avian Use Study Freeborn Wind Energy Project Expansion Area (November 17, 2017) (Schedule 7), WEST completed a bird use survey for the Project Expansion Area from October 2016 – September 2017. The Study consisted of

large bird, small bird, and wetland bird use surveys to assess temporal and spatial use of the expansion area.

In the Avian Use Study Freeborn Wind Energy Project Final Report Addendum (November 27, 2017) (Schedule 8), WEST completed a bird use survey between May 26 and September 22, 2017 for the initial Project Area. These surveys were conducted in response to a request by the USFWS to continue studying the original Project Area while avian surveys were ongoing in the expansion area. Large bird use surveys were conducted once a month in summer (May 27 – September 2) and fall (September 3 – September 22) in the Project Area.

The federally protected bald eagle was observed periodically, most often in the winter. No federal- or state-threatened or endangered species were observed during all bird use surveys. The complete reports are available in Schedule 7 and Schedule 8.

Q. The Association of Freeborn County Landowners ("AFCL") and its member, Dorenne Hansen, have alleged additional eagle nests in the Project Area in their comments in the docket. Has Freeborn Wind undertaken any further investigation to determine whether additional eagle nests are present?

A. Yes. In comment letters, AFCL and Ms. Hansen alleged that there were eagle nests north of the Project Area in the St. Johns Community in Albert Lea, GIS coordinates: 43.670554 N 93.393329 W and east of Bridge Avenue in Albert Lea (Nest 2), GIS coordinates: 43.669976 N 93.353687 W.[5] Both locations are northwest of the Project area. These two locations were in addition to the three listed in Ms. Hansen's July 2017 letter.

[5] Comment by Dorenne Hansen (Oct. 9, 2017) (eDocket No. 201710-136262-01); Comment by AFCL (Oct. 9, 2017) (eDocket No. 201710-136301-01).

Freeborn Wind again retained WEST this fall to conduct an additional site visit on November 19, 2017 to investigate the two Albert Lea locations listed above. The St. Johns Community nest had not been observed previously, and it is unknown when the nest was constructed. This nest is located northwest of Albert Lea, more than eight miles northwest of the Project boundary. It was a large stick nest that was the size and structure of a large raptor nest. The location east of Bridge Avenue, according to the coordinates provided by Ms. Hansen, was in a grass field with no trees. However, a nest was documented approximately 150 meters east of this location during the 2017 aerial nest survey and was observed again during the November 2017 visit. This nest is located approximately 6 miles northwest of the project boundary. This nest was documented during the aerial survey as an occupied/active bald eagle nest.

WEST also looked at a third site using alternative coordinates that were provided for a prior alleged nest location in Glenville, North of 110th St 1/2 mile and west of 840th Avenue, GIS Coordinates: 43.520563 N 93.19141302W. WEST had previously investigated the site using GIS coordinates: 43.529685 N 93.529685W provided by Ms. Hanson in her original comments. The original nest location from the July 2017 letter was already documented as a small stick nest (not of size or structure to be an eagle nest) during the 2017 aerial nest survey. The follow up check in November 2017 was at the new coordinates, which were about 630 meters to the east of the previous location. No nest was observed in the location of the new coordinates.

Q. Can you please summarize the findings of all of the nest surveys that WEST has completed for the Project?

A. WEST's nest surveys document that there are no active eagle nests within one half mile of any turbine.

Q. What if raptor nests are identified during Project construction and/or operation?

A. The Project's Draft ABPP is designed to address potential unexpected Project impacts on avian species, and it identifies measures that will be followed in the event that new nests are discovered. The conditions in the adaptive management plan in the ABPP were recommended by the USFWS and developed in coordination with the agency. (*See* Draft ABPP Section 6.2.3). The ABPP also provides for post-construction monitoring. These provisions will be included in the final ABPP.

VII. CONCLUSION

Q. Does this conclude your Direct Testimony?

A. Yes.

Raptor Nest Survey

Freeborn Wind Energy Project Expansion Area

Freeborn County, Minnesota and Worth County, Iowa

Final Report

March 29 – April 6, 2017

Prepared for:

Freeborn Wind Energy LLC

One South Wacker Drive, Suite 1800
Chicago, Illinois 60606

Prepared by:

Sandra Simon and Derek Hamilton

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 350
Golden Valley, Minnesota 55437

October 13, 2017

WEST inc.

STUDY PARTICIPANTS

Western EcoSystems Technology

Sandra Simon	Project Manager
Todd Mattson	Senior Manager
Derek Hamilton	Biologist
Josh Albers	Field Biologist
Adam Kreger	GIS Specialist
Jeanette Haddock	Independent Reviewer
Katie Michaels	Technical Editor
Jennifer Olson Krengel	Technical Editor

REPORT REFERENCE

Simon, S. and D. Hamilton. 2017. Raptor Nest Survey, Freeborn Wind Energy Project Expansion Area, Freeborn County, Minnesota and Worth County, Iowa. Final Report: March 29 – April 6, 2017. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 13 pages.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

Freeborn Wind Energy LLC (Freeborn) has proposed development of the Freeborn Wind Energy Project (Project) and Expansion Area (Project Expansion Area) in Freeborn County, Minnesota and Worth County, Iowa (Figure 3.1). Freeborn requested Western EcoSystems Technology, Inc. (WEST) conduct an aerial raptor nest survey to record bald eagle (*Haliaeetus leucocephalus*) and other raptor nests in the Project Expansion Area and established buffers (Study Area). The aerial survey was conducted in accordance with the United States (U.S.) Fish and Wildlife Service (USFWS) *Eagle Conservation Plan Guidance: Module 1 – Land-based Wind Energy, Version 2* (ECPG; USFWS 2013).

The objective for this survey was to document bald eagle nests within 16.1 kilometers (km; 10 miles [mi]) of the Project Expansion Area, and survey for and record bald eagle and other raptor nests found within the Project Expansion Area and a 3.2-km (2.0-mi) buffer (Figure 3.1). The aerial raptor nest survey was conducted from March 29 – April 6, 2017.

Additionally, Freeborn is currently seeking a Large Wind Energy Conversion System Site Permit for the Freeborn Wind Energy Project in Freeborn County, Minnesota (Docket Number IP-6946/WS-17-410). In response to an application with the Minnesota Public Utilities Commission, a local landowner submitted a comment letter dated July 2, 2017 indicating that the Draft Avian and Bat Protection Plan prepared for the Project did not identify three nests, which occurred within the Project area. Based on this letter, Freeborn contracted WEST to: 1) review existing nest data from previous nest surveys of the Project; and 2) conduct follow-up nest surveys and monitoring of the three potential nests in question. The objective of the follow-up surveys was to determine if raptor nests were present at these three sites and to document nest status and species for any nests present. The follow-up nest surveys and monitoring were conducted on July 10, 2017. The results of the follow-up nest surveys and monitoring are documented below.

2 STUDY AREA

The 22,482-hectare (55,553-acre) Project Expansion Area is located in Freeborn County, Minnesota and Worth County, Iowa. Two buffer areas were delineated for the Study Area. A 16.1-km (10-mi) buffer was established for surveying bald eagle nests, and a 3.2-km (2.0-mi) buffer was established for surveying nests of all raptor species (Figure 3.1). Both buffers included portions of Freeborn and Mower counties in Minnesota and Worth and Mitchell counties in Iowa (Figure 3.1).

The Project Expansion Area is located in the Eastern Iowa and Minnesota Drift Plains Level IV Ecoregion, within the Western Corn Belt Plains Level III Ecoregion (US Environmental Protection Agency [USEPA] 2013a), which covers much of Iowa and portions of southern Minnesota and eastern Nebraska. The Western Corn Belt Plains Ecoregion is composed of glaciated till plains and undulating loess plains. Much of the region was originally dominated by tall-grass prairie, riparian forest, oak (*Quercus*)-prairie savannas, and woody and herbaceous wetlands. Today,

most of the area has been cleared for highly productive farms producing corn (*Zea mays*), soybeans (*Glycine max*), and livestock. Many smaller streams in this ecoregion have been tilled, ditched, and tied into existing drainage systems, which has caused a reduction in the amount of aquatic habitat (USEPA 2013b). Topography in the region is nearly flat to gently rolling, with elevations ranging from 343 – 422 meters (m; 1,125 – 1,385 feet [ft]) above sea level.

3 METHODS

3.1 Aerial Raptor Nest Survey

An aerial raptor nest survey was conducted from a helicopter by two qualified biologists on March 29 – April 6, 2017. The survey was timed to coincide with the period when eagles were likely incubating eggs or tending young, based on chronology for nesting bald eagles in the region (USFWS *National Bald Eagle Management Guidelines* [USFWS 2007]).

A survey route was planned using aerial imagery and the U.S. Geological Survey (USGS) 2011 National Land Cover Database (NLCD; Homer et al. 2015) covering all suitable bald eagle and other raptor nesting habitat within 16.1 km (10 mi) of the Project Expansion Area. Suitable nesting habitat included wooded areas, riparian corridors, and forested margins of waterbodies. Bald eagle nests are typically placed near the tops of live trees in a main fork that can support the weight of the nest, and are typically a large open platform. Bald eagle nests occur in deciduous or coniferous trees (Buehler 2000).

All raptor and eagle nests found within suitable habitat within the Project Expansion Area and a 3.2-km (2.0-mi) buffer; and all eagle nests found within a 16.1-km (10-mi) buffer of the Project Expansion Area were recorded. Raptors include kites, accipiters, buteos, harriers, eagles, falcons, and owls.

Within the Study Area, transects were flown approximately 0.4 and 0.8 km (0.3 to 0.5 mi) apart. The survey track was recorded using a handheld global positioning system (GPS) unit to ensure all of the Study Area was adequately covered. The helicopter was positioned to allow thorough visual inspection of the habitat, and in particular, to provide a view of the tops of the tallest dominant trees where bald eagles generally prefer to nest (Buehler 2000). Biologists used binoculars when necessary to identify nesting raptor species and potential eagle nests. The helicopter was flown approximately 46 to 61 m (150 to 200 ft) above ground level at an airspeed of approximately 121 km (75 mi) per hour. Surveys were conducted between 08:00 hours and 17:00 hours.

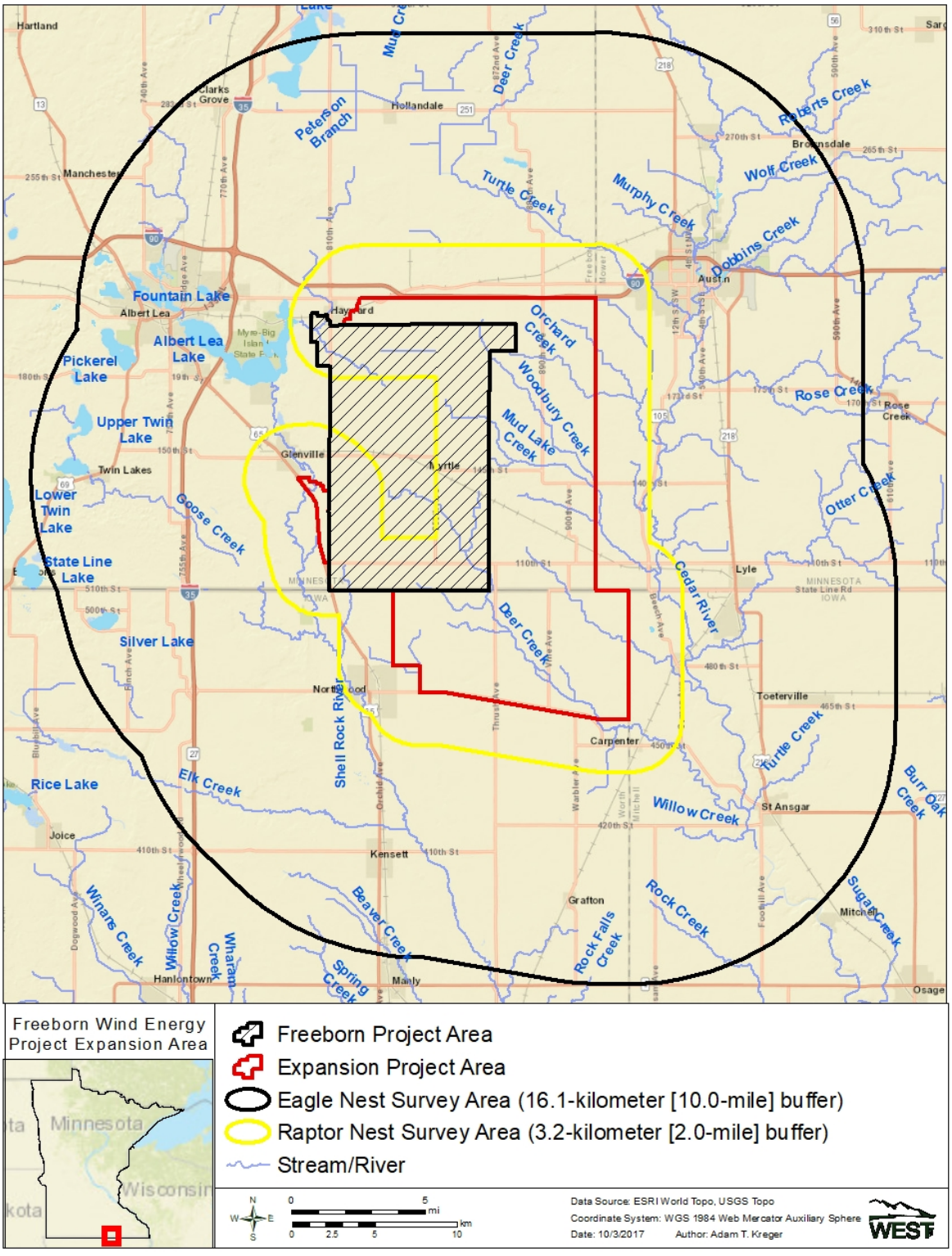


Figure 3.1. Location of the Freeborn Wind Energy Project Expansion Area and associated 3.2-kilometer (2.0-mile) and 16.1-kilometer (10.0-mile) buffers included in the aerial raptor nest survey conducted from March 29 – April 6, 2017.

Data recorded for each stick nest site included:

- Nest Identification
- Species occupying the nest
- Nest condition (i.e., poor, fair, good, excellent)
- Nest substrate
- Nest status (i.e., occupied or unoccupied, number of adults and young present)
- Nest location (marked with a hand-held GPS unit)

Included below are descriptions of terms used during the documentation of nests (see Section 4 - Results).

Nest Identification (ID) - A unique nest identification number was assigned for each nest documented.

Species - A species was assigned to each nest when possible, otherwise, it was classified as an unknown raptor nest. Nests documented as unknown raptor species were defined as any stick nest that did not hav an occupant associated with it at the time of the survey. Many times a nest will become abandoned or no longer used, and over time, may become a historic nest site. Unknown raptor nests, including old nests or nests that could become suitable for raptors, were documented in order to populate a nest database to ensure that future surveys include all potentially suitable nest sites.

Nest Condition - Nest condition was categorized using descriptions ranging from poor to excellent. Although the determination of nest condition can be subjective and may vary between observers, it gives a general sense of when a nest or nest site may have last been used. Nests in poor condition are typically dilapidated (e.g., in disrepair, sloughing, or sagging heavily) and require major repair in order to be suitable for successful nesting. A nest in fair condition is not dilapidated, but needs significant repair in order to be used. Nests in good condition only need minor attention to be suitable for nesting; while nests in excellent condition were those that appeared to have been well maintained, had a well-defined bowl shape, were not sagging or sloughing, and were deemed suitable for nesting.

Nest Substrate - The substrate in which a nest was observed was recorded to provide observers a visual reference. Common substrates used by raptors include manmade structures, such as power lines, nest platforms, or dock hoists; and coniferous and deciduous trees.

Nest Status - Basic nest use was categorized consistent with definitions from the ECPG (USFWS 2013). Nests were classified as occupied if any of the following were observed at the nest structure: 1) an adult in an incubating position; 2) eggs; 3) nestlings or fledglings; 4) occurrence of a pair of adults or sub-adults; 5) occurrence of sub-adults; 6)

a newly constructed or refurbished stick nest in the area where territorial behavior of a raptor had been observed early in the breeding season; or 7) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests were further classified as active if an egg or eggs had been laid or nestlings were observed, or inactive if no eggs or chicks were present. A nest that did not meet the above criteria for occupied was classified as unoccupied.

Nest location – The easting and northing of each nest location was recorded using a hand held GPS unit.

3.2 Ground-Based Follow-up Nest Surveys and Monitoring

Ground-based follow-up nest surveys and monitoring also were conducted at the three potential raptor nests locations identified in the landowner comment letter dated July 2, 2017, which was in response to Freeborn's application with the Minnesota Public Utilities Commission. The three nest locations identified in that letter were as follows:

- **Nest 1** (Nest 1489[1]) – North of 110th St 1/2 mile and west of 840th Ave, Glenville MN (easting: 483909 northing: 4818540)
- **Nest 2** – 140th St and 1/2 miles west of 830th Ave, Glenville MN (easting: 482279 northing: 4822801)
- **Nest 3** (Nest 1529) – 52717 173rd St, Austin MN (easting: 501193 northing: 4828085)

Data were reviewed from the aerial raptor survey conducted within the Project area and a 16.1-km (10.0-mi]) buffer area in March 2015 (Mattson et al. 2015), the ground raptor nest survey conducted in March 2016 within the Project area and a 3.2-km (2.0-mi) buffer area (Simon and Mattson 2016), and the aerial raptor nest survey within the Study Area (as defined in this report) in March – April 2017 to determine if the three potential nests were documented in any previous surveys.

On July 10, 2017, the three potential nest locations were surveyed from public roads with binoculars and a spotting scope to determine if there was a nest at the location described, if the nest was occupied and active, the species using the nest, and to determine whether the nest was the size and structure consistent with a bald eagle nest. Nest observations were made from all possible vantage points off of public roads. If nest species and occupancy could not be determined from public roads, the nest location was monitored for up to 4 hours to document if birds were leaving or coming to the nest, and to determine species using the nest. Data collected was recorded in a datasheet for each nest location to document survey results.

[1] Nest number in parenthesis provides the corresponding WEST nest identification. See Figure 4.1. Original nest labeling was retained to coincide with the response letter nest labels.

4 RESULTS

4.1 Aerial Raptor Nest Survey

A total of 54 raptor nests, representing three raptor species, and three great blue heron (*Ardrea herodias*) rookeries were detected during the aerial surveys conducted from March 29 – April 6, 2017 (Figure 4.1, Table 4.1). Fourteen confirmed bald eagle nests were documented in the Study Area (including one follow up nest confirmed during avian use surveys [Nest 0005]), and two additional nests were of the size and structure typical of bald eagle nests. Thirteen occupied and active bald eagle nests and one occupied and inactive bald eagle nest were identified within the Study Area. Other nests identified in the Study Area included two great horned owl (*Bubo virginianus*) nests, one unidentified owl nest, 21 red-tailed hawk (*Buteo jamaicensis*) nests[2], and 16 nests of unknown species. Nine of these 16 nests were considered occupied based on the criteria described in Section 3.1. No occupied or potential bald eagle nests were located within the Project area or Project Expansion Area (Figure 4.1, Table 4.1). No nests of federally or state-listed threatened or endangered raptor species were observed in the Study Area.

In addition, a follow up ground check on an occupied and active bald eagle nest (Nest 0005) not documented in this 2017 aerial survey, but previously documented in the 2015 aerial nest survey (Mattson et al. 2015) and the 2016 ground nest survey (Simon and Mattson 2016), was conducted to determine if the nest was still present and what the status of the nest was. While conducting avian use surveys on May 26, 2017, Nest 0005 was documented as an occupied and active bald eagle nest. The nest had two adult bald eagles in or next to the nest and at least one chick in the nest. Nest 0005 was located outside the Project Expansion Area but within the 3.2-km (2.0-mi) buffer.

[2] Red-tailed hawk Nest 1497 has been labeled on Figure 4.1 for clarity as it is largely overlapped by a great horned owl nest symbol due to close proximity.

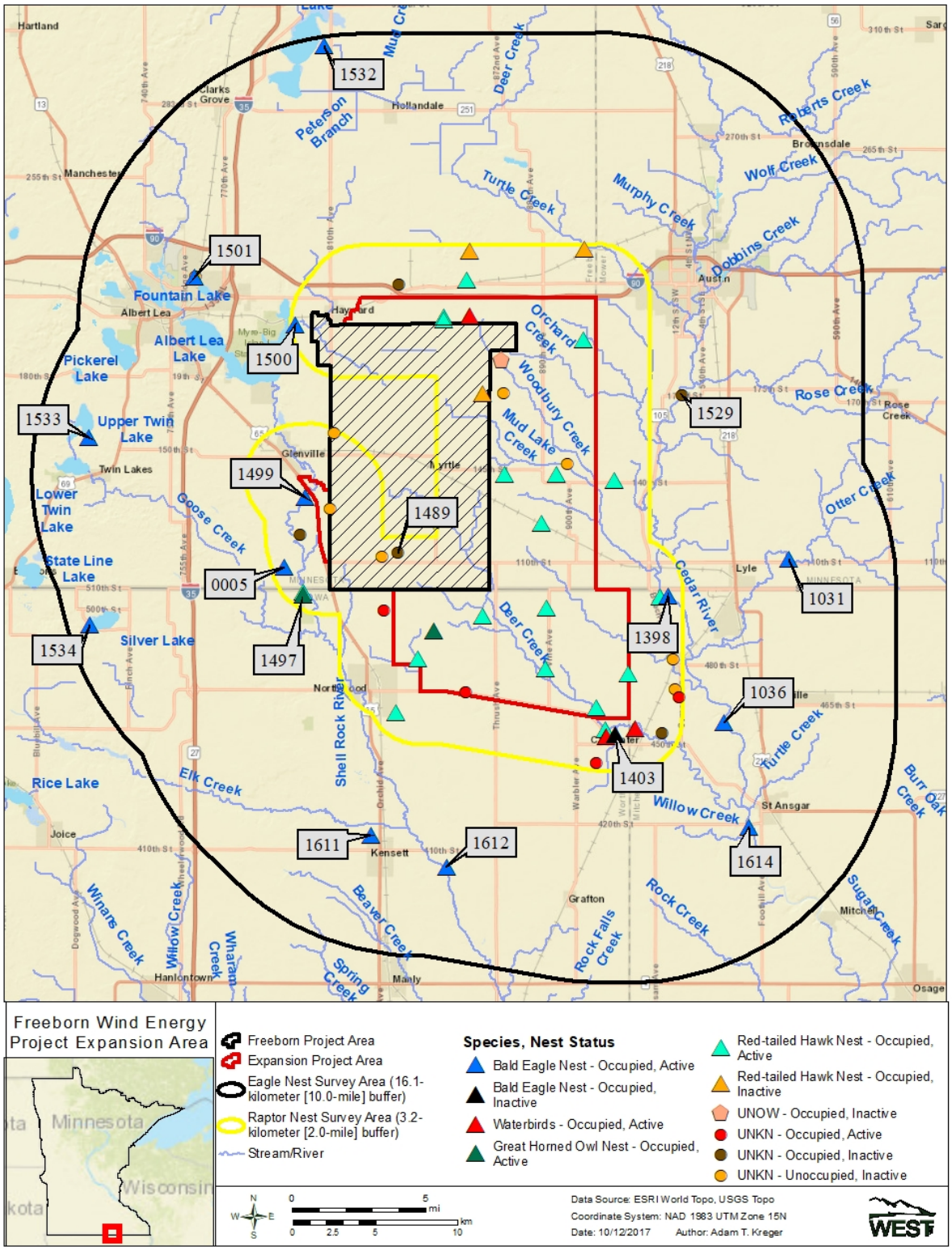


Figure 4.1. Location of nests documented within the Freeborn Wind Energy Project Expansion Area and 3.2-kilometer (2.0-mile) and 16.1-kilometer (10.0-mile) buffers during the aerial raptor nest survey conducted from March 29 – April 6, 2017.

BAEA = bald eagle; Waterbirds =heron/egret rookery; GHOW = great horned owl; RTHA = red-tailed hawk; UNKN = unknown species.

Table 4.1. Raptor nests identified during the aerial raptor nest survey conducted in the Freeborn Wind Energy Project Expansion Area and 3.2-kilometer (2.0-mile) and 16.1-kilometer (10.0-mile) buffers from March 29 – April 6, 2017.

Nest ID	Species[1]	Nest Status	Nest Condition	Substrate[2]	Easting	Northing	Located within Project Expansion Area?[3]	Comments
0005	BAEA	Occupied/Active	Good	DT	477105	4817686	No	Ground follow up check. Two adults in or near nest. At least one chick observed
1031	BAEA	Occupied/Active	Good	DT	507711	4818145	No	Incubating BAEA
1036	BAEA	Occupied/Active	Good	DT	503742	4808282	No	Incubating BAEA
1395	UNKN	Occupied/Active	Good	T	501051	4809783	No	Unknown species
1396	UNKN	Unoccupied/Inactive	Disrepair	T	500784	4810221	No	Unknown species
1397	UNKN	Unoccupied/Inactive	Good	T	500675	4812062	No	Unknown species
1398	BAEA	Occupied/Active	Good	DT	500347	4815957	No	At least one chick visible; Incubating adult flushed
1399	RTHA	Occupied/Active	Good	T	499871	4815900	No	Incubating RTHA
1400	UNKN	Occupied/Inactive	Good	T	500000	4807579	No	New materials
1401	RTHA	Occupied/Active	Good	T	497922	4811218	Yes	Incubating
1402	Water-birds	Occupied/Active	Good	T	498367	4807868	No	Large rookery
1403	BAEA	Occupied/Inactive	Good	DT	497147	4807508	No	New materials; No birds
1404	RTHA	Occupied/Active	Good	T	497131	4822967	No	Incubating
1405	RTHA	Occupied/Active	Good	T	496582	4807830	No	Incubating
1406	Water-birds	Occupied/Active	Good	T	496649	4807433	No	Rookery - move point
1407	UNKN	Occupied/Active	Good	T	496007	4805794	No	Unknown species; Blue egg
1408	RTHA	Occupied/Active	Good	T	496033	4809154	Yes	Incubating
1409	RTHA	Occupied/Inactive	Good	T	495293	4836991	No	New materials
1410	RTHA	Occupied/Active	Good	T	495221	4831444	Yes	
1411	UNKN	Unoccupied/Inactive	Disrepair	T	494235	4823918	Yes	Unknown species
1412	RTHA	Occupied/Active	Good	T	493612	4823312	Yes	Incubating
1413	RTHA	Occupied/Active	Good	T	492939	4811536	Yes	Incubating; Flushed - Two eggs

Table 4.2 (*continued).* Raptor nests identified during the aerial raptor nest survey conducted in the Freeborn Wind Energy Project Expansion Area and 3.2-kilometer (2.0-mile) and 16.1-kilometer (10.0-mile) buffers from March 29 – April 6, 2017.

Nest ID	Species[1]	Nest Status	Nest Condition	Substrate[2]	Easting	Northing	Located within Project Expansion Area?[3]	Comments
1414	RTHA	Occupied/Active	Good	T	492974	4815184	Yes	Incubating
1415	RTHA	Occupied/Active	Good	T	492671	4820337	Yes	Incubating
1416	UNOW	Occupied/Inactive	Good	T	490252	4830256	Yes	
1417	UNKN	Unoccupied/Inactive	Good	T	490373	4828222	Yes	Unknown species
1418	RTHA	Occupied/Active	Good	T	490448	4823297	Yes	Incubating
1477	RTHA	Occupied/Active	Good	T	489142	4814726	Yes	Incubating RTHA
1478	RTHA	Occupied/Inactive	Good	T	489101	4828212	No	
1479	UNKN	Occupied/Active	Good	T	488096	4810068	Yes	Unknown species; One egg
1480	Water-birds	Occupied/Active	Good	T	488316	4832931	Yes	Small rookery in middle of forest patch
1481	RTHA	Occupied/Active	Good	T	488129	4835089	No	Leucistic bird; Incubating
1482	RTHA	Occupied/Inactive	Good	T	488322	4836827	No	New materials
1483	RTHA	Occupied/Active	Good	T	486788	4832838	Yes	Two chicks
1484	RTHA	Occupied/Active	Good	T	486747	4832663	Yes	Three eggs
1486	GHOW	Occupied/Active	Good	T	486181	4813804	Yes	Flushed; Two owlets
1487	RTHA	Occupied/Active	Good	T	485189	4812101	Yes	Incubating RTHA
1488	UNKN	Occupied/Inactive	Good	T	484056	4834774	No	Unknown species
1489	UNKN	Occupied/Inactive	Good	T	483970	4818508	No	Unknown species; Small stick nest
1490	RTHA	Occupied/Active	Good	T	483846	4808852	No	Incubating RTHA
1491	UNKN	Occupied/Active	Good	T	483139	4815053	No	Small stick nest
1492	UNKN	Unoccupied/Inactive	Disrepair	T	483002	4818310	No	Unknown species; Sticks/leaves
1494	UNKN	Unoccupied/Inactive	Good	T	479904	4821205	Yes	Unknown species
1495	UNKN	Unoccupied/Inactive	Good	T	480101	4825775	No	Unknown species
1496	GHOW	Occupied/Active	Good	T	478264	4815974	No	Two owlets
1497	RTHA	Occupied/Active	Good	T	478243	4816161	No	Two eggs
1498	UNKN	Occupied/Inactive	Good	T	478039	4819598	No	New materials

Table 4.3 (*continued).* Raptor nests identified during the aerial raptor nest survey conducted in the Freeborn Wind Energy Project Expansion Area and 3.2-kilometer (2.0-mile) and 16.1-kilometer (10.0-mile) buffers from March 29 – April 6, 2017.

Nest ID	Species[1]	Nest Status	Nest Condition	Substrate[2]	Easting	Northing	Located within Project Expansion Area?[3]	Comments
1499	BAEA	Occupied/Active	Good	DT	478371	4821913	No	Incubating BAEA between poles 54 and 55
1500	BAEA	Occupied/Active	Good	DT	477750	4832398	No	Incubating BAEA
1501	BAEA	Occupied/Active	Good	DT	471648	4835249	No	Adult BAEA; Incubating; Flushed – Two eggs
1502	UNKN	Unoccupied/Inactive	Disrepair	DT	471723	4835282	No	Old BAEA nest about 200 feet from nest 1501
1529	UNKN	Occupied/Inactive	Good	DT	501192	4828086	No	Adult BAEA on top of nearby pine chased CAGO off of nest; four eggs revealed; in follow up transect no eggs or large birds were observed in the nest.
1532	BAEA	Occupied/Active	Good	DT	479543	4849303	No	Incubating BAEA
1533	BAEA	Occupied/Active	Good	DT	465241	4825575	No	Incubating BAEA
1534	BAEA	Occupied/Active	Good	DT	465306	4814210	No	Two adult BAEA's flew from the nest; Two eggs
1611	BAEA	Occupied/Active	Good	CT	482372	4801407	No	Adult BAEA on nest with prey
1612	BAEA	Occupied/Active	Good	DT	486928	4799500	No	Adult BAEA on nest with prey; fed eaglets prey - hard to tell prey from eaglets
1614	BAEA	Occupied/Active	Good	T	505270	4801881	No	Incubating BAEA; Flushed – Two eggs

1 BAEA = bald eagle; CAGO = Canada goose; GHOW = great horned owl; RTHA = red-tailed hawk; UNKN = unknown species, Waterbirds = heron/egret rookery, UNOW = unknown owl

2 CT = coniferous tree, DT = deciduous tree, T = tree (type of tree not recorded)

3 Only bald eagle nest or for nests with size and structure consistent with bald eagle nests are labeled on Figure 4.1

4.2 Ground-Based Follow-up Nest Surveys and Monitoring

None of the three nests identified by the landowner in the comment letter were documented in the Study Area during the 2015 or 2016 raptor nest surveys. However, two of these nests (Nest 1489 and 1529) were documented during the March 29 – April 6, 2017 aerial raptor nest survey (Figure 4.1). As discussed below, due to full leaf out at the time of the July 10, 2017 follow up nest surveys, no nest structures could be observed.

Nest 1 (Nest 1489)

Nest 1 was documented during the March 29 – April 6, 2017 aerial survey as a small raptor stick nest of unknown species, inactive, and not consistent with the size or structure of a bald eagle nest. Although no nest could be observed due to full leaf out during the ground follow up effort on July 10, 2017, the nest area was monitored for approximately 3 hours to determine if any large birds in the area were potentially using the nest. Only one observation, a turkey vulture, was recorded during the entire survey duration, but it was not in the vicinity of the nest location.

Nest 2

Nest 2 was not documented in the March 29 – April 6, 2017 aerial survey. Although the woodlot and canopy trees were readily observable from the public road, no large stick nest structures similar to those used by eagles were observed. A stick nest potentially used by smaller raptors might occur undetected in the denser understory trees, but no nests were observed from the road during this survey. No large birds were observed in or near this woodlot during the 3-hour survey period on July 10, 2017.

Nest 3 (Nest 1529)

Nest 3 was documented in the March 29 – April 6, 2017 aerial survey as a large stick nest of an unknown species, inactive, and consistent with the size and structure of a typical bald eagle nest. During the March 29 – April 6, 2017 aerial survey a Canada goose (*Branta canadensis*) was observed in the nest. When approaching the nest during the initial aerial survey transect, a bald eagle chased the Canada goose out of the nest, revealing four large eggs (likely goose eggs[3]). Approximately 3 hours after the initial survey transect, another transect was flown incorporating this nest to re-assess it's status. Although the surveyor had a clear view of the nest, no eggs or large birds were observed in the nest during the second over flight.

On July 10, 2017, Nest 3 was monitored from a nearby public road for about 4 hours. Due to full leaf out conditions, the nest itself was not visible from the observation point. However, no large birds were seen coming or going to the Nest 3 location. An adult bald eagle was observed perched along Cedar River approximately 400 m (1,312 ft) from the approximate nest location, and two observations of adult bald eagles were observed flying along Cedar River approximately 40 m (131 ft) away from Nest 3.

[3] The clutch size for bald eagles is typically one to two eggs; rarely does a bald eagle nest include up to three eggs (Buehler 2000).

5 DISCUSSION

The aerial raptor nest survey focused on detecting bald eagle nests within the Project Expansion Area and 16.1-km (10.0-mi) buffer and other raptor nests within the Project Expansion Area and 3.2-km (2.0-mi) buffer. Thirteen occupied and active bald eagle nests (including the one follow up nest confirmed during avian use surveys [Nest 0005]) and one occupied and inactive bald eagle nest were identified within the Study Area; and an additional two nests were of size and structure typical of bald eagle nests. None of these nests occurred within the Project Expansion Area itself, but five occurred within the 3.2-km (2.0-mi) buffer of the Project Expansion Area.

The absence of bald eagle nests within the Project Expansion Area is likely due to the land cover within the Project Expansion Area, which is dominated by cultivated agriculture with no prominent river or lake systems which might provide attractive nesting or foraging opportunities for bald eagles. In contrast, large areas of mature woody habitats and associated wetland complexes occur outside the Project Expansion Area, including areas along Cedar River, located 3.2 km (2.0 mi) east of the Project Expansion Area; Shell Rock River, located about 1.6 km (1.0 mi) west of the Project Expansion Area, with a small segment running through the western portion of the Project Expansion Area; and along Albert Lea Lake, located about 4.8 km (3.0 mi) west of the Project Expansion Area.

6 REFERENCES

Buehler, D. A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). P. G. Rodewald, ed. The Birds of North America Online. Cornell Lab of Ornithology. Ithaca, New York. Retrieved from the Birds of North America Online: https://birdsna.org/Species-Account/bna/species/baleag; doi: 10.2173/bna.506

ESRI. 2017. World Imagery and Aerial Photos. ArcGIS Resource Center. ESRI, producers of ArcGIS software. Redlands, California. Information available online from: http://www.arcgis.com/home/webmap/viewer.html?useExisting=1

Homer, C. G., J. A. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. D. Herold, J. D. Wickham, and K. Megown. 2015. Completion of the 2011 National Land Cover Database for the Conterminous United States-Representing a Decade of Land Cover Change Information. Photogrammetric Engineering and Remote Sensing 81(5): 345-354. Available online at: http://www.mrlc.gov/nlcd2011.php

Mattson, T., K. Chodachek, S. Simon, S. Hamilton, and S. Agudelo. 2015. Raptor Nest Survey for the Freeborn Wind Energy Project, Freeborn County, Minnesota. Final Report: March 20 – August 13, 2015. Prepared for Freeborn Wind Energy LLC. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. September 2, 2016. 12 pages.

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

Simon, S. and T. Mattson. 2016. Eagle Nest Survey for the Freeborn Wind Project, Freeborn County, Minnesota. Final Report: March 29 – 31, 2016. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 6 pages.

U.S. Fish and Wildlife Service (USFWS). 2007. National Bald Eagle Management Guidelines. May 2007. Available online at: http://www.fws.gov/northeast/EcologicalServices/pdf/NationalBaldEagleManagementGuidelines.pdf and https://www.fws.gov/southdakotafieldoffice/NationalBaldEagleManagementGuidelines.pdf

U.S. Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Executive Summary and frontmatter + 103 pp. Available online at: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

U.S. Geological Survey (USGS). 2017. USGS Topographic Maps. Last updated January 17, 2017. Homepage available at: https://nationalmap.gov/ustopo/index.html

U.S. Geological Survey (USGS) National Land Cover Database (NLCD). 2011. National Land Cover Database 2011 (NLCD 2011). Multi-Resolution Land Characteristics Consortium (MRLC), National Land Cover Database (NLCD). USGS Earth Resources Observation and Science (EROS) Center, Sioux Falls, South Dakota. Available online at: http://www.mrlc.gov/nlcd2011.php; Legend at: http://www.mrlc.gov/nlcd11_leg.php

Avian Use Study
Freeborn Wind Energy Project Expansion Area
Freeborn County, Minnesota and Worth County, Iowa

Final Report

October 25, 2016 – September 26, 2017

Prepared for:

Freeborn Wind Energy LLC
One South Wacker Drive, Suite 1800
Chicago, Illinois 60606

Prepared by:

Sandra Simon and Guy DiDonato

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 350
Golden Valley, Minnesota 55427

November 17, 2017

STUDY PARTICIPANTS

Western EcoSystems Technology

Sandra Simon	Project Manager
Todd Mattson	Senior Manager
Guy DiDonato	Statistician
Jean-Paul Willson	Data Analyst
Carmen Boyd	Data Manager
Grant Gardner	GIS Analyst
Jeanette Haddock	Independent Reviewer
Dave Klein	Technical Editor
Dustin Glander	Field Technician

REPORT REFERENCE

Simon, S. and G. DiDonato. 2017. Avian Studies Freeborn Wind Energy Project Expansion Area, Freeborn County, Minnesota and Worth County, Iowa. Final Report: October 25, 2016 – September 26, 2017 Prepared for Freeborn Wind Energy LLC Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 45 pages + appendices.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

Freeborn Wind Energy LLC (Freeborn) is considering the development of the Freeborn Wind Energy Project (Project) and Expansion Area (Project Expansion Area) in Freeborn County, Minnesota and Worth County, Iowa (Figure 1). To support development of the Project, Freeborn contracted Western EcoSystems Technology, Inc. (WEST) to conduct pre-construction baseline surveys to estimate temporal and spatial avian use of the Project Expansion Area. The methods for this study were consistent with the U.S. Fish and Wildlife Service's (USFWS) *Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy Guidance* (ECPG; USFWS 2013), the USFWS' *Final Land-Based Wind Energy Guidelines* (USFWS 2012), as well as the Minnesota Department of Natural Resources (MNDNR) and the Minnesota Department of Commerce's (MNDOC) *Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota* (MNDNR 2012).

Study objectives were to assess the following for large birds, small birds, and wetland birds: 1) species composition, relative abundance, and diversity; 2) overall use, percent of use, and frequency of occurrence; 3) flight height; 4) and spatial use. Additional objectives were to document use of the Project Expansion Area by threatened, endangered, and sensitive avian species and eagles. The following report describes the results of the avian use study conducted in the Project Expansion Area from October 25, 2016 – September 26, 2017.

Freeborn expanded the Project area for potential siting of wind energy facilities to include additional areas in Minnesota and Iowa. A similar 15 month avian study was conducted for the original Project area in Freeborn County, Minnesota, and was summarized in a previous report (Simon and Mattson 2016). An additional 5 months of large bird avian use studies were conducted at the original Project area in Freeborn County, Minnesota from May – September 2017; the results of that study are presented under a separate cover.

2 STUDY AREA

The Project Expansion Area encompasses 22,482 hectares (ha; 55,553 acres [ac]) in Freeborn County, Minnesota and Worth County, Iowa (Figure 1). The original Project area is also shown on Figure 1 for reference.

The Project Expansion Area occurs in the Western Corn Belt Plains Ecoregion (U.S. Environmental Protection Agency [USEPA] 2013), characterized by glaciated till plains and undulating loess plains. Much of the region was originally dominated by tallgrass prairie, riparian forest, oak-prairie savannas, and woody and herbaceous wetlands. Today, most of the area has been cleared for farms producing corn, soybeans, and livestock (USEPA 2013).

Many smaller streams in the ecoregion have been tilled, ditched, and tied into existing drainage systems, resulting in a reduction in wetland and aquatic habitats in this ecoregion (USEPA 2016). Several streams are present in and adjacent to the Project Expansion Area, including

Orchard Creek, Woodbury Creek, and Mud Lake Creek in the eastern Project Expansion Area, Deer Creek in the southern Project Expansion Area, and a small segment of the Shell Rock River in the western Project Expansion Area (Figure 1).

According to the 2011 U.S. Geological Survey National Land Cover Database (NLCD; USGS NLCD 2011, Homer et al. 2015), the majority (90%) of the Project Expansion Area consists of cultivated croplands (Table 1 and Figure 2). Corn and soybean are the primary crops. The next most common cover type by area (approximately 6%) is developed open space, which primarily includes farmsteads and roads. Herbaceous and deciduous forest land cover types compose approximately 2% and 1% of the Project Expansion Area, respectively. The remaining land cover types each comprise less than 1% of the Project Expansion Area.

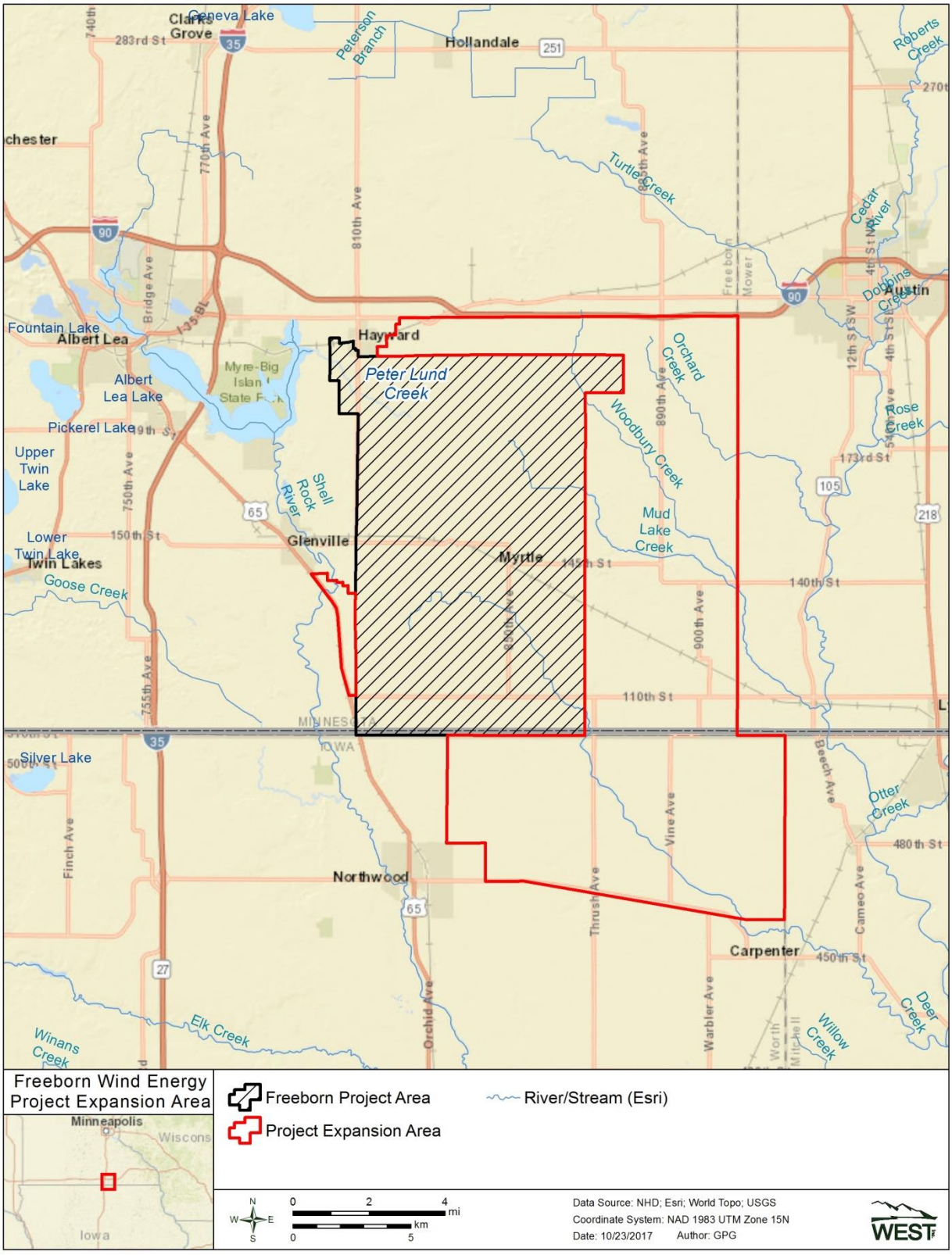


Figure 1. Location of the Freeborn Wind Energy Project Expansion Area in Freeborn County, Minnesota and Worth County, Iowa.

Table 1. 2011 National Land Cover Database land cover types within the Freeborn Wind Energy Project Expansion Area in Freeborn County, Minnesota and Worth County, Iowa.

Cover Type	Hectares	Acres	Percent (%)
Cultivated Crops	20,176	49,855	90
Developed, Open Space	1,230	3,041	6
Herbaceous	431	1,066	2
Deciduous Forest	227	561	1
Hay/Pasture	142	352	<1
Developed, Low Intensity	100	248	<1
Emergent Herbaceous Wetlands	86	212	<1
Woody Wetlands	46	113	<1
Developed, Medium Intensity	28	70	<1
Open Water	8	20	<1
Evergreen Forest	3	6	<1
Developed, High Intensity	2	6	<1
Barren Land	1	3	<1
Mixed Forest	0	0	0
Total[1]	**22,482**	**55,553**	**100**

Source: U.S. Geological Survey National Land Cover Database (USGS NLCD 2011), Homer et al. 2015
[1] Sums of values may not add to total value shown, due to rounding

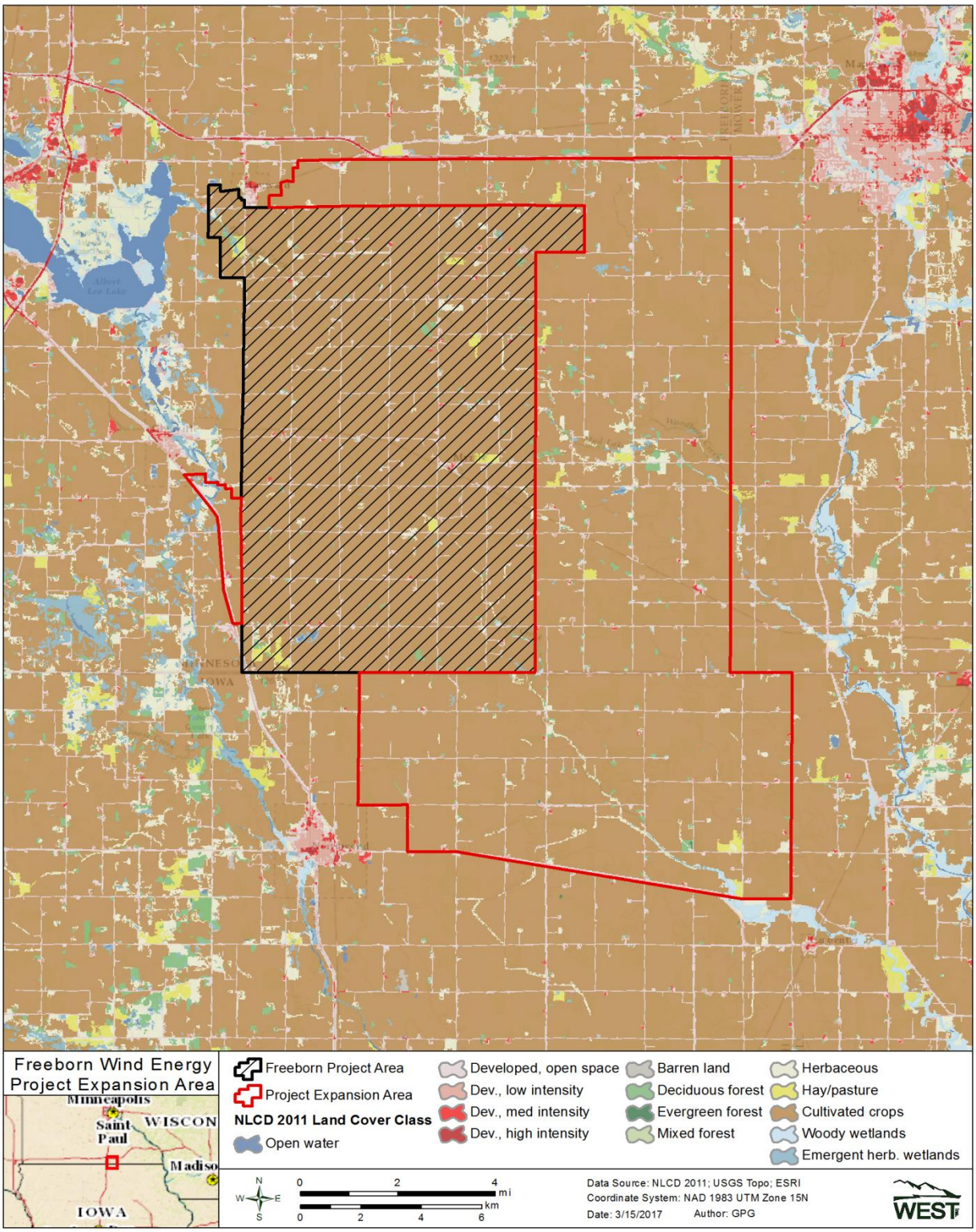


Figure 2. National Land Cover Database land cover types within and adjacent to the Freeborn Wind Energy Project Expansion Area in Freeborn County, Minnesota and Worth County, Iowa.

3 METHODS

3.1 Large Bird Use Surveys

Large bird use surveys were conducted using methods described by Reynolds et al. (1980). Thirty-three observation points[1] consisting of 800-meter (m; 2,625-foot [ft]) radius circular plots were established within the Project Expansion Area. Circular plots covered approximately 30% of the Project Expansion Area (Figure 3). Observation points (the center of the 800-m [2,625-ft] plot) were separated by at least 1,600 m (5,249 ft) to avoid overlap and were located along public roads using a systematic sampling scheme with a random start generated by ArcGIS (a Geographic Information System software program).

Large bird use surveys were conducted once per month during the following seasons: fall[2] (September 1 – November 8), winter (November 9 – March 13), spring (March 14 – May 31), and summer (June 1 – August 31). Surveys were conducted during daylight hours; survey periods were varied to approximately cover all daylight hours during a season. Observation points were planned to be surveyed the same number of times[3].

Point count surveys were conducted for 60 minutes. All large birds seen were recorded during each survey using a unique observation number, regardless of distance. In some cases, observations represented repeated sightings of the same individual. Observations of large birds outside the 800-m (2,625-ft) plot were recorded. These data were included in the development of species composition, relative abundance, and species diversity metrics, but were not included in analyses of avian use and flight heights. Large birds included the subtypes waterbirds, waterfowl, rails and coots, grebes and loons, gulls and terns, shorebirds, diurnal raptors, owls, vultures, upland game birds, doves/pigeons, large corvids (e.g., ravens, magpies, and crows), and goatsuckers.

[1] Based on request by Freeborn, two additional survey points were added to the survey effort (Points 44 and 45) in December 2016.

[2] The fall season includes: October 25 – November 8, 2016 and September 1 – 26, 2017.

[3] Some surveys were missed due to poor visibility as a result of weather conditions or site access issues (e.g., muddy roads).

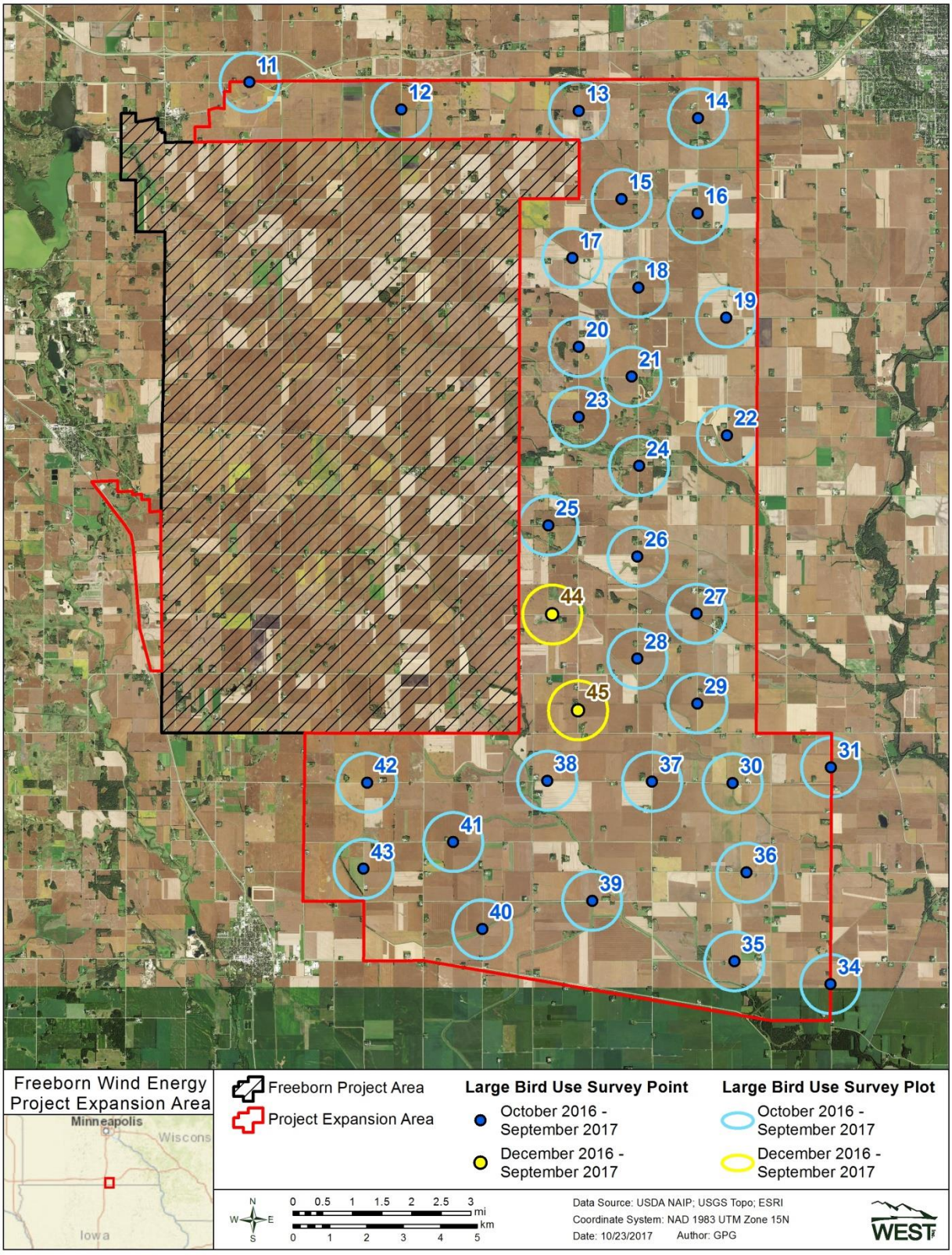


Figure 3. Location of large bird use survey plots in the Freeborn Wind Energy Project Expansion Area where surveys were conducted from October 25, 2016 – September 26, 2017.

The following information was recorded during each large bird use survey: date, start and end time, and weather information (i.e., temperature, wind speed, wind direction, precipitation, and cloud cover). Additionally, the following data were recorded for each observation:

- Species (or best possible identification)
- Number of individuals
- Distance from plot center when first observed
- Closest distance observed
- Flight height above ground
- Flight direction
- Activity (flying or perched)

Approximate flight height, flight direction, and distance from plot center at first observation were recorded to the nearest 5-m (16-ft) interval; the approximate lowest and highest heights were also recorded.

For bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*) observations, flight height, distance, and activity (i.e., flying or perched) were recorded during each 1-minute interval the eagle was within the 800-m (2625-ft) plot and at or below 200 m (656 ft) above ground level, per the ECPG (USFWS 2013). In addition, the time eagles were observed outside of plots or flying at higher altitudes was recorded, but not included in statistical analyses. The perch locations and flight paths of eagles were mapped to qualitatively assess areas of eagle use within the Project Expansion Area.

Wildlife incidental observations were recorded to provide information on wildlife seen outside of standardized surveys. All sensitive species were recorded along with unusual species or behavior observations, and birds observed outside of standardized survey plots. Incidental observations were recorded in a similar fashion to standardized surveys; the observation number, date, time, species, number of individuals, sex/age class, distance from observer, activity, and flight height above ground (for bird species) were recorded. The location of sensitive species was recorded by Universal Transverse Mercator coordinates using a hand-held Global Positioning System unit.

3.2 Small Bird Use Surveys

Small bird use surveys were conducted at 20 100-m radius (328-ft radius) circular plots established adjacent to forested areas (i.e., woodlots, shrubby areas, shelterbelts) along public roads within the Project Expansion Area (Figure 4). Small bird use surveys were conducted five times during spring (March 27 – May 31, 2017), during daylight hours, between approximately a half hour before sunrise and 4 hours after sunrise. Each plot was surveyed once per visit.

The following information was recorded during each small bird use survey: date, start and end time, and weather information (i.e., temperature, wind speed, wind direction, precipitation, and cloud cover). Additionally, the following data were recorded for each observation:

- Species (or best possible identification)
- Number of individuals
- Distance from plot center when first observed
- Closest distance observed
- Flight height above ground
- Flight direction
- Activity (flying or perched)

Small birds seen or heard during the 8-minute observation periods were recorded. Small birds observed outside the 100-m (328-ft) plots were recorded. These data were included in the development of species composition, relative abundance, and species diversity metrics, but were not included in analyses of avian use and flight heights. Approximate flight height and distance from plot center at first observation were recorded to the nearest 5-m (16-ft) interval; the approximate lowest and highest heights were also recorded. Wildlife incidental observations recorded during small bird use surveys were recorded as described in Section 3.1.

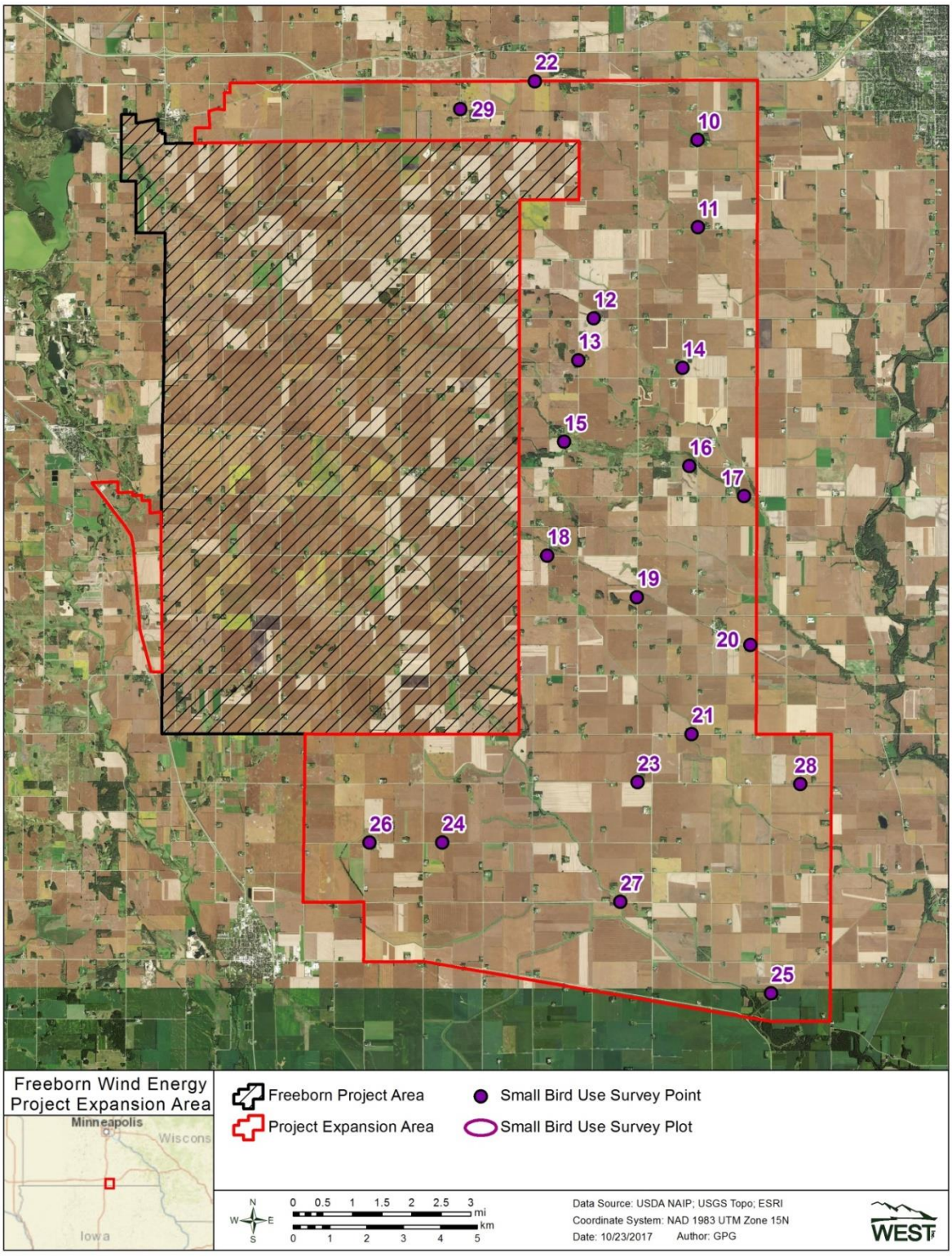


Figure 4. Location of small bird use survey plots in the Freeborn Wind Energy Project Expansion Area where surveys were conducted from March 27 – May 31, 2017.

3.3 Wetland Bird Use Surveys

Six 800-m (2,625-ft) radius circular plots adjacent to or within close proximity to wetlands and/or waterbodies were established within the Project Expansion Area (Figure 5). Based on available wetland/water resources in the Project Expansion Area, Points 4, 5, 6, and 7 were situated along wetlands or tributaries of Woodbury Creek in the central portion of the Project Expansion Area; and Points 8 and 9 were situated along Deer Creek in the southern portion of the Project Expansion Area.

The sampling protocol was designed to document bird use during spring migration and the early nesting season for wetland bird species[4], with at least one survey conducted to coincide with ice out (i.e., when the majority of waterbodies are free of ice) and peak waterfowl migration (MNDNR 2012). Wetland bird use surveys were conducted three times at intervals approximately 4 weeks apart during spring (March 29 and 31, April 29 and 30, and May 25 and 30, 2017). Wetland bird use surveys were conducted during daylight hours, between approximately dawn and 10:00 a.m. Each plot was surveyed once per visit.

Wetland birds and other large birds were recorded during wetland bird use surveys during 60-minute observation periods. Observations of wetland and large birds outside the 800-m (2,625-ft) plots were recorded. These data were included in the development of species composition, relative abundance, and species diversity metrics, but were not included in analyses of avian use and flight heights.

The following information was recorded during each wetland bird use survey: date, start and end time, and weather information (i.e., temperature, wind speed, wind direction, precipitation, and cloud cover). Additionally, the following data were recorded for each observation:

- Species (or best possible identification)
- Number of individuals
- Distance from plot center when first observed
- Closest distance observed
- Flight height above ground
- Flight direction
- Activity (flying or perched)

[4] The wetland bird use surveys were conducted to establish avian use around waterbodies or wetlands with an open water component. Although these surveys were designed to emphasize use by waterfowl and shorebirds, the wetland bird use surveys are not limited to these groups of birds.

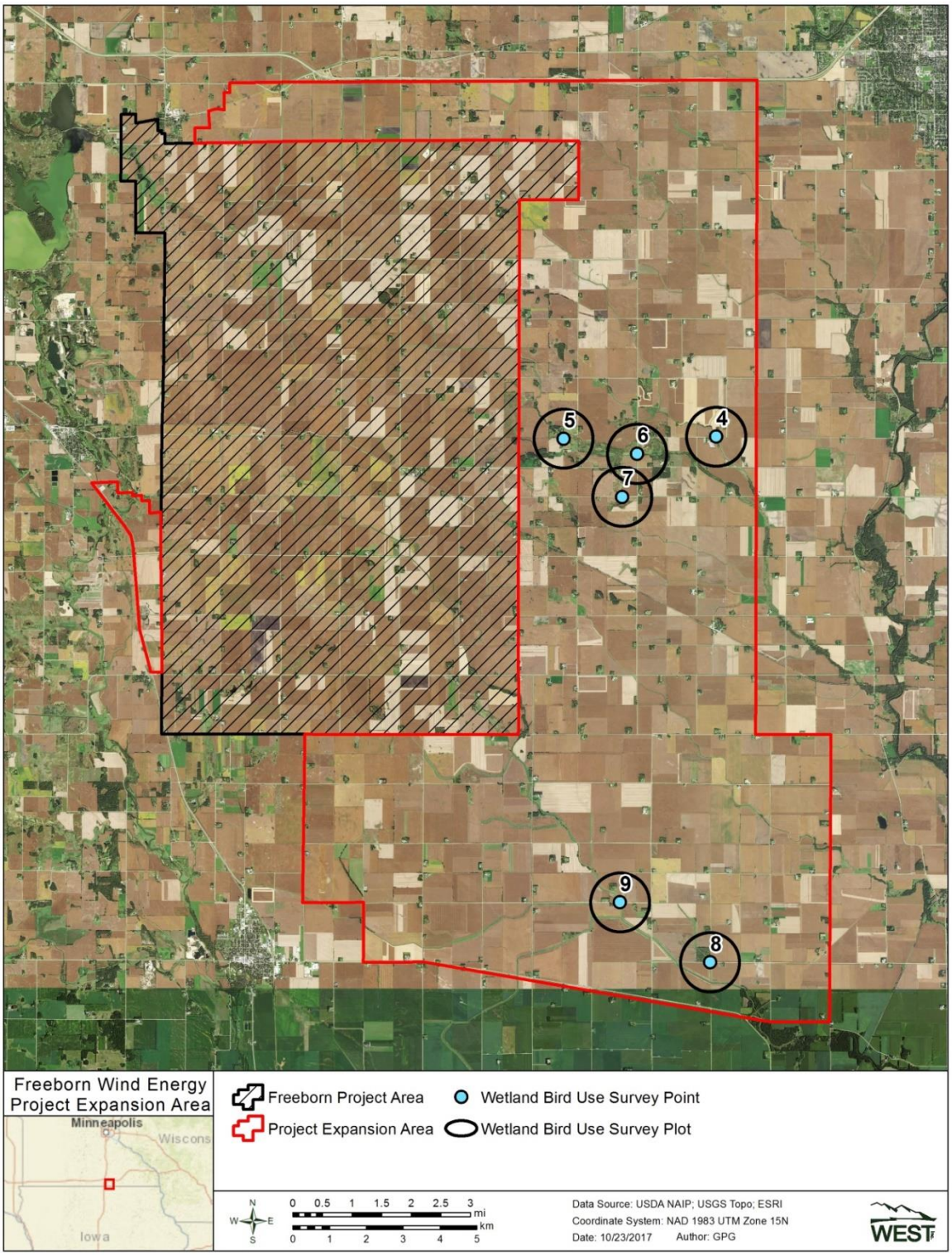


Figure 5. Location of wetland bird use survey plots in the proposed Freeborn Wind Energy Project Expansion Area where surveys were conducted from March 29 – May 30, 2017.

Approximate flight height, flight direction, and distance from plot center at first observation were recorded to the nearest 5-m (16-ft) interval; the approximate lowest and highest heights also were recorded.

Perches, on-water locations (i.e., birds observed swimming or floating on water), and flight paths of waterfowl, waterbirds, eagles, and other diurnal raptors were mapped to qualitatively show on maps the flight paths that were documented, flight locations within the wetland bird use plots, and flight direction (north/south, east/west). Aerial imagery was used to aid in recording locations of observations as accurately as possible. Wildlife incidental observations recorded during wetland bird use surveys were recorded as described in Section 3.1.

3.4 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 inspecting data forms for completeness, accuracy, and legibility. A data technician then compared a sample of records from an electronic database to the raw data forms and corrected any errors. Irregular codes or data suspected as questionable were discussed with the observer and/or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

A Microsoft® SQL Server database was developed to store, organize, and retrieve survey data. Data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. All data forms and electronic data files were retained for reference. QA/QC measurements implemented for report writing included review of the final document by a technical editor, statistician, peer (research biologist), independent reviewer, project manager, and senior manager.

4 DATA ANALYSIS

Data for each type of survey were analyzed separately (i.e., data were not combined among all studies). Data analysis for the large bird use surveys, small bird use surveys, and wetland bird use surveys were consistent among all three studies, but data for each study were presented independently based on target species groups and the viewsheds applied.

4.1 Species Composition, Relative Abundance, and Diversity

Species composition (i.e., species and bird types observed during the standardized surveys) and relative abundance (i.e., number of observations and groups of each species and bird type by season), and diversity (i.e., total number of species observed within each season) were compiled for all birds observed during point count surveys, irrespective of distance from observer (i.e., includes incidental observations). In addition, percent composition for each bird type was calculated by total percent of bird observations and total percent of bird observations

by season to assess percent composition of bird types based on all bird observations, regardless of distance from observer.

4.2 Bird Use, Percent of Use, and Frequency of Occurrence

Bird use was calculated as the number of birds per 800-m (2,625-ft) or 100-m (328-ft) plot per 60-minute or 8-minute survey for large bird/wetland bird use surveys and small bird use surveys, respectively. Bird use by season was estimated using a 2-step calculation: 1) for each survey event, the sum of number of bird observations was divided by the number of plots surveyed (average number observations/plot) and 2) for all survey events within the season; the sum of number of observations/plot was divided by the number of survey events. Overall bird use was calculated as the weighted average of seasonal values by the number of calendar days in each season (as defined by the season dates). Percent of use was calculated as the proportion of large bird/wetland bird use and small bird use that was attributable to a particular bird type or species, and frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species was observed.

4.3 Flight Height

Flight height data were used to identify the bird species and estimated bird use within the approximate turbine rotor-swept height (RSH) of 25-150 m (82-492 ft) above ground level. The flight height of each single bird or group (a single bird or a flock of 2 or more) when first observed was used to calculate the percentage of birds or groups flying below the 0-25 m (0-82 ft), within 25-150 m (82-492 ft), and above (≥150 m [≥492 ft]) the RSH.

4.4 Spatial Use

Spatial use was evaluated by comparing large bird/wetland bird and small bird use among plots. Use was calculated as the total number of bird observations made at a given plot divided by the number of survey events at that plot over the entire study period (number observations/800-m [2,625-ft] plot/60-minute survey for large birds; and number observations/100-m [328-ft] plot/10-minute survey for small birds). The modified large bird data collection period from December 2016 – September 2017 at Points 44 and 45 was taken into account when comparing use at other survey points. Large bird type groups are divided among waterbirds (e.g., herons, egrets, cormorants, and pelicans), waterfowl (e.g., ducks and geese), rails and coots, grebes and loons, gulls and terns, shorebirds, diurnal raptors, owls, vultures, upland game birds, doves/pigeons, large corvids (e.g., ravens, magpies, and crows), and goatsuckers. Waterfowl are separated from other waterbirds due to differences in foraging and flight behaviors.

Eagle flight paths were mapped during large bird use surveys and digitized to qualitatively show flight locations and flight direction (north/south, east/west) within survey plots. In addition, eagle, waterfowl, waterbird, and diurnal raptor flight paths were mapped during wetland bird use surveys. Aerial imagery was used to aid in recording locations of observations as accurately as possible.

4.5 Eagle Minutes

Following survey protocols described in the ECPG (USFWS 2013), eagle minutes were recorded within three-dimensional plots (i.e., cylinders) including the area within 800 m (2,625 ft) of the survey points and up to 200 m (656 ft) above ground level. Eagle minutes were defined as the number of minutes an eagle was observed in flight within these three-dimensional cylinders during the 60-minute survey periods. Observations of perched eagles did not apply to eagle minutes. These observations were then summed and mapped to document eagle minutes per plot. Eagle minutes were summed by season and divided by the number of survey minutes per season to standardize the sum by level of effort. Temporal variation was evaluated by calculating eagle minutes per month over the 12 month study period. Spatial variation was evaluated by calculating eagle minutes per plot, averaged across the 12 month study period, and mapped, accordingly.

5 RESULTS

5.1 Large Bird Use Surveys

A total of 387 60-minute large bird use surveys were conducted in the Project Expansion Area during 12 visits.

5.1.1 Large Bird Species Composition, Relative Abundance, and Diversity

A total of 9,134 large bird observations were recorded within 1,137 separate groups (Appendix A), based on birds observed both within and outside the 800-m (2,625-ft) plot. The most commonly recorded large bird type was waterfowl, which comprised 73.4% of large bird observations throughout the study period, and 85.3% of observations during winter (Appendix A). The majority of waterfowl observations were comprised of Canada geese (*Branta canadensis;* 5,035 observations in 96 groups), with the majority of observations recorded during winter (4,444 observations), accounting for 81.0% of large bird winter observations, irrespective of bird type (Appendix A).

Large corvids were the second most abundant bird type observed, accounting for 12.3% of large bird observations during the study period (1,122 observations; Appendix A). Ten raptor species were observed during large bird use surveys, which accounted for 3.1% of large bird observations (286 observations). Bald eagles, a single golden eagle, and a single unidentified eagle accounted for 25.2% of raptor observations (72 observations) and 0.8% of large bird observations (Appendix A). Eagles were observed more often during winter (47 observations; 65.3%) compared to 17 observations (23.6%) in fall, seven observations (9.7%) in spring, and one observation (1.4%) in summer (Appendix A).

Twenty-seven species were observed during large bird use surveys; species diversity was highest during spring (21 species), compared to fall (16 species), summer (15 species), and winter (14 species).

5.1.2 Large Bird Seasonal Use, Percent of Use, and Frequency of Occurrence

Large bird use over the study period was 7.9 observations/800-m plot/60-minute survey and was higher during fall surveys (15.0 observations/800-m plot/60-minute survey; largely influenced by waterfowl and gulls/terns observations) compared to winter (9.1), spring (4.6), and summer surveys (3.8; Table 2; Appendix B).

Table 2. Bird use[1], percent of total use (%), and frequency of occurrence (%) for each bird type by season observed during the large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.

	Bird Use				% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Waterbirds	0.1	0.1	0.1	0.1	3.0	3.8	0.4	0.3	11.1	4.1	4.6	0.8
Waterfowl	2.2	0.2	6.5	6.0	46.3	4.9	43.5	66.5	22.2	5.1	15.6	9.1
Shorebirds	0.1	0.5	0.8	0.0	2.4	13.8	5.1	0.0	8.1	29.4	3.0	0.0
Gulls/Terns	0.0	0.0	4.8	0.0	0.0	0.0	32.2	0.0	0.0	0.0	1.6	0.0
Diurnal Raptors	0.5	0.2	0.6	0.3	11.3	6.5	3.8	3.7	33.3	22.4	42.3	20.7
Accipiters	*0.1*	*0.1*	*0.1*	*<0.1*	*1.5*	*1.4*	*0.5*	*0.2*	*7.1*	*5.1*	*6.1*	*1.5*
Buteos	*0.4*	*0.2*	*0.4*	*0.1*	*8.5*	*4.1*	*2.3*	*1.0*	*22.2*	*14.3*	*25.2*	*7.9*
Northern Harrier	*0.1*	*0.0*	*<0.1*	*0.1*	*1.3*	*0.0*	*0.2*	*0.7*	*5.1*	*0.0*	*3.2*	*5.4*
Eagles	*0.0*	*0.0*	*0.1*	*0.2*	*0.0*	*0.0*	*0.5*	*1.9*	*0.0*	*0.0*	*7.9*	*7.4*
Falcons	*0.0*	*<0.1*	*<0.1*	*0.0*	*0.0*	*1.1*	*0.2*	*0.0*	*0.0*	*4.1*	*3.0*	*0.0*
Owls	<0.1	0.0	0.0	<0.1	0.4	0.0	0.0	<0.1	2.0	0.0	0.0	0.8
Vultures	0.6	0.9	0.2	0.0	12.2	23.4	1.2	0.0	23.2	39.8	15.2	0.0
Upland Game Birds	0.3	<0.1	0.7	0.1	7.4	0.3	4.5	0.5	8.1	1.0	7.9	4.7
Large Corvids	0.8	1.8	1.4	2.6	17.0	47.4	9.3	28.9	42.4	47.9	32.3	66.1
Large Bird Overall[2]	**4.7**	**3.8**	**15.0**	**9.1**	**100.0**	**100.0**	**100.0**	**100.0**				

[1] Number of observations/800-meter plots/observation period
[2] Sums of values may not add to total value shown, due to rounding

Waterbirds

Waterbird use over the study period was 0.1 observation/800-m plot/60-minute survey for all four seasons (0.1 observation/800-m plot/60-minute survey; Table 2; Appendix B). Waterbirds accounted for 3.8% of all large bird use in summer, 3.0% in spring, 0.4% in fall, and 0.3% in winter. Waterbirds were observed during 11.1% of spring, 4.6% of fall, 4.1% of summer surveys, and 0.8% of winter surveys (Table 2; Appendix B).

Waterfowl

Waterfowl use over the study periods was 3.8 observations/800-m plot/60-minute survey, with highest waterfowl use in fall and winter (6.5 and 6.0 observations/800-m plot/60-minute survey, respectively) compared to spring (2.2) and summer waterfowl use (0.2; Table 2; Appendix B). Waterfowl accounted for 66.5% of all large bird use in winter, 46.3% in spring, 43.5% in fall, and 4.9% in summer surveys. Waterfowl were observed during 22.2% of spring surveys, 15.6% of fall surveys, 9.1% of winter surveys, and 5.1% of summer surveys (Table 2; Appendix B). Canada geese made up most waterfowl use during winter surveys (4.3 observations/800-m plot/60-minute survey; Appendix B).

Shorebirds

Shorebird use, comprised of only of killdeer (*Charadrius vociferous*), over the study period was 0.3 observation/800-plot/60-minute survey, with highest use in fall (0.8 observation/800-m plot/60-minute survey) followed by 0.5 in summer, and 0.1 in spring, and no use was documented during winter (Table 2; Appendix B). Shorebirds comprised 13.8% of large bird use in summer, 5.1% in fall, and 2.4% in spring. Shorebirds were observed most frequently during summer surveys (29.4%) followed by spring (8.1%), and fall (3.0%; Table 2; Appendix B).

Gulls/Terns

Gull/tern use comprised of only Franklin's gull (*Leucophaeus pipixcan*), over the study period was 0.9 observation/800-m plot/60-minute survey, but use was only documented during fall (4.8 observations/800-m plot/60-minute survey (Table 2; Appendix B). Gulls/terns accounted for 32.3% of all large bird use in fall and were observed during 1.6% of fall surveys (Table 2; Appendix B).

Diurnal Raptors

Diurnal raptor use over the study period was 0.4 observation/800-m plot/60-minute survey, with highest use in fall (0.6 observation/800-m plot/60-minute survey), followed by 0.5 in spring, 0.3 in winter, and 0.2 in summer (Table 2; Appendix B). Diurnal raptors comprised 11.3% of all large bird use in spring, 6.5% in summer, 3.8% in fall, and 3.7% in winter. Diurnal raptors were observed most frequently during fall surveys (42.3%) followed by spring (33.3%), summer (22.4%), and winter (20.7%) surveys (Table 2; Appendix B).

Buteo use was highest during spring and fall (0.4 observation/800-m plot/60-minute survey); buteos were observed during 8.5% of the spring survey, largely comprised of red-tailed hawk (*Buteo jamaicensis*) observations (Table 2; Appendix B). Falcon use was only observed during

summer and fall (<0.1 observation/800-m plot/60-minute survey); and falcons were observed during 1.1% of summer surveys (Table 2; Appendix B). Accipiter use was the same during spring, summer, and fall (0.1 observation/800-m plot/60-minute survey during all three seasons) and <0.1 in winter; accipiters were observed during 7.1% of spring surveys, largely comprised of Cooper's hawk (*Accipiter cooperii*) use (Table 2; Appendix B).

Eagle use over the study period was 0.1 observation/800-m plot/60-minute survey, comprised of bald eagle observations, and was highest in winter (0.2 observation/800-m plot/60-minute survey) followed by fall (0.1), and no eagle use in spring or summer(Table 2; Appendix B). Eagles accounted for 1.9% of large bird use in winter and 0.5% in fall. Eagles were observed during 7.9% of fall surveys and 7.4% of winter surveys (Table 2; Appendix B).

Northern harrier (*Circus cyaneus*) use was highest during spring and winter surveys (0.1 observation/800-m plot/60-minute survey each); northern harriers were observed during 5.4% and 5.1% of winter and spring surveys, respectively.

Owls

Owl use, comprised only of great horned owl (*Bubo virginianus*), over the study period was <0.1 observation/800-m plot/60-minute survey; owl use was only documented in spring and winter (Table 2; Appendix B). Owls were observed during 2.0% of spring surveys and 0.8% of winter surveys (Table 2).

Vultures

Vulture use, comprised only of turkey vultures (*Cathartes aura*), over the study period was 0.4 observation/800-m plot/60-minute survey, with use highest in summer (0.9 observation/800-m plot/60-minute survey) followed by 0.6 in spring, 0.2 in fall; vultures were not observed in winter (Table 2; Appendix B). Vultures accounted for 23.4% of all large bird use in summer, 12.2% in spring, and 1.2% in fall surveys. Vultures were observed during 39.8% of summer, 23.2% of spring, and 15.2% of fall surveys (Table 2).

Upland Game Birds

Upland game bird use over the study period was 0.2 observation/800-m plot/60-minute survey, with use highest in fall (0.7 observation/800-m plot/60-minute survey) followed by 0.3 in spring, and <0.1 in summer and winter (Table 2; Appendix B). Upland game birds comprised 7.4% of all large bird use in spring, 4.5% in fall, 0.5% in winter, and 0.3% in summer. Upland game birds were observed during 8.1% of spring surveys, 7.9% of fall surveys, 4.7% of winter surveys, and 1.0% of summer surveys (Table 2; Appendix B).

Large Corvids

Large Corvid bird use over the study period was 1.8 observations/800-m plot/60-minute survey, with use highest in winter (2.6 observations/800-m plot/60-minute survey) followed by 1.8 in summer, 1.4 in fall, and 0.8 in spring (Table 2; Appendix B). Large corvids comprised 47.4% of all large bird use in summer, 28.9% in winter, 17.0% in spring, and 9.3% in fall surveys. Large

corvids were observed during 66.1% of winter surveys, 47.9% of summer surveys, 42.4% of spring surveys, and 32.3% of fall surveys (Table 2).

5.1.3 Flight Height Characteristics

Of the 511 groups (2,564 observations) of large birds observed flying within 800-m (2,625-ft) plots, 72.7% of groups were recorded in the estimated RSH (Table 3). Of these groups, 132 groups of 138 observations of diurnal raptors were recorded, with 63.8% of the raptor flights recorded within the estimated RSH (Table 3). Considering only eagle observations in flight, 57.7% were observed flying within the RSH within 800-m (2,625-ft) radius plots (Table 3). Of all other raptor observations, buteos had the highest number of groups recorded in flight (65 groups); 69.0% were flying within the RSH based on initial observation (Table 3). Flying waterfowl were observed in 62 groups of 1,426 observations, and 82.2% of the groups were flying within the RSH (Table 3). Considering other bird types, 45.0% of waterbird flights recorded were above the RSH; 80.1% of vultures flights recorded and 100.0% of gulls/terns flights recorded were within the RSH; and 96.1% of shorebird flights and 60.0% of large corvid flights recorded were below the RSH (Table 3).

Table 3. Flight height characteristics by bird type[1] and raptor subtype during large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height of Groups		% of Total Obs Flying	% of Groups within Flight Height Categories[2]		
			Height (meters [m])	Height (feet [ft])		0-25 m (0-82 ft)	25-150 m (82-492 ft)	>150 m (>492 ft)
Waterbirds	9	20	49.4	162.2	55.6	25.0	30.0	45.0
Waterfowl	62	1,426	60.7	199.3	98.1	4.8	82.2	13.0
Shorebirds	21	76	11.3	37.2	67.3	96.1	3.9	0.0
Gulls/Terns	1	300	25.0	82.0	100.0	0.0	100.0	0.0
Diurnal Raptors	132	138	49.7	163.1	89.0	29.0	63.8	7.2
Accipiters	*19*	*19*	*29.2*	*95.8*	*100.0*	*31.6*	*68.4*	*0.0*
Buteos	*65*	*71*	*49.6*	*162.7*	*81.6*	*23.9*	*69.0*	*7.0*
Northern Harrier	*16*	*16*	*22.1*	*72.6*	*100.0*	*56.2*	*43.8*	*0.0*
Eagles	*26*	*26*	*85.8*	*281.4*	*96.3*	*23.1*	*57.7*	*19.2*
Falcons	*6*	*6*	*33.3*	*109.4*	*100.0*	*33.3*	*66.7*	*0.0*
Owls	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Vultures	90	151	46.2	151.5	98.1	18.5	80.1	1.3
Upland Game Birds	3	16	5.7	18.6	19.3	100.0	0.0	0.0
Large Corvids	193	437	21.2	69.6	65.0	60.0	40.0	0.0
Large Birds Overall	**511**	**2,564**	**37.8**	**123.9**	**86.3**	**19.2**	**72.7**	**8.0**

[1] For observations (Obs) within 800-m plots[2] The likely rotor-swept height is 25 – 150 m (82 – 492 ft) above ground level

5.1.4 Large Bird Spatial Use

For all large bird species combined, bird use was highest at Point 11 (29.3 observations/800-m plot/60-minute survey), largely due to high gulls/terns use at that location (25.0 observations/800-m plot/60-minute survey). Large bird use ranged from 1.4 to 22.8 observations/800-m plot/60-minute survey at all other points (Appendix C1).

Waterbird use was observed at 13 observation points, with Point 18 having the highest use (0.8 observation/800-m plot/60-minute survey; Appendix C1 and C2). Waterbird use ranged from 0.1 to 0.7 observation/800-m plot/60-minute survey at the remaining 12 points with waterbird data (Appendix C1 and C2).

Waterfowl were observed at 26 observation points, with the highest use at Point 22 (20.1 observations/800-m plot/60-minute survey), followed by Point 40 (18.8 observations/800-m plot/60-minute survey). Remaining waterfowl use ranged from 0.1 to 10.7 observations/800-m plot/60-minute survey at the other 24 survey points with waterfowl use (Appendix C1 and C2).

Shorebird use was observed at 22 observation points, with Point 35 having the highest use (4.5 observations/800-m plot/60-minute survey; Appendix C1). Shorebird use ranged from 0.1 to 0.7 observation/800-m plot/60-minute survey at the remaining 21 points with shorebird data (Appendix C1).

Gulls/terns use was observed at one observation point, Point 11 (25.0 observations/800-m plot/60-minute survey; Appendix C1). Gulls/terns use was not observed at any other observation point.

Diurnal raptor use was observed at all 33 observation points. Diurnal raptor use was highest at Point 38 (1.2 observations/800-m plot/60-minute survey), and ranged from 0.1 to 1.1 observations/800-m plot/60-minute survey at the other survey points (Appendix C1 and C2). Of the diurnal raptors, buteos were observed at 28 points, with highest use at Points 37 and 11 (0.9 and 0.7 observation/800-m plot/60-minute survey, respectively; Appendix C1 and C2). Accipiters were observed at 14 points, with highest use at Point 35 (0.4 observation/800-m plot/60-minute surveys each; Appendix C1 and C2). Eagle use was observed at 12 observation points, with highest use observed at Point 38 (1.1 observations/800-m plot/60-minute survey), followed by Point 24 (0.3 observation/800-m plot/60-minute survey; Figure 6; Appendix C1). Eagle use at the remaining 10 points with documented activity ranged from 0.1 to 0.2 observation/800-m plot/60-minute survey (Figure 6; Appendix C1).

Owl use was observed at two observation points, Points 42 and 45 (0.1 and 0.2 observation/800-m plot/60-minute survey, respectively; Appendix C1). Owl use was not documented at any other observation points.

Vulture use was observed at 29 observation points, with Point 24 having the highest use (1.3 observations/800-m plot/60-minute survey; Appendix C1). Vulture use ranged from 0.1 to 1.2

observations/800-m plot/60-minute survey at the remaining 27 points with vulture data (Appendix C1).

Upland game bird use was observed at 11 observation points, with Point 24 having the highest use (2.9 observations/800-m plot/60-minute survey; Appendix C1). Upland game birds ranged from 0.1 to 2.3 observations/800-m plot/60-minute survey at the remaining 10 points with upland game bird use.

Large corvid use was observed at all 33 observation points, with Point 42 having the highest use (4.3 observations/800-m plot/60-minute survey; Appendix C1). Large corvid use ranged from 0.1 to 3.2 observations/800-m plot/60-minute survey at the remaining 32 points (Appendix C1).

Figure 7[5] presents mapped bald eagle flight paths recorded from each survey point, with the highest number of flight paths documented at Point 38 along Deer Creek in the southern portion of the Project Expansion Area (Figure 7). The rest of the Project Expansion Area had a similar number of flight paths. Overall, no consistent flight patterns were observed based on location or direction of flight paths (Figure 7).

[5] Flight paths and perch locations on Figure 7 may represent more than one eagle using the same flight path or perch location.

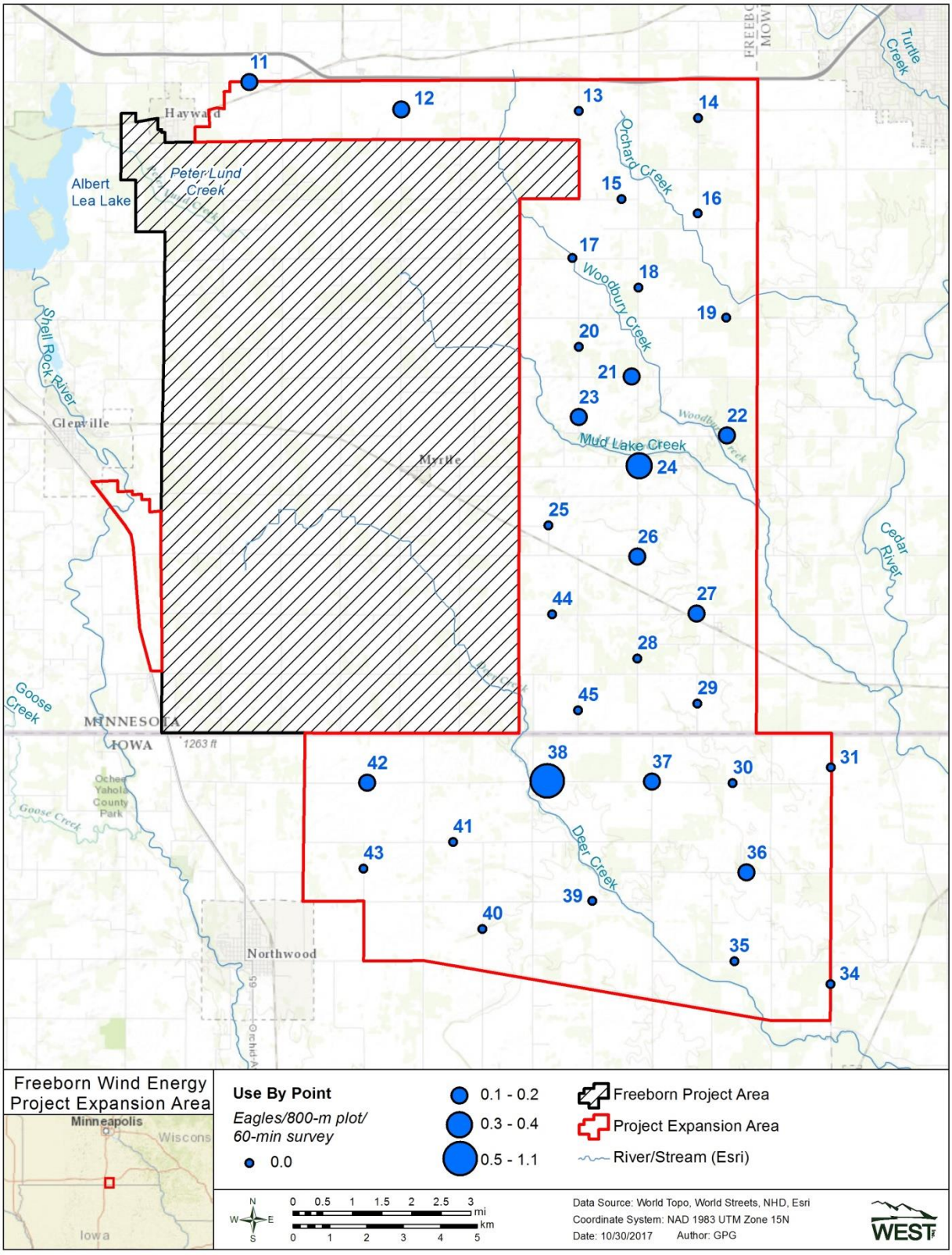


Figure 6. Eagle use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.

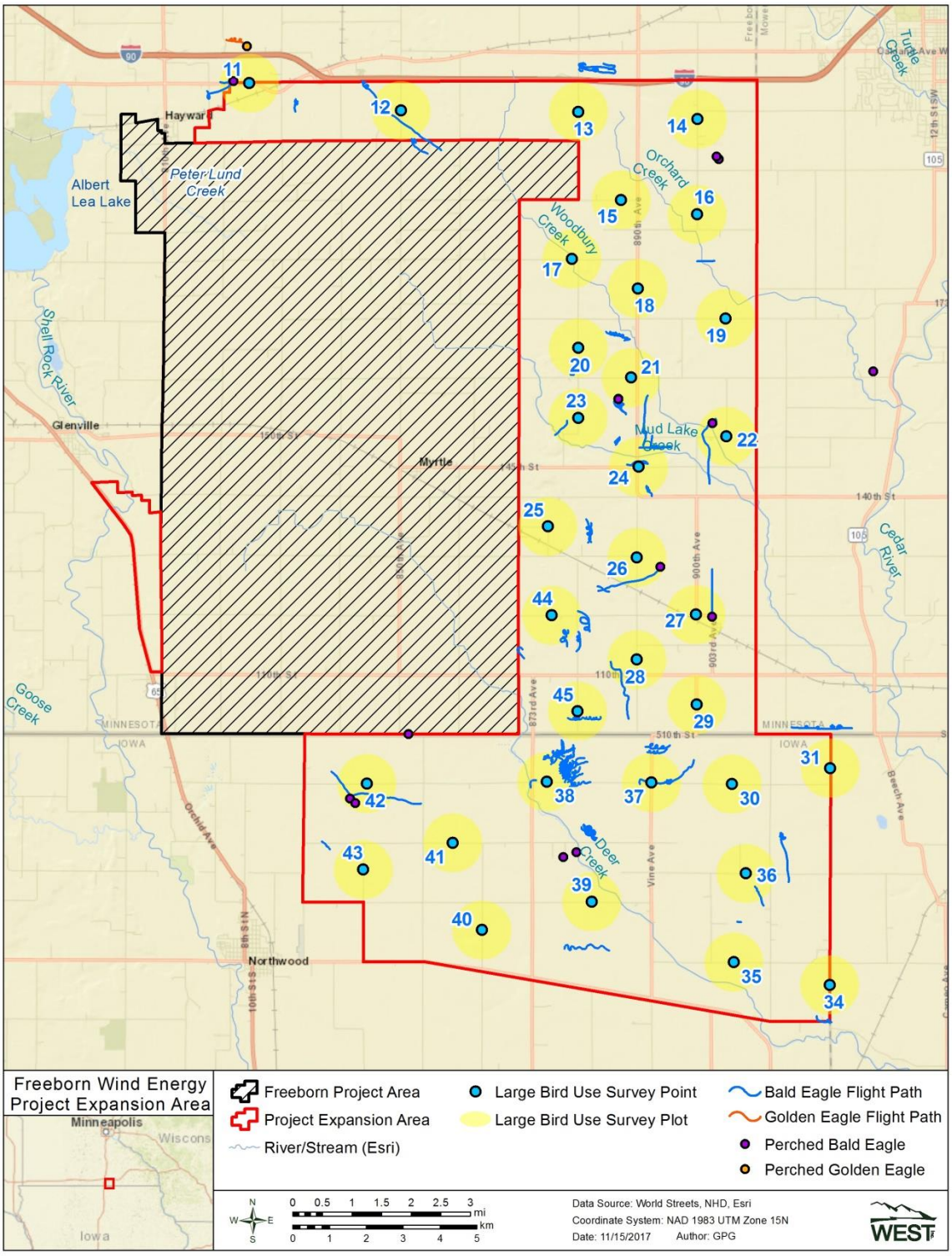


Figure 7. Bald and golden eagle flight paths and perch locations recorded during large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 27, 2017.

5.1.5 Eagle Minutes

A total of 82 eagle minutes were documented during 387 large bird use survey observation hours (23,220 minutes; Table 4). Eagle minutes per minute of survey were highest during winter (0.009) followed by fall (0.003), and no eagle minutes were documented during spring or summer (Table 4). The majority of eagle minutes were recorded during February 2017 (57 eagle minutes) followed by December 2016 (13 eagle minutes), and the remaining 10 months of the study ranged from 0 – 9 eagle minutes (Table 5). Eagle minutes were documented at 11 of the observation points (Figure 9). Point 38, in the southern portion of the Project Expansion Area along Deer Creek, had the highest eagle minutes (44 minutes) followed by Points 21 and 24 (ranging between 7 and 12 minutes), Points 27, 37, and 41 (ranging between 3 and 6 minutes), and Points 11, 22, 23, 26, and 36(ranging between 1 and 2 minutes; Figure 9).

Table 4. Eagle minutes documented during large bird surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.

Season	Eagle Minutes	Survey Effort (hours)	Survey Effort (minutes)	Eagle minutes per minute survey
Fall (10/25/16 – 11/08/16 and 09/1/17 – 09/26/17)[1]	11	64	3,840	0.003
Winter (11/09/16 – 03/13/17)	71	126	7,560	0.009
Spring (03/14/17 – 05/31/17)	0	99	5,940	0.000
Summer (06/01/17 – 08/31/17)	0	98	5,880	0.000
Total	**82**	**387**	**23,220**	**0.004**

[1] Data combined for both fall seasons

Table 5. Number of flying eagle observations[1] with a duration of 1 minute or more and eagle minutes by month during large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26 2017.

Month/Year	Eagle Observations	Eagle Minutes
October 2016	3	9
November 2016	1	1
December 2016	5	13
January 2017	0	0
February 2017	16	57
March 2017	0	0
April 2017	0	0
May 2017	0	0
June 2017	0	0
July 2017	0	0
August 2017	0	0
September 2017	1	2
Total	**26**	**82**

[1] Observations of eagles flying with an 800-meter (m) (2,625-feet [ft]) x 200-m (656-ft) cylinder

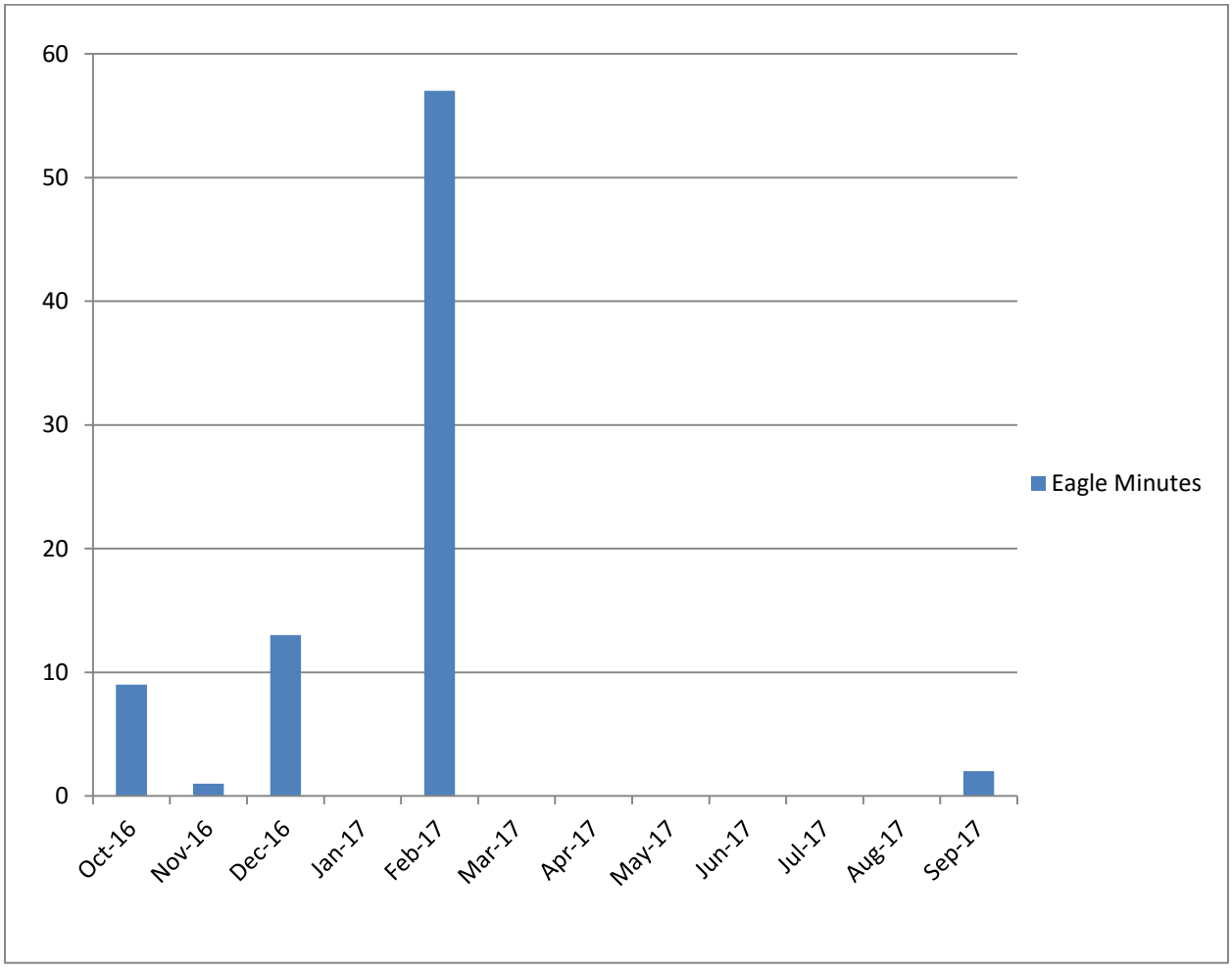


Figure 8. Number of eagle minutes recorded by month during large bird use surveys in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.

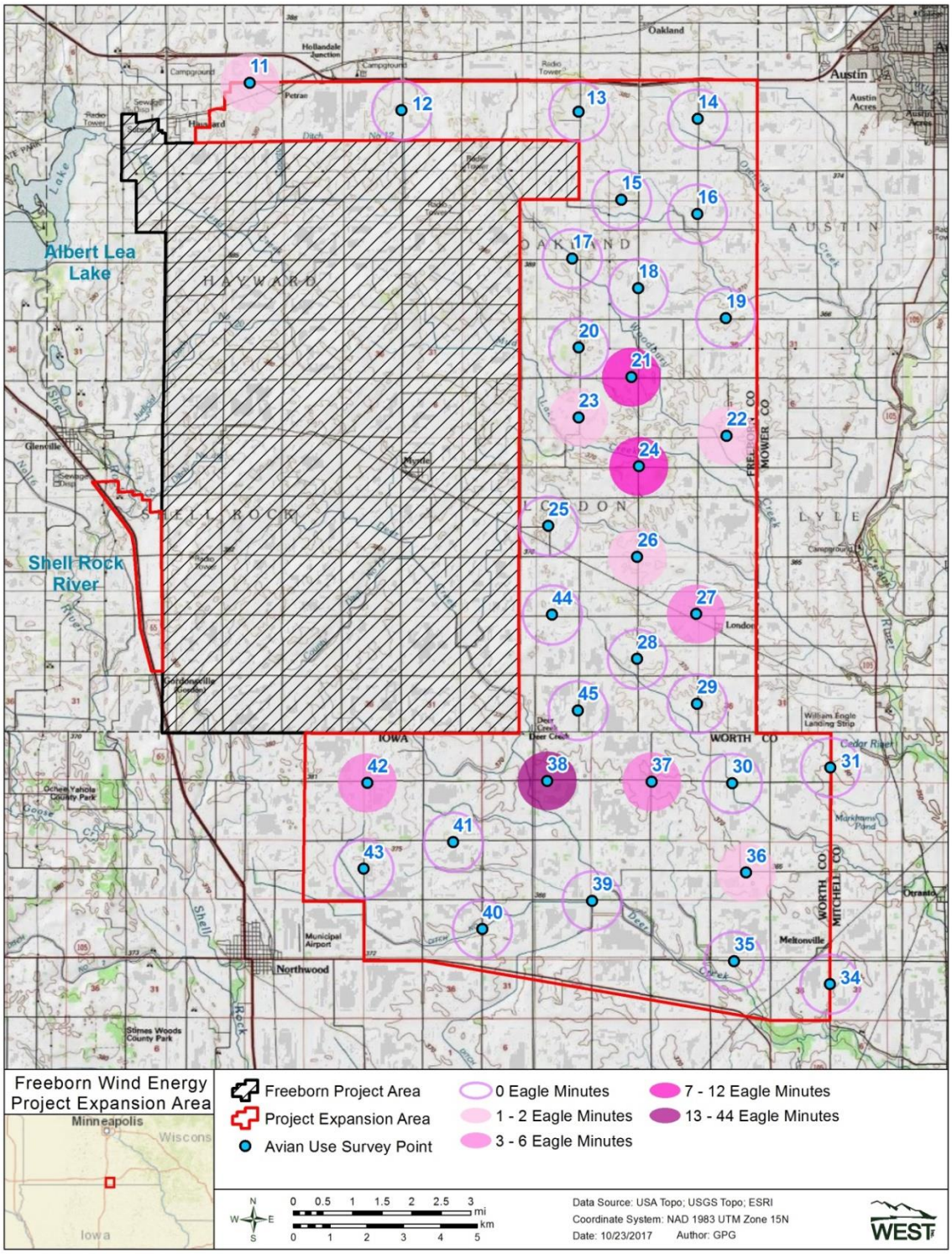


Figure 9. Number of eagle minutes recorded during large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.

5.2 Small Bird Use Surveys

A total of 99 8-minute small bird use surveys were conducted during five visits.

5.2.1 Small Bird Species Composition, Relative Abundance, and Diversity

A total of 1,147 bird observations in 342 separate groups were recorded (Table 6). Passerines accounted for 98.8% of all small bird observations, with the majority comprised of the subtype blackbirds/orioles (61.7% of all passerines and 60.9% of all small birds; 699 observations; Table 6). Of all passerine observations, almost 44% were comprised of red-winged blackbird (*Agelaius phoeniceus*; 495 observations) and common grackle (*Quiscalus quiscula*; 11.0%; 125 observations; Table 6). Swallows were the second most abundantly observed passerine subtype, accounting for 12.6% of all passerine observations, with 93.7% of swallow observations comprised of cliff swallow (*Petrochelidon pyrrhonota*; 134 observations; Table 6). Woodpeckers and kingfisher accounted for just over 1.1% of small bird observations (Table 6). The majority (62.0%) of woodpecker observations were comprised of northern flicker (*Colaptes auratus*; Table 6). Thirty identifiable species were observed over the course of small bird use surveys.

Table 6. Number of groups (grps) and number of observations (obs) by bird type and species observed during small bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 27 – May 31, 2017.

Bird Type/Species	Scientific Name	# grps	Total # obs	% obs
Passerines		**330**	**1,133**	**98.8**
Blackbirds/Orioles		*168*	*699*	
Bobolink	*Dolichonyx oryzivorus*	1	1	
Brewer's blackbird	*Euphagus cyanocephalus*	6	23	
Brown-headed cowbird	*Molothrus ater*	24	47	
Common grackle	*Quiscalus quiscula*	17	125	
European starling	*Sturnus vulgaris*	1	2	
Red-winged blackbird	*Agelaius phoeniceus*	116	495	
Rusty blackbird	*Euphagus carolinus*	1	4	
Western meadowlark	*Sturnella neglecta*	1	1	
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	1	1	
Corvids		*14*	*17*	
Blue jay	*Cyanocitta cristata*	14	17	
Finches/Crossbills		*8*	*13*	
American goldfinch	*Spinus tristis*	7	12	
Unidentified finch	*NA*	1	1	
Flycatchers		*1*	*1*	
Alder flycatcher	*Empidonax alnorum*	1	1	
Grassland/Sparrows		*42*	*97*	
American tree sparrow	*Spizella arborea*	1	15	
Chipping sparrow	*Spizella passerina*	1	2	
Song sparrow	*Melospiza melodia*	38	77	

Table 6 (*continued*). Number of groups (grps) and number of observations (obs) by bird type and species observed during small bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 27 – May 31, 2017.

Bird Type/Species	Scientific Name	# grps	Total # obs	# grps
White-throated sparrow	*Zonotrichia albicollis*	2	3	
Grosbeaks		*6*	*8*	
Rose-breasted grosbeak	*Pheucticus ludovicianus*	6	8	
Swallows		*12*	*143*	
Barn swallow	*Hirundo rustica*	5	7	
Cliff swallow	*Petrochelidon pyrrhonota*	6	134	
Tree swallow	*Tachycineta bicolor*	1	2	
Tanagers		*6*	*12*	
Scarlet tanager	*Piranga olivacea*	6	12	
Thrushes		*58*	*97*	
American robin	*Turdus migratorius*	57	96	
Eastern bluebird	*Sialia sialis*	1	1	
Titmice/Chickadees		*11*	*41*	
Black-capped chickadee	*Poecile atricapilla*	11	41	
Vireos		*1*	*2*	
Warbling vireo	*Vireo gilvus*	1	2	
Warblers		*3*	*3*	
Common yellowthroat	*Geothlypis trichas*	3	3	
Woodpeckers		**11**	**13**	**1.1**
Downy woodpecker	*Picoides pubescens*	2	2	
Northern flicker	*Colaptes auratus*	6	8	
Red-bellied woodpecker	*Melanerpes carolinus*	3	3	
Kingfishers		**1**	**1**	**<0.1**
Belted kingfisher	*Megaceryle alcyon*	1	1	
Overall		**342**	**1,147**	**100.0**

5.2.2 Small Bird Seasonal Use, Percent of Use, and Frequency of Occurrence

Overall small bird use was 11.5 observations/100-m plot/8-minute survey (Table 7).

Table 7. Small bird use (mean number of observations/plot/survey), percent of total use (%), and frequency of occurrence (%) for each small bird type and subtype observed during small bird use surveys in the Freeborn Wind Energy Project Expansion Area from March 27 – May 31, 2017.

Bird Type	Bird Use	% of Use	% Frequency
Passerines	11.4	98.8	96.9
Blackbirds/Orioles	*7.0*	*60.9*	*85.8*
Bobolink	<0.1	<0.1	1.0
Brewer's blackbird	0.2	2.0	6.0
Brown-headed Cowbird	0.5	4.1	23.2
Common grackle	1.3	10.9	17.4
European starling	<0.1	0.2	1.0
Red-winged blackbird	5.0	43.1	75.7
Rusty blackbird	<0.1	0.3	1.0
Western meadowlark	<0.1	<0.1	1.0
Yellow-headed blackbird	<0.1	<0.1	1.1
Corvids	*0.2*	*1.5*	*12.3*
Blue jay	0.2	1.5	12.3
Finches/Crossbills	*0.1*	*1.1*	*7.1*
American goldfinch	0.1	1.0	6.0
Unidentified finch	<0.1	<0.1	1.1
Flycatchers	*0.1*	*0.1*	*1.0*
Alder flycatcher	<0.1	<0.1	1.0
Grosbeaks	*0.8*	*0.7*	*6.0*
Rose-breasted grosbeak	<0.1	0.7	6.0
Grassland/Sparrows	*1.0*	*8.5*	*35.3*
American tree sparrow	0.2	1.4	1.1
Chipping sparrow	<0.1	0.2	1.0
White-throated sparrow	<0.1	0.3	2.1
Song sparrow	0.8	6.7	33.2
Swallows	*1.4*	*12.4*	*12.0*
Barn swallow	<0.1	0.6	5.0
Cliff swallow	1.3	11.6	6.0
Tree swallow	<0.1	0.2	1.0
Tanagers	*0.1*	*1.0*	*5.0*
Scarlet tanager	0.1	1.0	5.0
Thrushes	*0.9*	*8.5*	*44.6*
American robin	1.0	8.4	44.6
Eastern bluebird	<0.1	<0.1	1.1
Titmice/Chickadees	*0.4*	*3.6*	*9.1*
Black-capped chickadee	0.4	3.6	9.1
Vireos	*0.2*	*0.2*	*1.0*
Warbling vireo	<0.1	0.2	1.0
Warblers	*<0.1*	*0.3*	*3.0*
Common yellowthroat	<0.1	0.3	3.0
Kingfishers	**<0.1**	**<0.1**	**1.1**
Belted kingfisher	<0.1	<0.1	1.1
Woodpeckers	**0.1**	**1.1**	**11.3**
Downy woodpecker	<0.1	0.2	2.0
Northern flicker	<0.1	0.7	6.2
Red-bellied woodpecker	<0.1	0.3	3.1
Overall	**11.5**	**100.0**	

Passerines

Small bird use was highest for passerines (11.4 observations/100-m plot/8-minute survey), mostly comprised of the subtype blackbird/orioles (7.0 observations/100-m plot/8-minute survey) and swallows (1.4 observations/100-m plot/8-minute survey Table 7). Passerines comprised 98.8% of overall small bird use, largely comprised of the blackbird/orioles subtype (60.9% of use) followed by swallow subtypes (composing 12.4% of use). Passerines were observed during approximately 96.9% of surveys, with blackbirds/orioles observed most frequently (85.8% of surveys), followed by thrushes (44.6%) and grassland/sparrows (35.3%; Table 7).

Kingfishers

Bird use for kingfishers was <0.1 observation/100-m plot/8-minute survey and was comprised only of belted kingfisher (*Megaceryle alcyon*; <0.1% of use), which equated to being observed during 1.1% of surveys (Table 7).

Woodpeckers

Woodpecker use was 0.1 observation/100-m plot/8-minute survey, and they composed 1.1% of overall small bird use. Woodpeckers were observed during approximately 11.3% of small bird use surveys (Table 7).

5.2.3 Flight Height Characteristics

One hundred-seventeen groups of small birds were observed flying within 100-m (328-ft) plots, totaling 601 observations, with 48.9% recorded in the estimated RSH. Of these observations, 114 groups of 598 observations of passerines were recorded, with 49.0% of flights recorded within the estimated RSH (Table 8).

Table 8. Flight height characteristics by bird type during small bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 27 – May 31, 2017.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight of Groups		% of Total Obs Flying	% of Groups within Flight Height Categories[1]		
			Height (meters [m])	Height (feet [ft])		0-25 m (0-82 ft)	25-150 m (82-492 ft)	>150 m (>492 ft)
Passerines	114	598	19.3	63.4	52.8	51.0	49.0	0.0
Woodpeckers	3	3	21.7	71.1	23.1	66.7	33.3	0.0
Kingfishers	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Small Birds Overall	**117**	**601**	**19.4**	**63.6**	**52.4**	**51.1**	**48.9**	**0.0**

[1] The likely rotor-swept height is 25 – 150 m (82 – 492 ft) above ground level.

5.2.4 Small Bird Spatial Use

Small bird observations were dominated by passerines and blackbirds/orioles subtype. Small birds were recorded at all 20 observation points, with the highest level of use observed at Point 27 (30.0 observations/100-m plot/8-minute survey), followed by Point 21 (22.6 observations/100-m plot/8-minute survey; Table 9). Small bird use at the remaining 18 points ranged from 2.6 to 18.0 observations/100-m plots/8-minute survey (Table 9).

Passerines were recorded at all 20 observation points, with the highest level of use observed at Point 27 (29.6 observations/100-m plot/8-minute survey), followed by Point 21 (22.2 observations/100-m plot/8-minute survey; Figure 10; Table 9). Passerine use at the remaining 18 points ranged from 2.6 to 18.0 observations/100-m plot/8-minute survey (Figure 10; Table 9). Blackbirds/orioles were recorded at 19 observation points, with the highest level of use observed also at Point 21 (18.8 observations/100-m plot/8-minute survey), followed by Point 18 (14.2 observations/100-m plot/8-minute survey; Figure 10; Table 9). Blackbirds/orioles use at the remaining 17 points ranged from 0.8 to 14.0 observations/100-m plots/8-minute surveys (Table 9). Use by other groups of small birds was generally much lower (0.2 to 3.8 observations/100-m plots/8-minute survey; Table 9).

Table 9. Small bird use (mean number of observations/100-m plot/8-minute survey) by point for small bird types and passerine subtypes observed during small bird use surveys in the Freeborn Wind Energy Project Expansion Area from March 27 – May 31, 2017.

Bird Type	Survey Point									
	10	11	12	13	14	15	16	17	18	19
Passerines	**17.0**	**11.4**	**2.6**	**9.2**	**7.0**	**10.6**	**4.4**	**13.6**	**16.6**	**6.5**
Blackbirds/Orioles	14.0	10.4	1.6	5.8	3.2	7.2	0.8	12.0	14.2	3.8
Finches	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.5
Flycatchers	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grassland/Sparrows	0.0	0.8	0.4	2.2	2.6	1.0	2.0	0.8	0.2	0.3
Swallows	0.2	0.0	0.0	0.0	0.2	0.8	0.0	0.4	0.0	0.0
Tanagers	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.5
Grosbeaks	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Thrushes	1.6	0.0	0.6	0.4	0.8	1.4	0.6	0.4	1.8	1.3
Titmouse/Chickadees	0.0	0.0	0.0	0.0	0.0	0.2	0.8	0.0	0.0	0.0
Vireos	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Warblers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
Corvids	0.2	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0
Woodpeckers	**0.0**	**0.0**	**0.0**	**0.4**	**0.0**	**0.4**	**0.0**	**0.0**	**0.0**	**0.0**
Kingfishers	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Overall	**17.0**	**11.4**	**2.6**	**9.6**	**7.0**	**11.0**	**4.4**	**13.6**	**16.6**	**6.5**

Table 9 (*continued*). Small bird use (mean number of observations/100-m plot/8-minute survey) by point for small bird types and passerine subtypes observed during small bird use surveys in the Freeborn Wind Energy Project Expansion Area from March 27 – May 31, 2017.

Bird Type	Survey Point									
	20	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**
Passerines	**13.4**	**22.2**	**2.8**	**7.4**	**8.0**	**18.0**	**10.6**	**29.6**	**6.6**	**10.4**
Blackbirds/Orioles	3.0	18.8	0.0	5.4	6.0	11.4	8.6	3.8	3.2	7.4
Finches	0.0	0.8	0.4	0.0	0.0	0.0	0.4	0.0	0.0	0.2
Flycatchers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Grassland/Sparrows	0.4	0.2	1.4	0.0	0.2	3.8	0.6	0.6	1.8	0.2
Swallows	0.4	0.4	0.0	0.4	0.2	0.2	0.4	25.0	0.0	0.0
Tanagers	0.0	0.2	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Grosbeaks	0.6	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0
Thrushes	1.8	1.4	0.2	1.0	1.4	0.8	0.6	0.2	1.4	2.0
Titmouse/Chickadees	6.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.4
Vireos	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Warblers	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Corvids	1.0	0.2	0.0	0.6	0.0	0.6	0.0	0.0	0.2	0.2
Woodpeckers	**0.0**	**0.4**	**0.2**	**0.6**	**0.0**	**0.0**	**0.4**	**0.2**	**0.0**	**0.0**
Kingfishers	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**	**0.0**	**0.0**
Overall	**13.4**	**22.6**	**3.0**	**8.0**	**8.0**	**18.0**	**11.0**	**30.0**	**6.6**	**10.4**

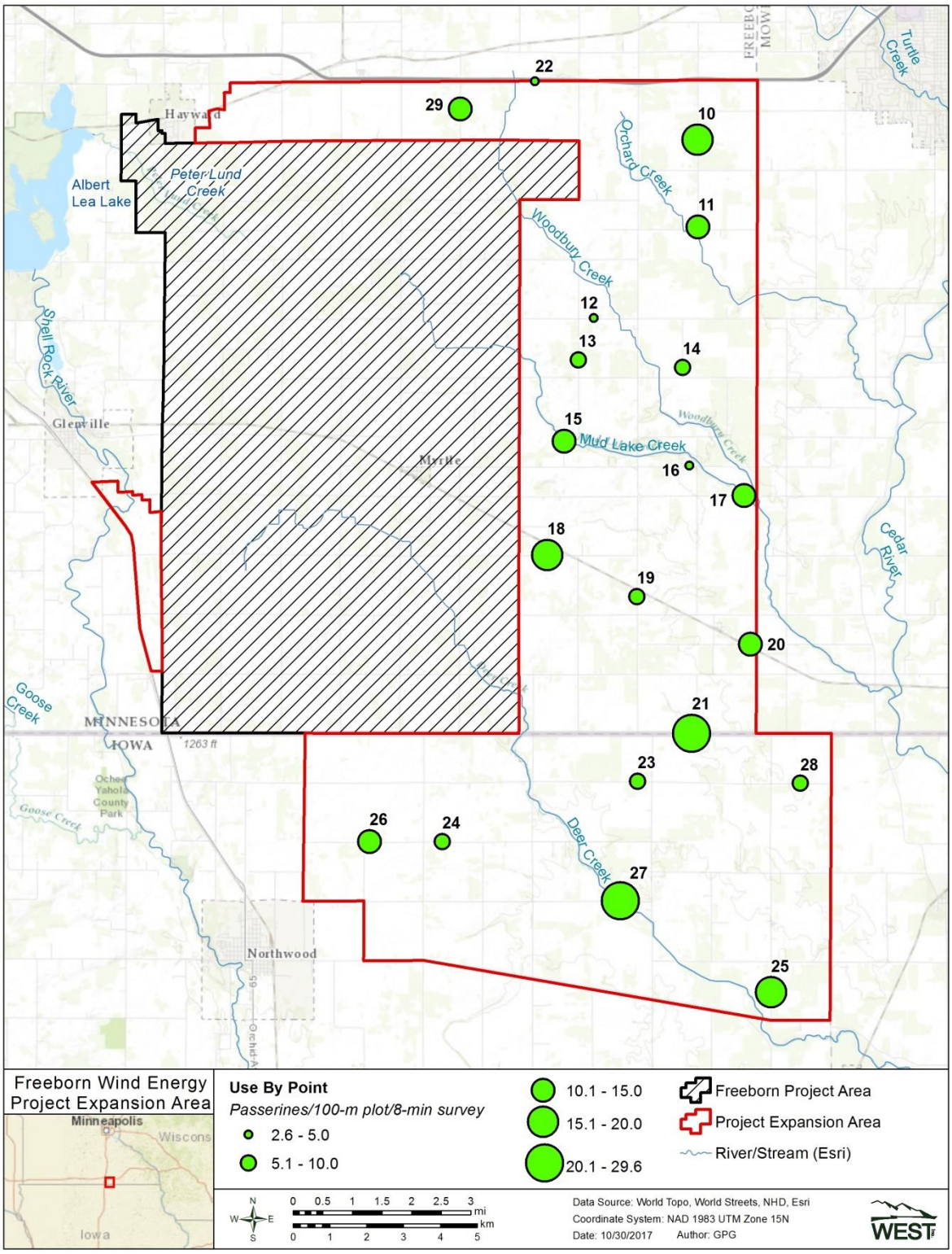


Figure 10. Passerine use by observation point during small bird use surveys in the Freeborn Wind Energy Project Expansion Area from March 27 – May 31, 2017.

5.3 Wetland Bird Use Surveys

Eighteen 60-minute wetland bird use surveys were conducted during three visits.

5.3.1 Bird Species Composition, Relative Abundance, and Diversity

A total of 121 large bird observations in 57 separate groups were recorded during the wetland bird use surveys (Table 10). The most commonly recorded large bird subtype was waterfowl, which comprised 86.0% of all observations including seven identified species. The majority (53.8%) of all waterfowl observations was comprised of Canada goose (56 observations; Table 10). Mallard (*Anas platyrhynchos)* were the most abundant duck species observed, accounting for 21.2% of all waterfowl observations (Table 10). The waterbird subtype accounted for 8.3% of birds observed, with all waterbird observations comprised of great blue heron (*Ardea herodias;* five observations) and sandhill crane (*Grus canadensis*; five observations; Table 10). Raptors accounted for 0.8% of all large birds observed (one northern harrier observation) during wetland bird use surveys. Twelve large bird species were observed over the course of wetland bird use surveys.

Table 10. Summary of observations by bird type and species for birds observed during wetland bird use surveys at the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017.

Bird Type	Scientific Name	# grps	Total # obs	% obs
Waterbirds		**8**	**10**	**8.3**
Great blue heron	*Ardea herodias*	5	5	
Sandhill crane	*Grus canadensis*	3	5	
Waterfowl		**44**	**104**	**86.0**
American green-winged teal	*Anas crecca carolinensis*	9	16	
Canada goose	*Branta canadensis*	14	56	
Hooded merganser	*Lophodytes cucullatus*	1	1	
Mallard	*Anas platyrhynchos*	15	22	
Ruddy duck	*Oxyura jamaicensis*	1	1	
Snow goose	*Chen caerulescens*	1	3	
Wood duck	*Aix sponsa*	2	3	
Unidentified duck		1	2	
Shorebirds		**4**	**6**	**5.0**
Killdeer	*Charadrius vociferus*	2	3	
Least sandpiper	*Calidris minutilla*	2	3	
Diurnal Raptors		**1**	**1**	**0.8**
Northern harrier	*Circus cyaneus*	1	1	
Overall		**57**	**121**	**100.0**

5.3.2 Bird Use, Percent of Use, and Frequency of Occurrence

Bird use estimates, percent of use, and frequency of occurrence for all large bird types observed during wetland bird use surveys are reported in Table 11. Large bird use was 6.7 observations/800-m plot/60-minute during wetland bird use surveys (Table 11).

Table 11. Bird use (mean number of observations/plot/survey), percent of total use (%), and frequency of occurrence (%) for each bird type and subtype of birds observed during wetland bird use surveys at the Freeborn Expansion Wind Energy Project from March 29 – May 30, 2017.

Bird Type	Bird Use	% of Use	% Frequency
Waterbirds	0.6	8.3	38.9
Waterfowl	5.8	86.0	88.9
Shorebirds	0.3	5.0	16.7
Diurnal Raptors	<0.1	0.8	5.6
Northern Harrier	*<0.1*	*0.8*	*5.6*
Overall	**6.7**	**100.0**	

Waterbirds

Waterbird use was 0.6 observation/800-m plot/60-minute survey. Waterbirds accounted for 8.3% of overall use and were observed during 38.9% of wetland bird use surveys (Table 11).

Waterfowl

Waterfowl use was higher (5.8 observations/800-m plot/60-minute survey) than any other bird type recorded (Table 11). Waterfowl comprised 86.0% of overall use and waterfowl were observed during 88.9% of wetland bird use surveys (Table 11).

Shorebirds

Shorebird use was 0.3 observation/800-m plot/60-minute survey and comprised 5.0% of overall use (Table 11). Shorebirds were observed during 16.7% of the wetland bird use surveys (Table 11).

Diurnal Raptors

Diurnal raptor, comprised only of northern harrier, use was <0.1 observation/800-m plots/60-minute survey(Table 11). Diurnal raptors comprised 0.8% of overall use during the wetland bird survey, and were observed during 5.6% of surveys (Table 11).

5.3.3 Flight Height Characteristics

A total of 50 large bird observations in 30 groups were observed flying within 800-m (2,625-ft) plots, and of these, 44.0% were recorded in the estimated RSH. Of these groups, 44 observations of waterfowl in 24 groups were recorded, and 40.9% of these groups were within the estimated RSH (Table 12). Of the flying groups of diurnal raptors within 800-m plots (2,625-ft), 100% were below the RSH (Table 12).

Table 12. Flight height characteristics by large bird type and raptor subtype of large birds observed during wetland bird use surveys at the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height of Groups		% of Total Obs Flying	% of Groups within Flight Height Categories[1]		
			Height meters (m)	Height feet (ft)		0-25 m (0-82 ft)	25-150 m (82-492 ft)	>150 m (>492 ft)
Waterbirds	5	5	34.0	111.6	50.0	20.0	80.0	0.0
Waterfowl	24	44	18.3	60.0	42.3	59.1	40.9	0.0
Shorebirds	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Diurnal Raptors	1	1	10.0	32.8	100.0	100.0	0.0	0.0
Northern Harrier	*1*	*1*	*10.0*	*32.8*	*100.0*	*100.0*	*0.0*	*0.0*
Large Birds Overall	**30**	**50**	**20.6**	**67.7**	**41.3**	**56.0**	**44.0**	**0.0**

[1] The likely rotor-swept height is 25 -150 m (82 - 492 ft) above ground level.

5.3.4 Wetland Bird Spatial Use

Waterfowl were observed at all six observation points, with bird use highest at Point 7 (13.0 observations/800-m plot/60-minute survey; near a tributary to Woodbury Creek) followed by Point 6 (10.0 observations/800-m plot/60-minute survey; adjacent to Woodbury Creek). All other waterbird use ranged from 0.3 to 4.7 observations/800-m plot/60-minute survey (Table 13; Appendix C3).

Table 13. Bird use (mean number of observations/800-m plot/60-minute survey) by point for large bird types and raptor subtypes during wetland bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017.

Bird Type	Survey Point					
	4[1]	5	6	7	8	9
Waterbirds	0.3	2.0	0.3	0.3	0.0	0.3
Waterfowl	0.3	4.7	10.0	13.0	2.0	4.7
Shorebirds	0.3	0.0	1.0	0.7	0.0	0.0
Diurnal Raptors	0.0	0.0	0.0	0.0	0.0	0.3
Northern Harrier	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.3*
Overall	**1.0**	**6.7**	**11.3**	**14.0**	**2.0**	**5.3**

[1] Sums of values may not add to total value shown, due to rounding

Waterbird use was highest at Point 5 (2.0 observation/800-m plot/60-minute survey) followed by Points 4, 6, 7, and 9 (0.3 observation/800-m plot/60-minute survey; Table 14; Appendix C3). Waterbird use was not observed at Point 8 during wetland bird use surveys.

Shorebird use was highest at Point 6 (1.0 observations/800-m plot/60-minute survey) followed by Point 7 (0.7), and Point 4 (0.3); shorebird use was not documented at Points 5, 8, or 9 (Table 13; Appendix C3).

Diurnal raptor use, consisting of only northern harriers, was only documented at Point 9 (0.3 observation/800-m plot/60-minute survey (Table 13; Appendix C3).

Appendix D[6] documents mapped waterfowl flight paths, which qualitatively suggest that waterfowl flight paths and swimming/foraging behavior were highest at Point 6 and 7, along Mud Lake Creek and adjacent wetland complexes. No waterfowl were observed in flight or swimming at Point 4 along Woodbury Creek (Appendix D).

Waterbird flights were observed at all points, except for Point 8, with the majority of flight paths or perch locations documented at Points 4, 5, 6, and 7. All flight paths or perch locations were represented by great blue heron, except for one sandhill crane flight path documented at Point 5 (Appendix D). Diurnal raptor flight paths consisted of one northern harrier flight path at Point 9 along Deer Creek (Appendix D). All shorebird (consisting only of killdeer [*Charadrius vociferus*] and least sandpiper [*Calidris minutilla*]) flight paths or perch locations were observed at Points 6

[6] Flight paths and perch locations on Appendix D may include multiple observations along the same flight path or at the same perch location.

and 7 along Mud Lake Creek and adjacent wetland complexes (Appendix D). These data are not directly comparable to the quantitative use data, which are a more reliable indicator of bird use within the Project Expansion Area. No consistent flight patterns were observed based on direction of flight paths within wetland bird use plots (i.e., north/south, east/west); however, flights paths and perch locations appeared to be more concentrated at the northern points, and particularly along Mud Lake Creek and adjacent wetland complexes for waterbirds, waterfowl, and shorebirds (Appendix D).

5.4 Threatened, Endangered, and Sensitive Species Observations

No federal-endangered or –threatened species were observed during all bird use surveys. One Iowa state-endangered species was observed during large bird use surveys only: northern harrier, 22 observations (Table 14). Five other sensitive species were observed during large bird use surveys and one sensitive species was incidentally observed (Table 14). Franklin's gull, a state-listed species of concern, composed the majority of sensitive species observations, with 750 observations (300 during formal large bird use surveys and 450 incidental observations; Table 14).

For bald eagle, which is a USFWS Bird of Conservation Concern (USFWS 2008), protected under the *Bald and Golden Eagle Protection Act* (BGEPA 1940), and is an Iowa special concern species (Iowa Department of Natural Resources 2015), there were 83 observations (70 observations during formal large bird use surveys and 13 incidental observations; Table 14). American white pelican (*Pelecanus erythrorhynchos),* a state special concern species, was the third most commonly observed sensitive species, with 18 observations during large bird use surveys. American golden-plover (*Pluvialis dominica*), a federal watch list species, was observed twice incidentally, and one golden eagle, protected under the BGEPA, was observed during large bird use surveys (Table 14).

Table 14. Summary of sensitive species observed in the Freeborn Wind Energy Project Expansion Area during large bird use surveys (LB), small bird use survey (SB), wetland bird use surveys (WB), and as incidental wildlife observations (INC) from October 25, 2016 – September 26, 2017.

Species	Scientific Name	Status		LB		WB		SB		INC		Total	
		IA	MN	# of grps	# of obs	# of grps	# of obs	# of grps	# of obs	# of grps	# of obs	# of grps	# of obs
American golden-plover	*Pluvialis dominica*	FWL	FWL	0	0	0	0	0	0	1	2	1	2
American white pelican	*Pelecanus erythrorhynchos*		SCS	2	18	0	0	0	0	0	0	2	18
Bald eagle	*Haliaeetus leucocephalus*	SCS, BGEPA, BCC	BGEPA, BCC	70	70	0	0	0	0	13	13	83	83
Franklin's gull	*Leucophaeus pipixcan*		SCS	1	300	0	0	0	0	2	450	3	750
Golden eagle	*Aquila chrysaetos*	BGEPA	BGEPA	1	1	0	0	0	0	0	0	1	1
Northern harrier	*Circus cyaneus*	SE		22	22	0	0	0	0	0	0	22	22
Overall	**6 species**			**96**	**411**	**0**	**0**	**0**	**0**	**16**	**465**	**112**	**876**

SCS = state-listed special concern species (Minnesota Department of Natural Resources [MNDNR 2013]), SCS = state-listed special concern species (Iowa Department of Natural Resources (Iowa DNR 2015), SE = state-endangered (Iowa DNR 2015), WL = watch list, BGEP = Bald and Golden Eagle Protection Act (BGEPA 1940), FWL = federal watch list (Shorebirds of Conservation Concern [USFWS 2015])., Birds of Conservation Concern (USFWS 2008) IA=Iowa; MN=Minnesota; LG=large bird; WB=waterbird; SB=small bird; INC=Incidental

5.5 Incidental Observations

Thirteen unique bird species were incidentally observed outside of the standardized 60-minute or 8-minute point count during all bird use surveys, totaling 2,083 observations within 102 separate groups (Table 15).

Table 15. Birds incidentally observed outside of the standardized 60-minute or 8-minute point count while conducting all bird use surveys at the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.

Species	Scientific Name	# grps	# obs
Canada goose	*Branta canadensis*	11	668
Unidentified goose		1	45
American golden-plover	*Pluvialis dominica*	1	2
Dunlin	*Calidris alpina*	1	15
Greater yellowlegs	*Tringa melanoleuca*	1	1
Killdeer	*Charadrius vociferus*	12	16
Pectoral sandpiper	*Calidris melanotos*	1	3
Franklin's gull	*Leucophaeus pipixcan*	2	450
Herring gull	*Larus argentatus*	1	164
Ring-billed gull	*Larus delawarensis*	2	162
Unidentified gull		3	418
Bald eagle	*Haliaeetus leucocephalus*	13	13
Red-tailed hawk	*Buteo jamaicensis*	21	23
Unidentified raptor		3	6
Mourning dove	*Zenaida macroura*	2	3
American crow	*Corvus brachyrhynchos*	27	94
Total	**16 species**	**102**	**2,083**

6 REFERENCES

Bald and Golden Eagle Protection Act (BGEPA). 1940. 16 United States Code (USC) § 668-668d. Bald Eagle Protection Act of 1940, June 8, 1940, Chapter 278, Section (§) 2, 54 Statute (Stat.) 251; Expanded to include the related species of the golden eagle October 24, 1962, Public Law (PL) 87-884, 76 Stat. 1246. [as amended: October 23, 1972, PL 92-535, § 2, 86 Stat. 1065; November 8, 1978, PL 95-616, § 9, 92 Stat. 3114.].

ESRI. 2017. World Imagery and Aerial Photos. ArcGIS Resource Center. ESRI, producers of ArcGIS software. Redlands, California. Information online: http://www.arcgis.com/home/webmap/viewer.html?useExisting=1

Homer, C. G., J. A. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. D. Herold, J. D. Wickham, and K. Megown. 2015. Completion of the 2011 National Land Cover Database for the Conterminous United States-Representing a Decade of Land Cover Change Information. Photogrammetric Engineering and Remote Sensing 81(5): 345-354. Available online: http://www.mrlc.gov/nlcd2011.php

Iowa Department of Natural Resources (IDNR). 2015. Iowa Wildlife Action Plan - Revision Materials. Iowa Wildlife Action Plan (IWAP), Wildlife Stewardship, IDNR, Des Moines, Iowa. Accessed October 8, 2015. IWAP available online at: http://www.iowadnr.gov/Environment/WildlifeStewardship/IowaWildlifeActionPlan.aspx

Minnesota Department of Natural Resources (MDNR). 2012. Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota. Draft. MDNR, Division of Ecological and Water Resources. October 2, 2012.

Minnesota Department of Natural Resources (MNDNR). 2013. Minnesota's List of Endangered, Threatened, and Special Concern Species. Effective August 19, 2013. 18 pp. Information avaialable at: http://files.dnr.state.mn.us/natural_resources/ets/endlist.pdf

North American Datum (NAD). 1983. Nad83 Geodetic Datum.

Reynolds, R. T., J. M. Scott, and R. A. Nussbaum. 1980. A Variable Circular-Plot Method for Estimating Bird Numbers. Condor 82(3): 309-313.

Simon, S. and T. Mattson. 2016. Avian Studies for the Freeborn Wind Energy Project, Freeborn County, Minnesota. Final Report: January 2015 – March 2016. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 44 pages + appendices.

U.S.A. Topo. 2017. USA Topo Maps. U.S. Geological Survey (USGS) Topographical maps for the United States. ArcGIS. ESRI producers of ArcGIS software. Redlands, California.

U.S. Department of Agriculture (USDA). 2017. Imagery Programs - National Agriculture Imagery Program (NAIP). USDA - Farm Service Agency (FSA). Aerial Photography Field Office (APFO), Salt Lake City, Utah. Accessed August 2017. Information online: http://www.fsa.usda.gov/programs-and-services/aerial-photography/imagery-programs/index

U.S. Environmental Protection Agency (USEPA). 2013. Primary Distinguishing Characteristics of Level III Ecoregions of the Continental United States. Map scale 1:3,000,000. USEPA National Health and Environmental Effects Research Laboratory, Corvallis, Oregon. Accessed May 2015. Information and downloads available online at: https://archive.epa.gov/wed/ecoregions/web/html/level_iii_iv-2.html#Level%20III

U.S. Environmental Protection Agency (USEPA). 2016. Level III and Level IV Ecoregions of the Continental United States. Available online at: https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states

U.S. Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. December 2008. Division of Migratory Bird Management. Arlington, Virginia. Available online: https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf

U.S. Fish and Wildlife Service (USFWS). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

U.S. Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Executive Summary and frontmatter + 103 pp. Available online: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

U.S. Geological Survey (USGS). 2017. National Hydrography Dataset (NHD). USGS NHD Extracts. Accessed July 2017. Available online: http://nhd.usgs.gov/

U.S. Geological Survey (USGS). 2017. USGS Topographic Maps. Last updated January 17, 2017. Homepage available at: https://nationalmap.gov/ustopo/index.html

U.S. Geological Survey (USGS) National Land Cover Database (NLCD). 2011. National Land Cover Database 2011 (NLCD 2011). Multi-Resolution Land Characteristics Consortium (MRLC), National Land Cover Database (NLCD). USGS Earth Resources Observation and Science (EROS) Center, Sioux Falls, South Dakota. Available online: http://www.mrlc.gov/nlcd2011.php; Legend: http://www.mrlc.gov/nlcd11_leg.php

U.S. Shorebird Conservation Plan Partnership. 2015. U.S. Shorebirds of Conservation Concern ─ 2015. http://www.shorebirdplan.org/science/assessment-conservation-status-shorebirds/

Appendix A. All Bird Types and Species Observed at the Freeborn Wind Energy Project Expansion Area during Large Bird Use Surveys from October 25, 2016 – September 26, 2017

Appendix A. Summary of observations by bird type and species for the large bird use surveys and incidentally conducted in the Freeborn Wind Energy Project Expansion Area October 25, 2016 – September 26, 2017[1].

Type/Species	Scientific Name	Spring			Summer			Fall			Winter			Total		
		# grps	# obs	% obs	# grps	# obs	% obs	# grps	# obs	% obs	# grps	# obs	% obs	# grps	# obs	% obs
Waterbirds		**13**	**16**	**0.9**	**6**	**23**	**3.7**	**3**	**4**	**0.3**	**1**	**4**	**0.1**	**23**	**47**	**0.5**
American white pelican	*Pelecanus erythrorhynchos*	0	0		2	18		0	0		0	0		2	18	
Great blue heron	*Ardea herodias*	8	8		4	5		2	2		0	0		14	15	
Sandhill crane	*Grus canadensis*	5	8		0	0		1	2		1	4		7	14	
Waterfowl		**41**	**1,391**	**79.1**	**5**	**18**	**2.9**	**27**	**621**	**48.8**	**71**	**4,677**	**85.3**	**144**	**6707**	**73.4**
American green-winged teal	*Anas crecca carolinensis*	3	5		0	0		0	0		0	0		3	5	
Cackling goose	*Branta hutchinsii*	0	0		0	0		0	0		2	130		2	130	
Canada goose	*Branta canadensis*	15	199		1	13		19	379		61	4,444		96	5035	
Mallard	*Anas platyrhynchos*	8	16		4	5		1	28		6	97		19	146	
Snow goose	*Chen caerulescens*	5	1132		0	0		1	150		0	0		6	1282	
Tundra swan	*Cygnus columbianus*	1	1		0	0		0	0		2	6		3	7	
Unidentified duck		6	32		0	0		4	58		0	0		10	90	
Unidentified goose		0	0		0	0		1	4		0	0		1	4	
Wood duck	*Aix sponsa*	3	6		0	0		1	2		0	0		4	8	
Shorebirds		**8**	**11**	**0.6**	**33**	**51**	**8.3**	**2**	**51**	**4.0**	**0**	**0**	**0**	**43**	**113**	**1.2**
Killdeer	*Charadrius vociferus*	8	11		33	51		2	51		0	0		43	113	
Gulls/Terns		**0**	**0**	**0**	**1**	**120**	**19.5**	**1**	**300**	**23.6**	**0**	**0**	**0**	**2**	**420**	**4.6**
Franklin's gull	*Leucophaeus pipixcan*	0	0		0	0		1	300		0	0		1	300	
Unidentified gull		0	0		1	120		0	0		0	0		1	120	
Diurnal Raptors		**70**	**78**	**4.4**	**33**	**33**	**5.4**	**78**	**78**	**6.1**	**97**	**97**	**1.8**	**278**	**286**	**3.1**
Accipiters		*9*	*9*		*5*	*5*		*6*	*6*		*2*	*2*		*22*	*22*	
Cooper's hawk	*Accipiter cooperii*	6	6		4	4		6	6		0	0		16	16	
Sharp-shinned hawk	*Accipiter striatus*	2	2		1	1		0	0		2	2		5	5	
Unidentified accipiter	*Accipiter spp*	1	1		0	0		0	0		0	0		1	1	
Buteos		*47*	*55*		*23*	*23*		*47*	*47*		*28*	*28*		*145*	*153*	
Red-tailed hawk	*Buteo jamaicensis*	43	51		23	23		47	47		18	18		131	139	
Rough-legged hawk	*Buteo lagopus*	3	3		0	0		0	0		0	0		3	3	
Unidentified buteo	*Buteo spp*	1	1		0	0		0	0		10	10		11	11	

Appendix A (*continued*). Summary of observations by bird type and species for the large bird use surveys and incidentally conducted in the Freeborn Wind Energy Project Expansion Area October 25, 2016 – September 26, 2017[1].

		Spring			Summer			Fall			Winter			Total		
Type/Species	**Scientific Name**	**# grps**	**# obs**	**% obs**	**# grps**	**# obs**	**% obs**	**# grps**	**# obs**	**% obs**	**# grps**	**# obs**	**% obs**	**# grps**	**# obs**	**% obs**
Northern Harrier		*7*	*7*		*0*	*0*		*2*	*2*		*13*	*13*		*22*	*22*	
Northern harrier	*Circus cyaneus*	7	7		0	0		2	2		13	13		22	22	
Eagles		*7*	*7*		*1*	*1*		*17*	*17*		*47*	*47*		*72*	*72*	
Bald eagle	*Haliaeetus leucocephalus*	6	6		1	1		17	17		46	46		70	70	
Golden eagle	*Aquila chrysaetos*	1	1		0	0		0	0		0	0		1	1	
Unidentified eagle		0	0		0	0		0	0		1	1		1	1	
Falcons		*0*	*0*		*4*	*4*		*3*	*3*		*1*	*1*		*8*	*8*	
American kestrel	*Falco sparverius*	0	0		2	2		3	3		0	0		5	5	
Gyrfalcon	*Falco rusticolus*	0	0		0	0		0	0		1	1		1	1	
Merlin	*Falco columbarius*	0	0		2	2		0	0		0	0		2	2	
Other Raptors		*0*	*0*		*0*	*0*		*3*	*3*		*6*	*6*		*9*	*9*	
Unidentified hawk		0	0		0	0		0	0		1	1		1	1	
Unidentified raptor		0	0		0	0		3	3		5	5		8	8	
Owls		**2**	**2**	**0.1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**<0.1**	**3**	**3**	**<0.1**
Great horned owl	*Bubo virginianus*	2	2		0	0		0	0		1	1		3	3	
Vultures		**60**	**116**	**6.6**	**100**	**184**	**29.8**	**22**	**30**	**2.4**	**0**	**0**	**0**	**182**	**330**	**3.6**
Turkey vulture	*Cathartes aura*	60	116		100	184		22	30		0	0		182	330	
Upland Game Birds		**12**	**34**	**1.9**	**1**	**1**		**7**	**64**	**5.0**	**6**	**6**	**0.1**	**26**	**105**	**1.2**
Ring-necked pheasant	*Phasianus colchicus*	5	5		0	0		0	0		4	4		9	9	
Wild turkey	*Meleagris gallopavo*	7	29		1	1		7	64		2	2		17	96	
Large Corvids		**66**	**111**	**6.3**	**65**	**187**	**30.3**	**43**	**124**	**9.8**	**261**	**700**	**12.8**	**435**	**1,122**	**12.3**
American crow	*Corvus brachyrhynchos*	66	111		65	187		43	124		261	700		435	1,122	
Unidentified Birds		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**<0.1**	**1**	**1**	**<0.1**
Unidentified large bird		0	0		0	0		0	0		1	1		1	1	
Overall		**272**	**1,759**		**244**	**617**		**183**	**1,272**		**438**	**5,486**		**1,137**	**9,134**	

[1]Large bird observations recorded within and outside of the 800-meter (2,625-foot) plots
grps = groups, obs= observations

Appendix B. Large Bird Use, Percent of Use, and Frequency of Occurrence during Large Bird Use Surveys at the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017

Appendix B. Large bird use (number of large bird observations/800-meter plot/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during large bird use surveys conducted in the Freeborn Expansion Wind Energy Project area October 25, 2016 – September 26, 2017.

	Bird Use					% of Use				% Frequency			
Type/Species	Spring	Summer	Fall	Winter	Study Period	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter
Waterbirds	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**3.0**	**3.8**	**0.4**	**0.3**	**11.1**	**4.1**	**4.6**	**0.8**
American white pelican	0.0	0.1	0.0	0.0	<0.1	0.0	2.4	0.0	0.0	0.0	1.0	0.0	0.0
Great blue heron	0.1	0.1	0.1	0.0	<0.1	1.3	1.4	0.2	0.0	6.1	4.1	3.1	0.0
Sandhill crane	0.1	0.0	0.1	0.1	<0.1	1.7	0.0	0.2	0.3	5.1	0.0	1.5	0.8
Waterfowl	**2.2**	**0.2**	**6.5**	**6.0**	**3.8**	**46.3**	**4.9**	**43.5**	**66.5**	**22.2**	**5.1**	**15.6**	**9.1**
American green-winged teal	0.1	0.0	0.0	0.0	<0.1	1.1	0.0	0.0	0.0	3.0	0.0	0.0	0.0
Cackling goose	0.0	0.0	0.0	0.9	0.3	0.0	0.0	0.0	10.8	0.0	0.0	0.0	1.5
Canada goose	0.9	0.1	2.9	4.3	2.3	19.8	3.5	19.5	47.4	9.1	1.0	9.2	6.8
Mallard	0.2	0.1	0.5	0.7	0.4	3.5	1.3	3.0	8.1	7.1	4.0	1.6	3.0
Snow goose	0.7	0.0	2.3	0.0	0.6	15.2	0.0	15.1	0.0	1.0	0.0	1.5	0.0
Tundra swan	0.0	0.0	0.0	<0.1	<0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.8
Unidentified duck	0.3	0.0	0.9	0.0	0.2	5.4	0.0	5.7	0.0	3.0	0.0	3.2	0.0
Wood duck	0.1	0.0	<0.1	0.0	<0.1	1.3	0.0	0.2	0.0	2.0	0.0	1.6	0.0
Shorebirds	**0.1**	**0.5**	**0.8**	**0.0**	**0.3**	**2.4**	**13.8**	**5.1**	**0.0**	**8.1**	**29.4**	**3.0**	**0.0**
Killdeer	0.1	0.5	0.8	0.0	0.3	2.4	13.8	5.1	0.0	8.1	29.4	3.0	0.0
Gulls/Terns	**0.0**	**0.0**	**4.8**	**0.0**	**0.9**	**0.0**	**0.0**	**32.2**	**0.0**	**0.0**	**0.0**	**1.6**	**0.0**
Franklin's gull	0.0	0.0	4.8	0.0	0.9	0.0	0.0	32.2	0.0	0.0	0.0	1.6	0.0
Diurnal Raptors	**0.5**	**0.2**	**0.6**	**0.3**	**0.4**	**11.3**	**6.5**	**3.8**	**3.7**	**33.3**	**22.4**	**42.3**	**20.7**
Accipiters	*0.1*	*0.1*	*0.1*	*<0.1*	<0.1	*1.5*	*1.4*	*0.5*	*0.2*	*7.1*	*5.1*	*6.1*	*1.5*
Cooper's hawk	0.1	<0.1	0.1	0.0	<0.1	1.1	1.1	0.5	0.0	5.1	4.1	6.1	0.0
Sharp-shinned hawk	<0.1	<0.1	0.0	<0.1	<0.1	0.4	0.3	0.0	0.2	2.0	1.0	0.0	1.5
Buteos	*0.4*	*0.2*	*0.4*	*0.1*	0.2	*8.5*	*4.1*	*2.3*	*1.0*	*22.2*	*14.3*	*25.2*	*7.9*
Red-tailed hawk	0.4	0.1	0.4	0.1	0.2	7.8	4.1	2.3	1.0	20.2	14.3	25.2	7.9
Rough-legged hawk	0.0	0.0	0.0	0.0	<0.1	0.7	0.0	0.0	0.0	3.0	0.0	0.0	0.0
Northern Harrier	*0.1*	*0.0*	<0.1	*0.1*	<0.1	*1.3*	*0.0*	*0.2*	*0.7*	*5.1*	*0.0*	*3.2*	*5.4*
Northern harrier	0.1	0.0	<0.1	0.1	<0.1	1.3	0.0	0.2	0.7	5.1	0.0	3.2	5.4
Eagles	*0.0*	*0.0*	*0.1*	*0.2*	0.1	*0.0*	*0.0*	*0.5*	*1.9*	*0.0*	*0.0*	*7.9*	*7.4*
Bald eagle	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.5	1.9	0.0	0.0	7.9	7.4
Falcons	*0.0*	<0.1	<0.1	*0.0*	<0.1	*0.0*	*1.1*	*0.2*	*0.0*	*0.0*	*4.1*	*3.0*	*0.0*
American kestrel	0.0	<0.1	<0.1	0.0	<0.1	0.0	0.5	0.2	0.0	0.0	2.1	3.0	0.0

Appendix B (*continued*). Large bird use (number of large bird observations/800-meter plot/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during large bird use surveys conducted in the Freeborn Expansion Wind Energy Project area October 25, 2016 – September 26, 2017.

	Bird Use					% of Use				% Frequency			
Type/Species	**Spring**	**Summer**	**Fall**	**Winter**	**Study Period**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**
Merlin	0.0	<0.1	0.0	0.0	<0.1	0.0	0.5	0.0	0.0	0.0	2.0	0.0	0.0
Owls	**<0.1**	**0.0**	**0.0**	**<0.1**	**<0.1**	**0.4**	**0.0**	**0.0**	**<0.1**	**2.0**	**0.0**	**0.0**	**0.8**
Great horned owl	0.2	0.0	0.0	<0.1	<0.1	0.4	0.0	0.0	<0.1	2.0	0.0	0.0	0.8
Vultures	**0.6**	**0.9**	**0.2**	**0.0**	**0.4**	**12.2**	**23.4**	**1.2**	**0.0**	**23.2**	**39.8**	**15.2**	**0.0**
Turkey vulture	0.6	0.9	0.2	00	0.4	12.2	23.4	1.2	0.0	23.2	39.8	15.2	0.0
Upland Game Birds	**0.3**	**<0.1**	**0.7**	**<0.1**	**0.2**	**7.4**	**0.3**	**4.5**	**0.5**	**8.1**	**1.0**	**7.9**	**4.7**
Ring-necked pheasant	0.1	0.0	0.0	**<0.1**	<0.1	1.1	0.0	0.0	0.4	4.0	0.0	0.0	3.2
Wild turkey	0.3	<0.1	0.7	**<0.1**	0.2	6.3	0.3	4.5	0.2	5.1	1.0	7.9	1.6
Large Corvids	**0.8**	**1.8**	**1.4**	**2.6**	**1.8**	**17.0**	**47.4**	**9.3**	**28.9**	**42.4**	**47.9**	**32.3**	**66.1**
American crow	0.8	1.8	1.4	2.6	1.8	17.0	47.4	9.3	28.9	42.4	47.9	32.3	66.1
Overall	**4.6**	**3.8**	**15.0**	**9.1**	**7.9**	**100.0**	**100.0**	**100.0**	**100.0**				

Appendix C. Large Bird Use by Point for All Birds, Major Bird Types, and Diurnal Raptor Subtypes during Large Bird Use Surveys Conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017; and during Wetland Bird Use Surveys from March 29 – May 30, 2017

Appendix C1. Large bird use (number of observations/800-m plot/60-minute survey) by point for all birds[a], major bird types, and diurnal raptor subtypes observed at the Freeborn Wind Energy Project Expansion Area during the large bird use surveys from October 25, 2016 – September 26, 2017.

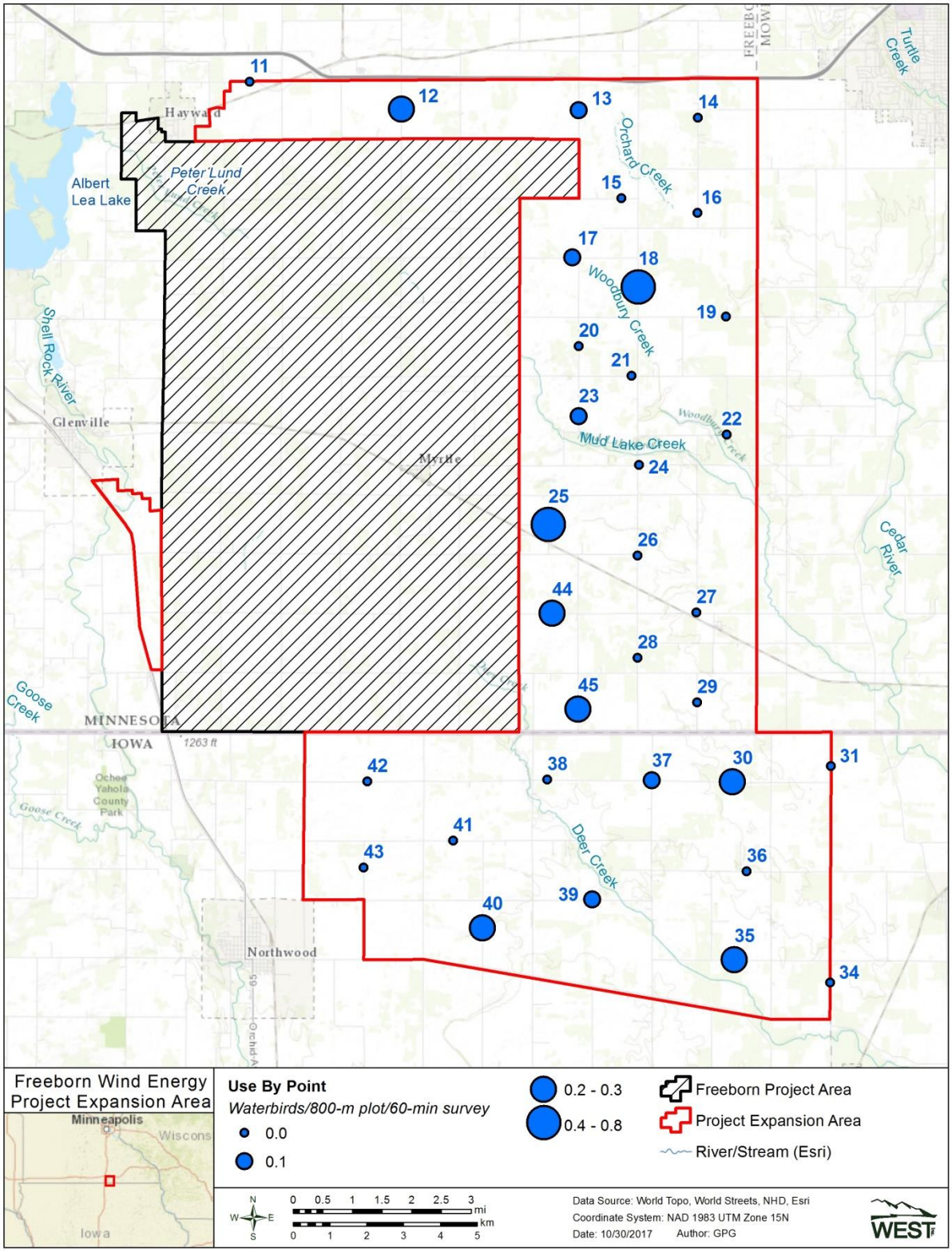
Bird Type	Survey Point																
	11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
Waterbirds	0.0	0.3	0.1	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.1	0.0	0.7	0.0	0.0
Waterfowl	0.0	7.5	0.0	1.9	3.5	2.4	0.3	10.1	5.4	0.3	0.3	20.1	0.2	1.4	10.0	0.0	0.1
Shorebirds	0.2	0.5	0.4	0.1	0.0	0.2	0.3	0.1	0.3	0.0	0.0	0.0	0.0	0.2	0.2	0.7	0.2
Gulls/Terns	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diurnal Raptors	0.9	0.4	0.3	0.3	0.3	0.6	0.2	0.2	0.3	0.3	0.9	0.5	0.2	0.9	0.5	0.3	0.2
Accipiters	*0.1*	*0.1*	*0.1*	*0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.1*	*0.0*	*0.1*	*0.0*	*0.0*	*0.2*	*0.1*	*0.1*	*0.1*
Buteos	*0.7*	*0.3*	*0.2*	*0.2*	*0.0*	*0.4*	*0.2*	*0.2*	*0.2*	*0.3*	*0.6*	*0.4*	*0.1*	*0.4*	*0.3*	*0.1*	*0.1*
Northern Harrier	*0.0*	*0.0*	*0.0*	*0.1*	*0.3*	*0.2*	*0.0*	*0.0*	*0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.1*	*0.1*	*0.0*	*0.0*
Eagles	*0.1*	*0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.2*	*0.1*	*0.1*	*0.3*	*0.0*	*0.1*	*0.1*
Falcons	*0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Owls	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Vultures	0.3	0.3	1.1	0.0	0.4	0.0	0.1	0.0	0.2	0.8	0.4	0.5	0.7	1.3	0.3	0.0	0.6
Upland Game Birds	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.1	0.0	2.3	2.9	0.3	0.1	0.3
Large Corvids	2.9	0.1	2.8	1.2	3.2	1.9	2.6	1.2	2.3	2.3	1.3	1.7	3.0	1.6	2.0	0.4	0.8
All Large Birds	**29.3**	**9.0**	**4.6**	**3.5**	**7.3**	**5.1**	**3.6**	**12.3**	**8.4**	**4.6**	**2.9**	**22.8**	**6.5**	**8.2**	**14.0**	**1.5**	**2.2**

[a.] 800-meter; 2,625-foot plot for large birds

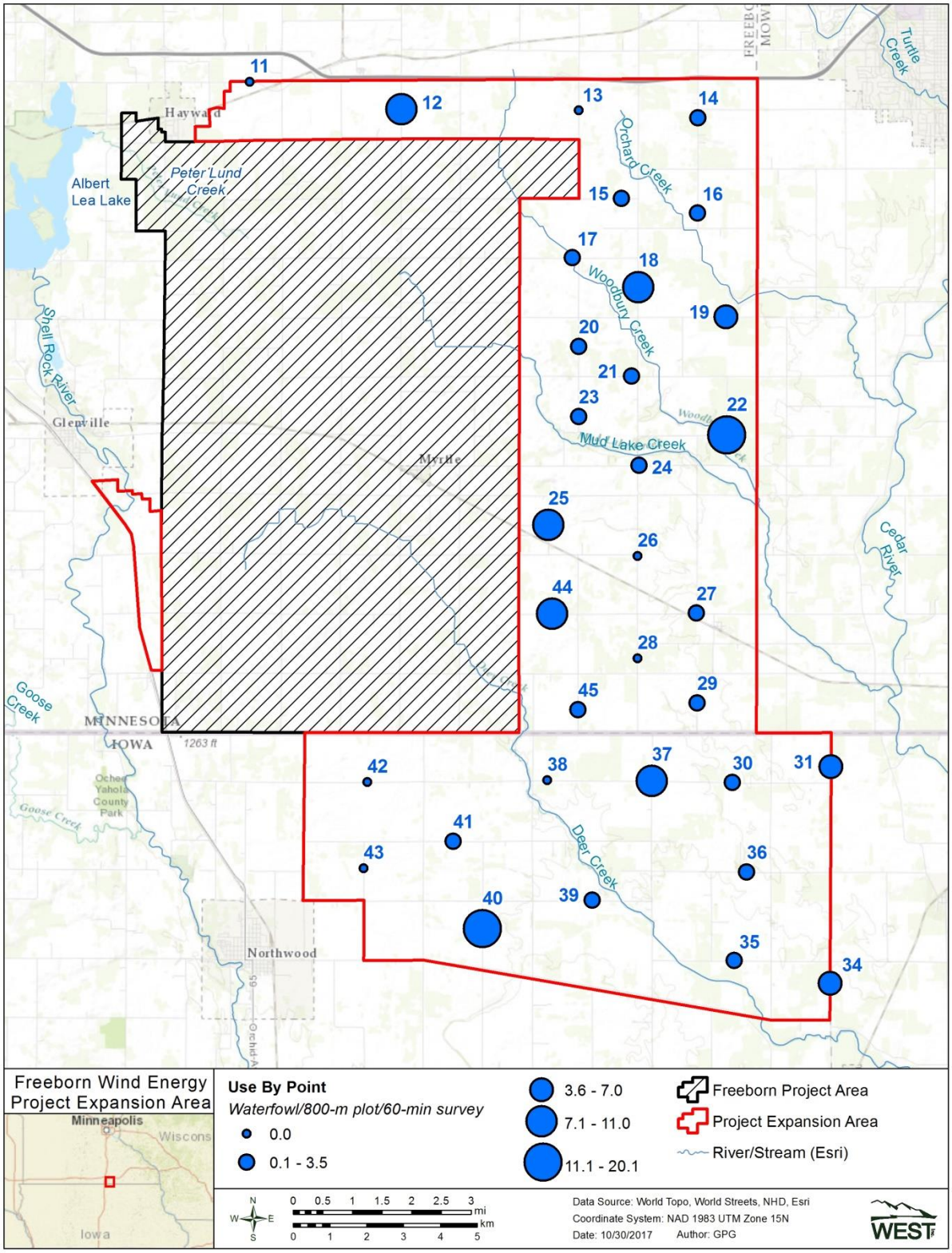
Appendix C1 (*continued*). Large bird use (number of observations/800-m plot/60-minute survey) by point for all birds[a], major bird types, and diurnal raptor subtypes observed at the Freeborn Wind Energy Project Expansion Area during the large bird use surveys from October 25, 2016 – September 26, 2017.

	Survey Point															
Bird Type	**28**	**29**	**30**	**31**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**
Waterbirds	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.1	0.0	0.1	0.2	0.0	0.0	0.0	0.2	0.2
Waterfowl	0.0	2.4	0.7	5.8	6.2	3.3	2.3	10.7	0.0	0.9	18.8	0.2	0.0	0.0	7.7	0.2
Shorebirds	0.2	0.1	0.3	0.0	0.0	4.5	0.3	0.0	0.0	0.3	0.0	0.3	0.0	0.1	0.2	0.1
Gulls/Terns	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diurnal Raptors	0.2	0.4	0.3	0.1	0.3	0.4	0.2	1.1	1.2	0.5	0.3	0.2	0.5	0.2	0.1	0.3
Accipiters	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.4*	*0.0*	*0.0*	*0.0*	*0.1*	*0.0*	*0.0*	*0.2*	*0.1*	*0.0*	*0.0*
Buteos	*0.2*	*0.3*	*0.1*	*0.0*	*0.3*	*0.0*	*0.1*	*0.9*	*0.1*	*0.3*	*0.3*	*0.0*	*0.2*	*0.1*	*0.0*	*0.2*
Northern Harrier	*0.0*	*0.1*	*0.2*	*0.1*	*0.0*	*0.0*	*0.0*	*0.1*	*0.0*	*0.1*	*0.0*	*0.1*	*0.0*	*0.0*	*0.0*	*0.0*
Eagles	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.1*	*0.1*	*1.1*	*0.0*	*0.0*	*0.0*	*0.1*	*0.0*	*0.0*	*0.0*
Falcons	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.1*	*0.1*	*0.1*	*0.0*	*0.1*	*0.1*
Owls	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
Vultures	0.5	1.2	0.1	0.8	0.9	0.3	0.5	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.1
Upland Game Birds	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1
Large Corvids	1.2	1.4	1.0	2.1	1.9	1.9	1.4	2.8	1.9	0.8	0.9	0.6	4.3	1.3	1.7	1.7
All Large Birds	**2.0**	**5.5**	**2.7**	**8.8**	**9.2**	**10.7**	**4.6**	**14.8**	**3.0**	**3.0**	**20.2**	**1.4**	**5.2**	**1.8**	**10.1**	**2.9**

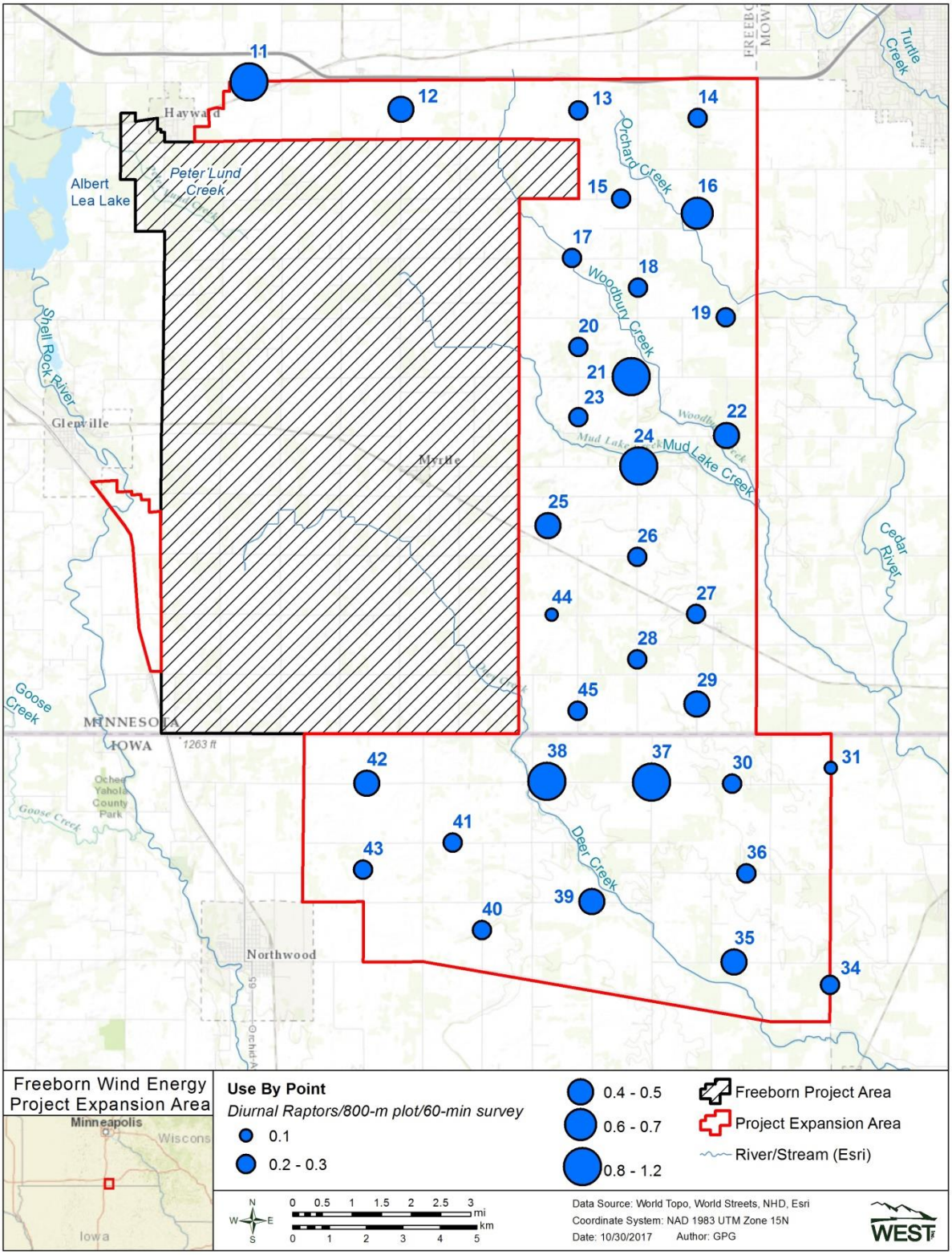
[a.] 800-meter; 2,625-foot plot for large birds



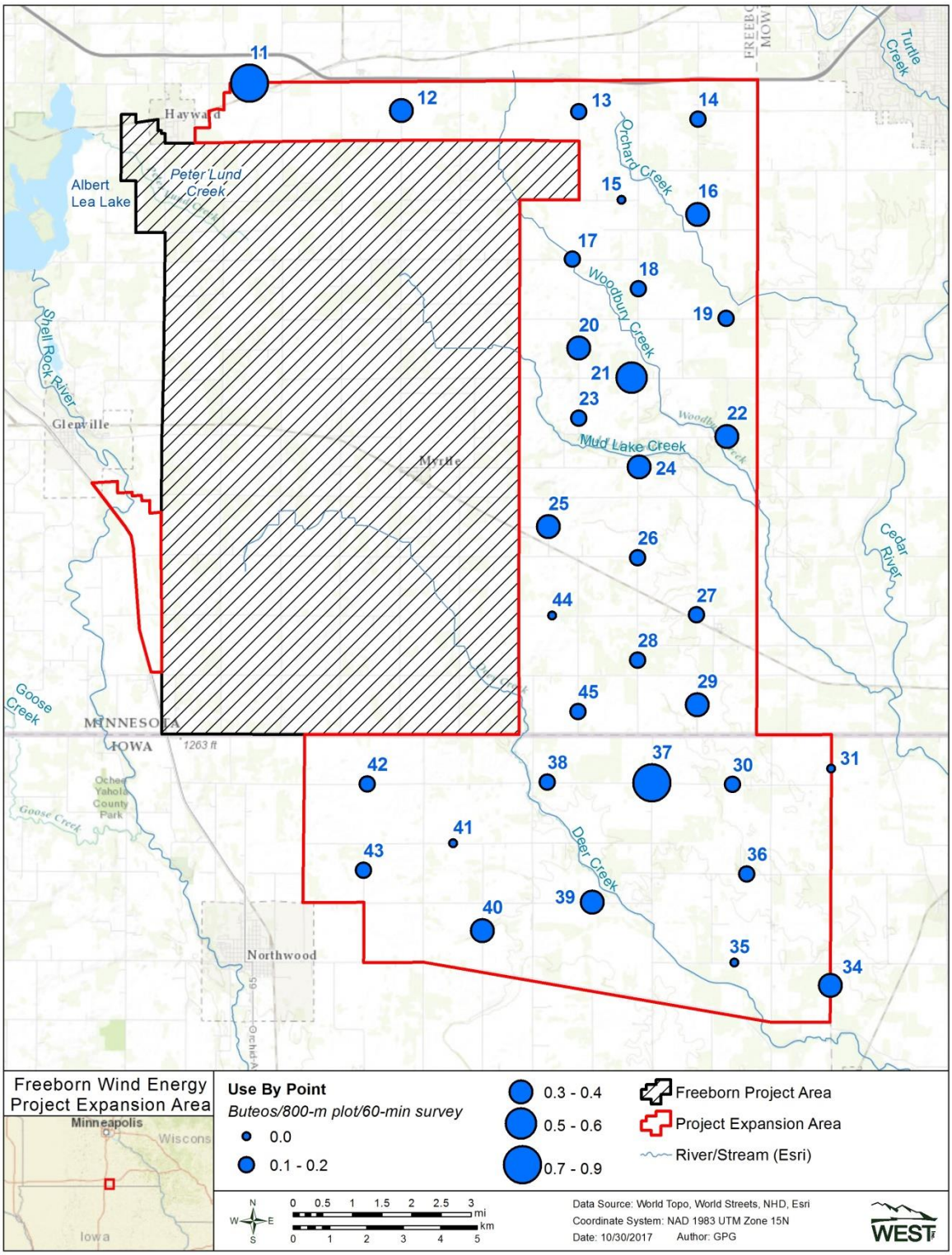
Appendix C2. Waterbird use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.



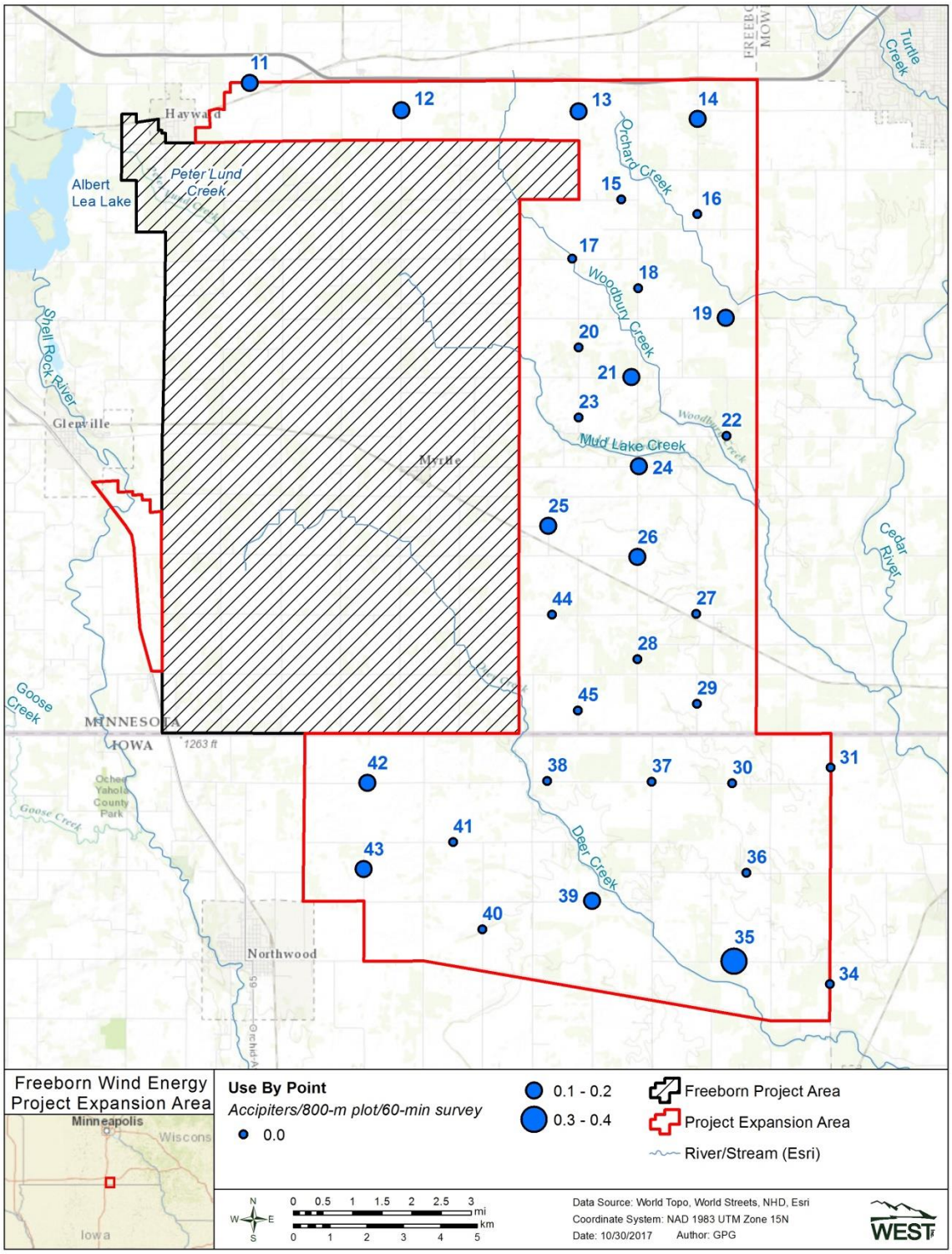
Appendix C2 (continued). Waterfowl use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017January 17, 2015 – March 22, 2016.



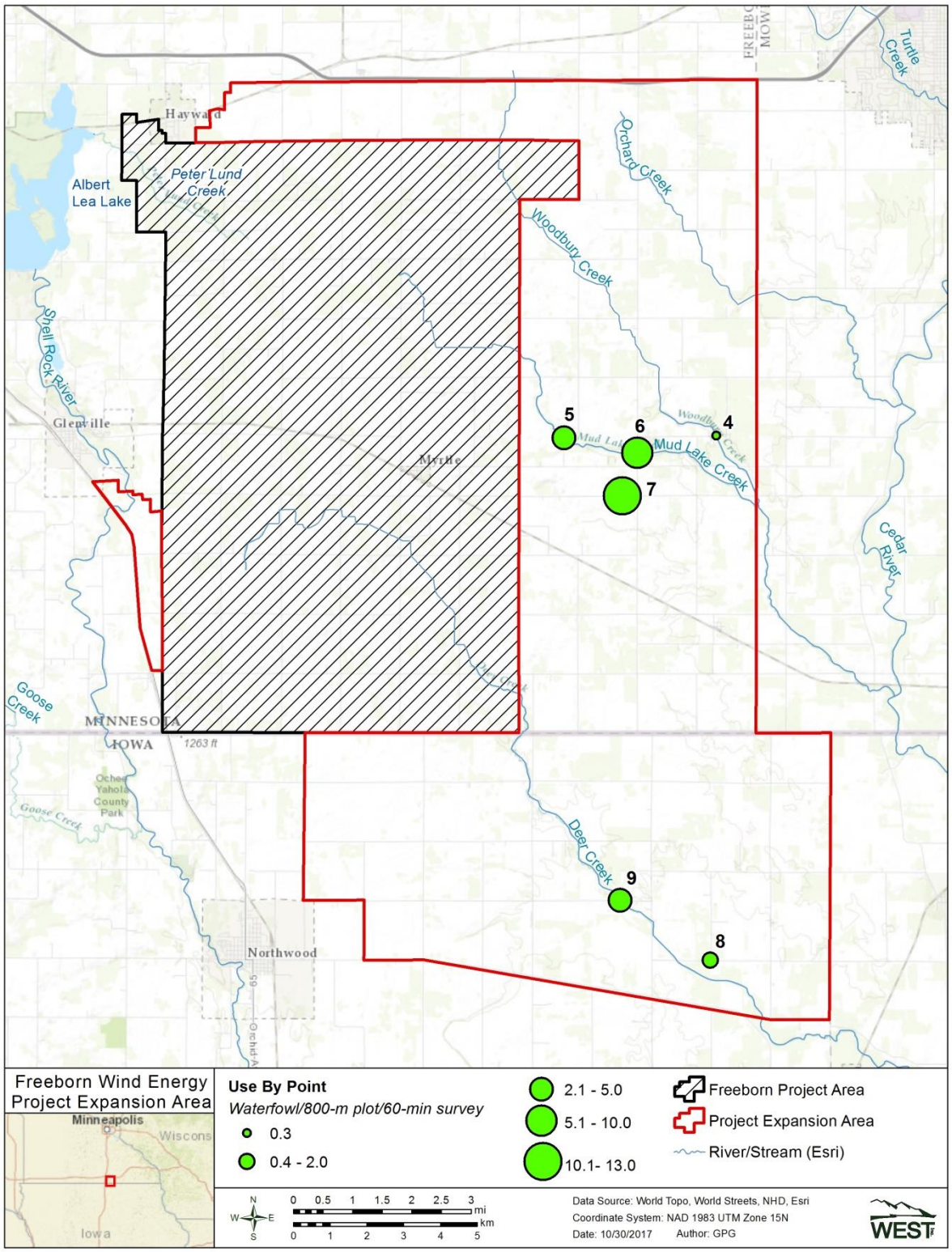
Appendix C2 (continued). Raptor use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.



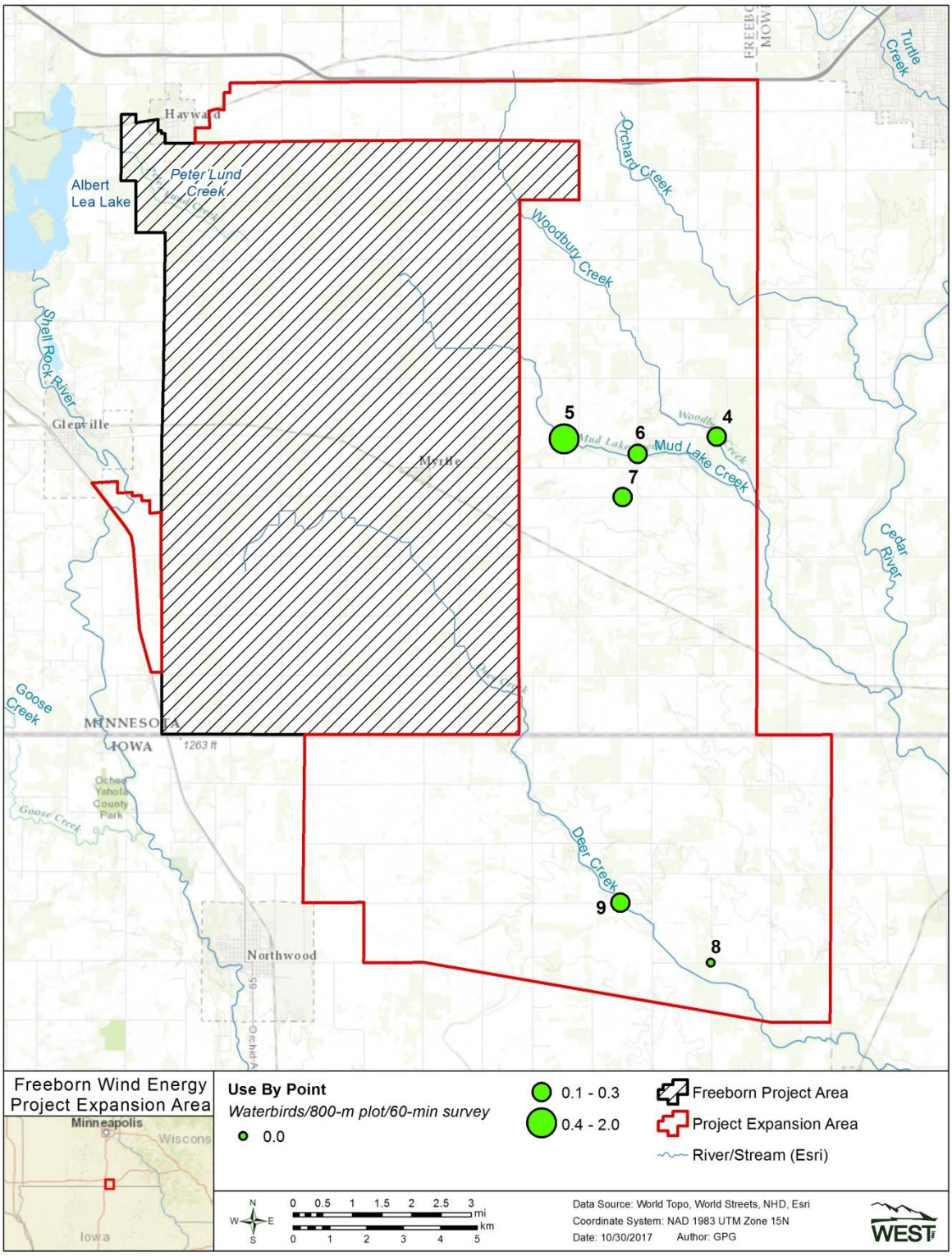
Appendix C2 (continued). Buteo use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.



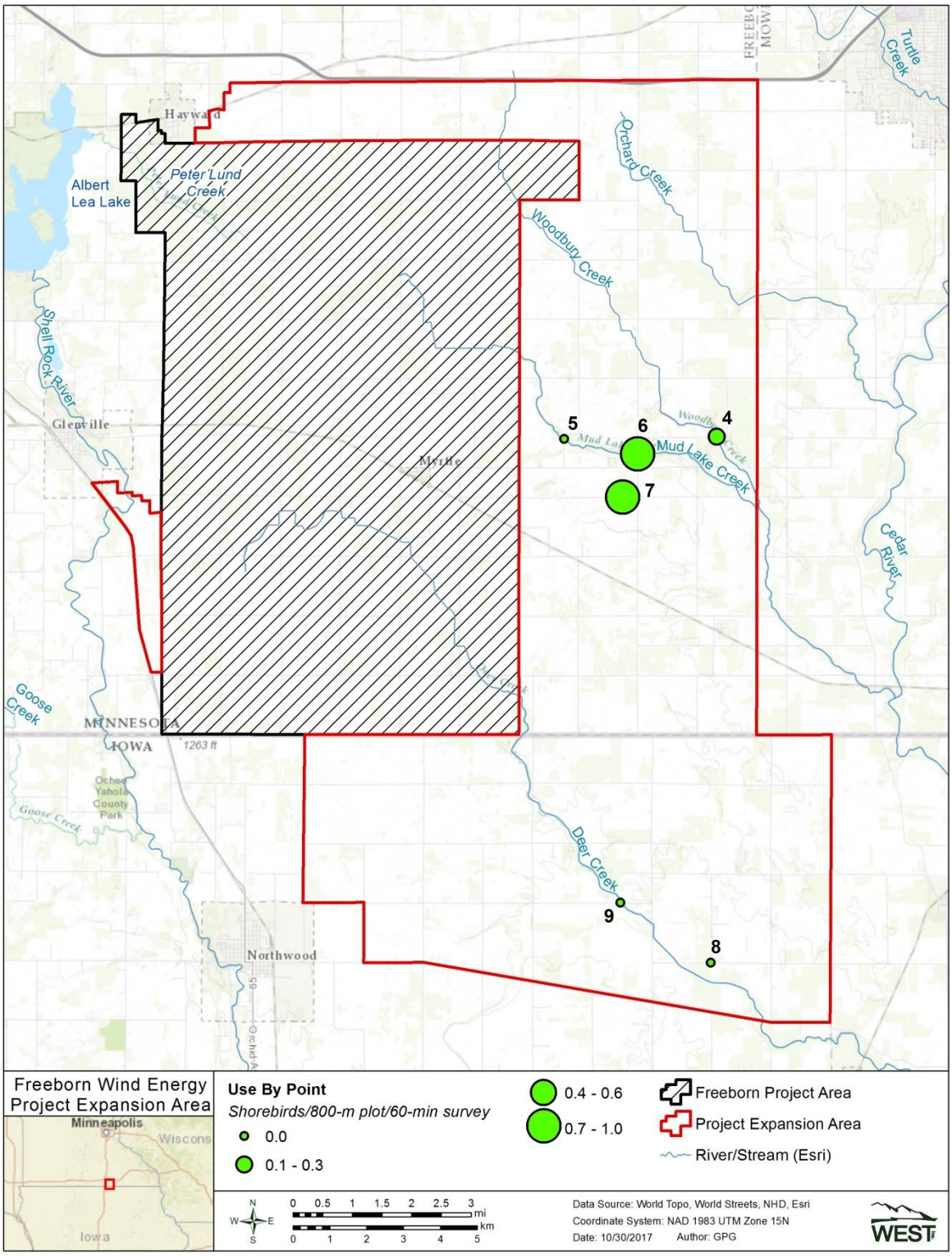
Appendix C2 (continued). Accipiter use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from October 25, 2016 – September 26, 2017.



Appendix C3. Waterfowl use by observation point during wetland bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017.

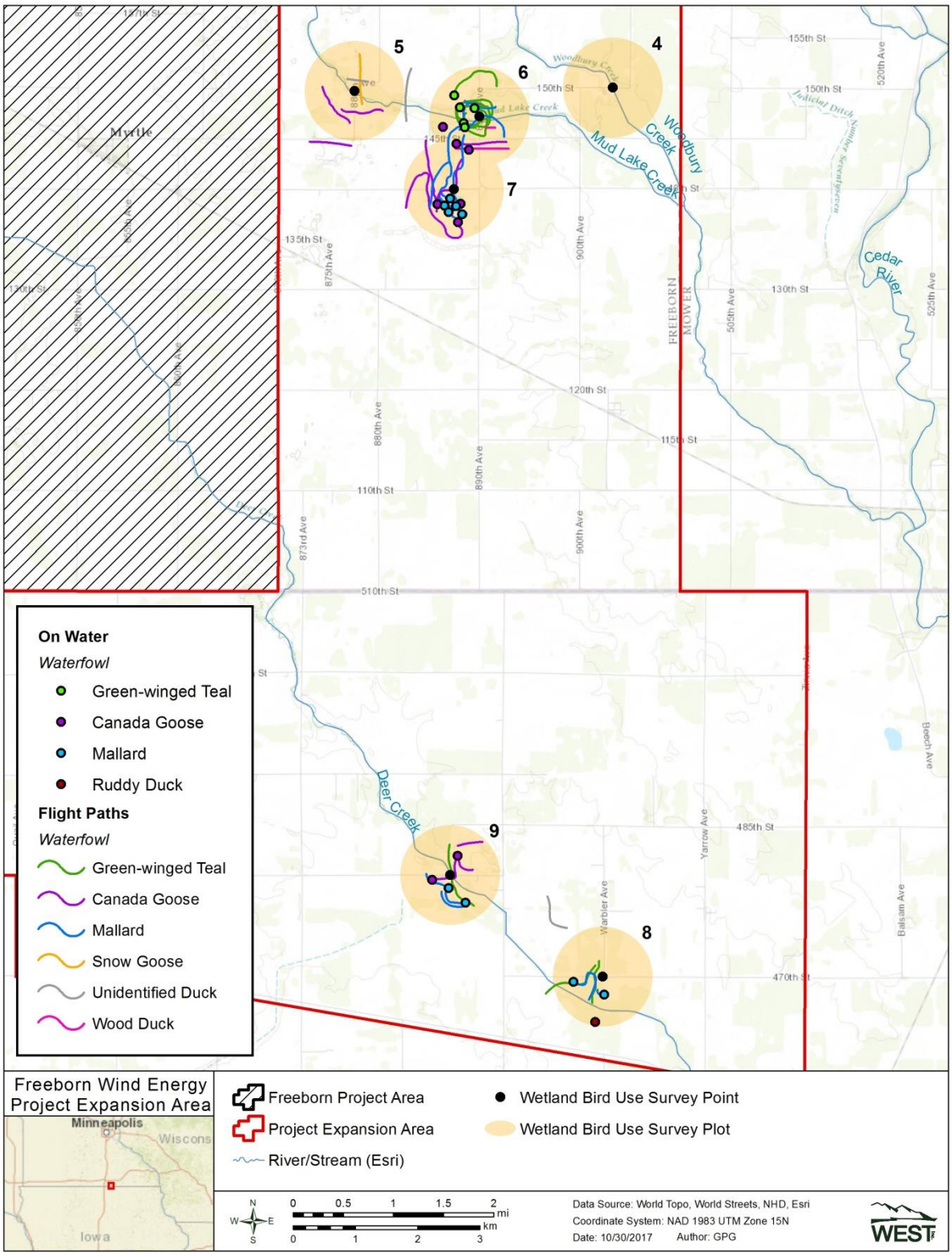


Appendix C3 (continued). Waterbird use by observation point during wetland bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017.

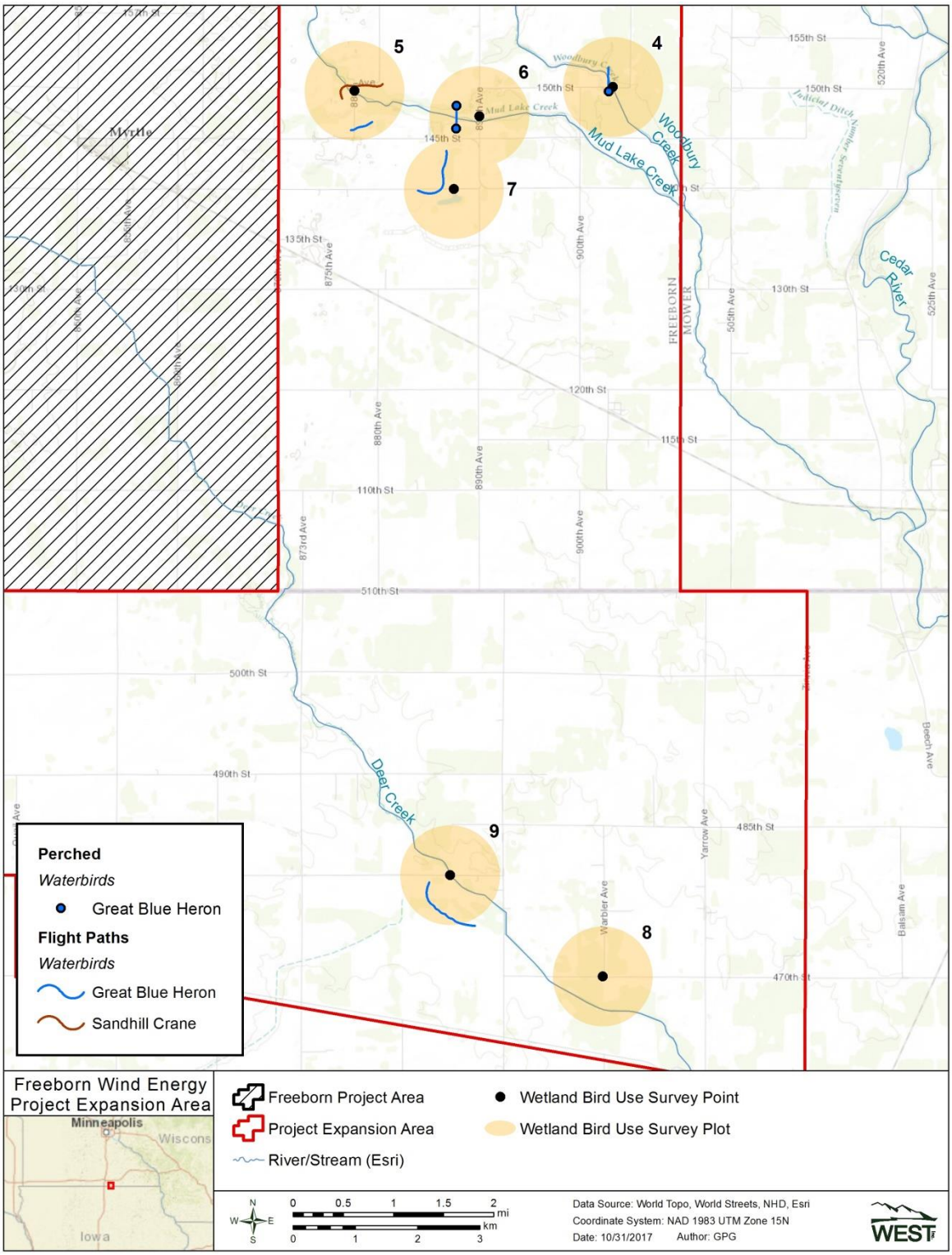


Appendix C3 (continued). Shorebird use by observation point during wetland bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017.

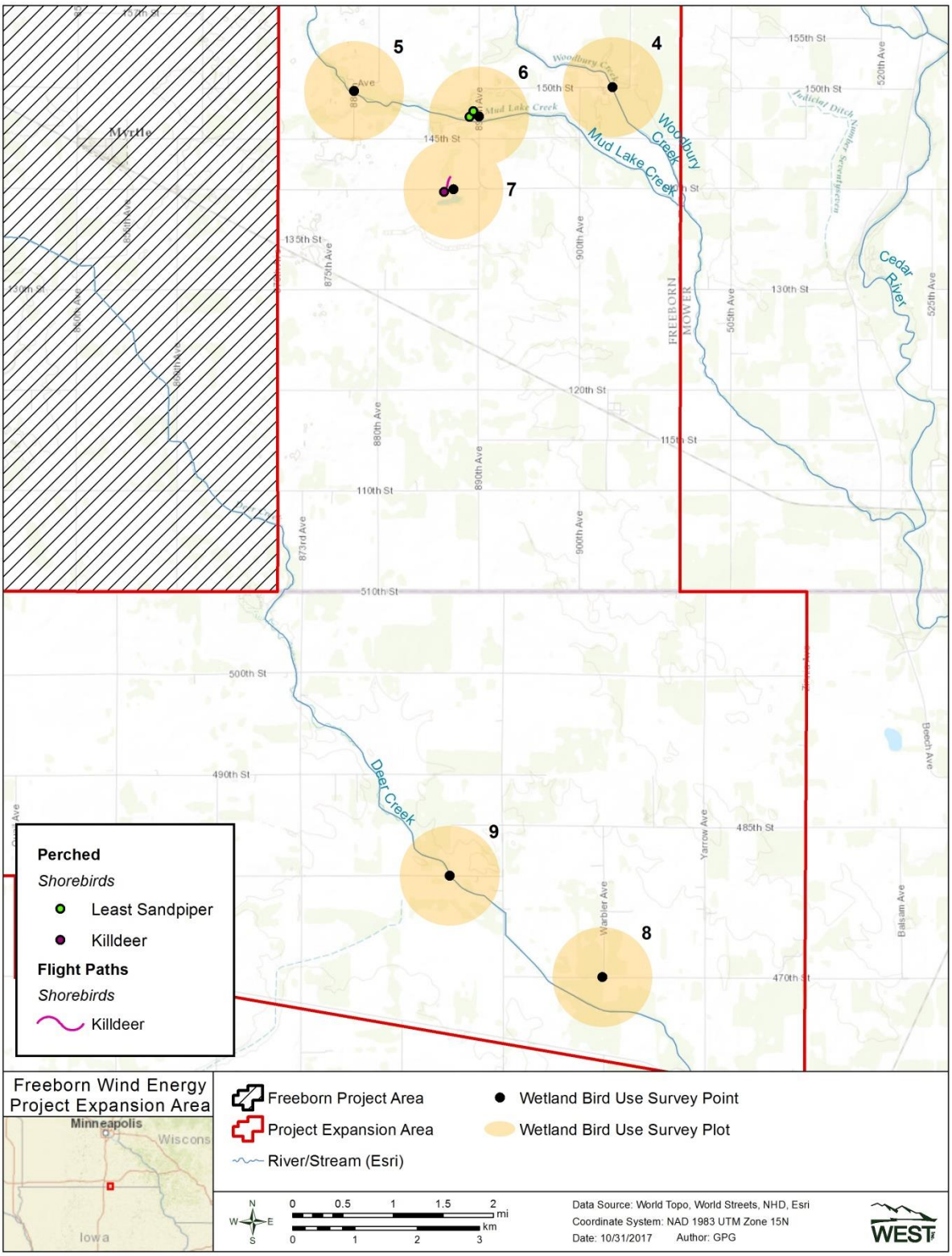
Appendix D. Flight Paths Recorded for All Waterfowl, Waterbirds, and Diurnal Raptors during Wetland Bird Use Surveys Conducted in the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017



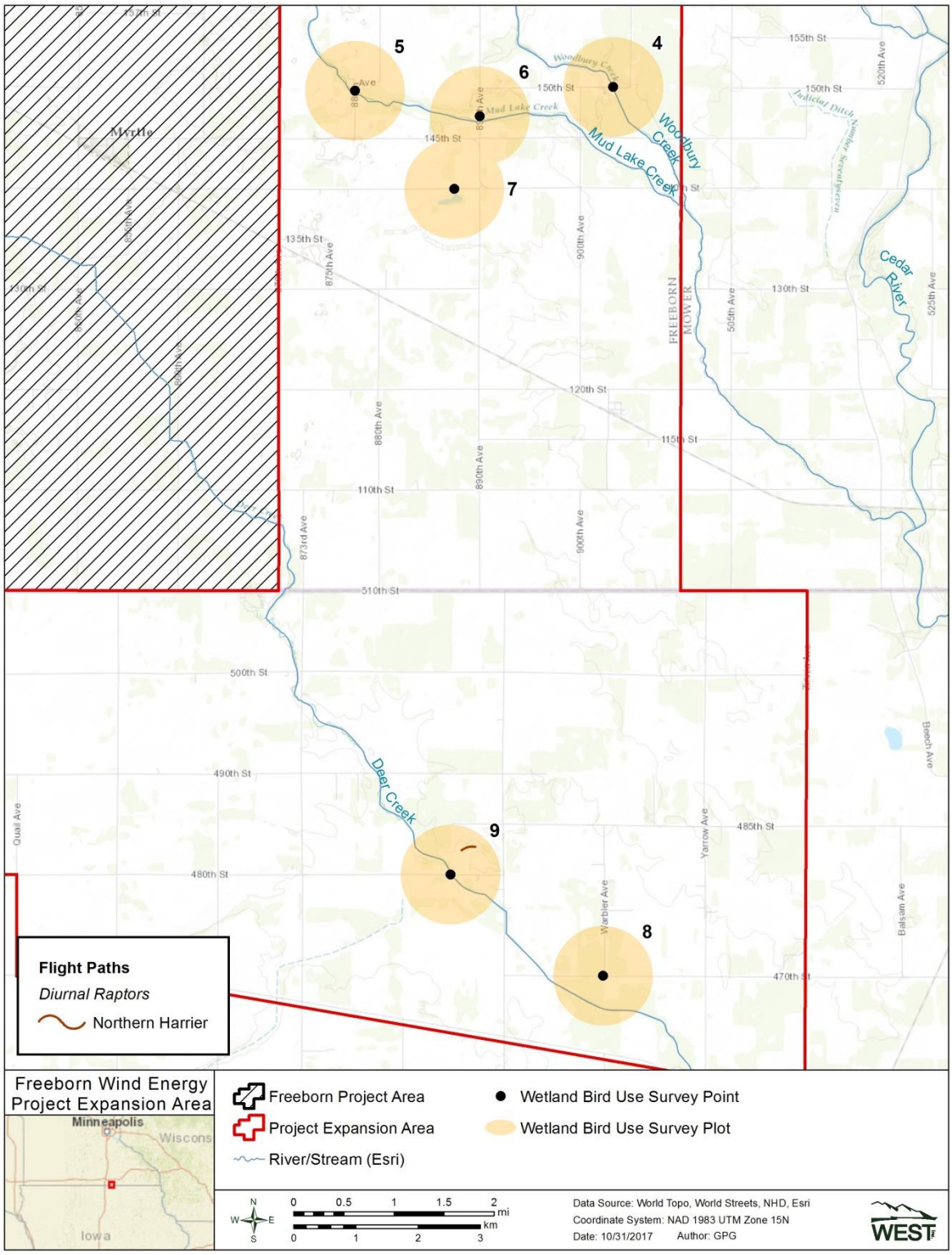
Appendix D. Waterfowl flight paths recorded during wetland bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017.



Appendix D (continued). Waterbird flight paths recorded during wetland bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017.



Appendix D (continued). Shorebird flight paths recorded during wetland bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017.



Appendix D (continued). Diurnal raptor flight paths recorded during wetland bird use surveys conducted in the Freeborn Wind Energy Project Expansion Area from March 29 – May 30, 2017.

Avian Use Study
Freeborn Wind Energy Project
Freeborn County, Minnesota

Final Report Addendum

May 26 – September 22, 2017

Prepared for:

Freeborn Wind Energy LLC
One South Wacker Drive, Suite 1800
Chicago, Illinois 60606

Prepared by:

Sandra Simon

Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 350
Golden Valley, Minnesota 55427

November 27, 2017

STUDY PARTICIPANTS

Western EcoSystems Technology

Sandra Simon	Project Manager
Todd Mattson	Senior Manager
Ray Tupling	Statistician
John Paul Wilson	Data Analyst
Carmen Boyd	Data and Report Manager
Grant Gardner	GIS Analyst
Jeanette Haddock	Independent Reviewer
Carissa Goodman	Technical Editor
Dustin Glander	Field Technician

REPORT REFERENCE

Simon, S. 2017. Avian Use Study Freeborn Wind Energy Project, Freeborn County, Minnesota. Final Report Addendum: May 26 – September 22, 2017. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 24 pages + appendices.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1 INTRODUCTION

Freeborn Wind Energy LLC (Freeborn) is considering the development of the Freeborn Wind Energy Project (Project) in Freeborn County, Minnesota (Figure 1). To support development of the Project, Freeborn contracted Western Ecosystems Technology, Inc. (WEST) to conduct pre-construction baseline surveys to estimate temporal and spatial avian use of the Project area. The methods for this study were consistent with the U.S. Fish and Wildlife Service's (USFWS) *Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy Guidance* (ECPG; USFWS 2013), the USFWS' *Final Land-Based Wind Energy Guidelines* (USFWS 2012), as well as the Minnesota Department of Natural Resources' (MNDNR) and the Minnesota Department of Commerce's (MNDOC) *Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota* (MNDNR 2012).

Study objectives were to assess the following for large birds: 1) species composition, relative abundance, and diversity; 2) overall use, percent of use, and frequency of occurrence; 3) flight height; 4) and spatial use. Additional objectives were to document use of the Project area by threatened, endangered, and sensitive avian species and eagles. The following report describes the results of the avian use study conducted in the Project area from May 26 – September 22, 2017.

A 15 month avian study was conducted for the Project area in Freeborn County, Minnesota, and was summarized in a previous report (Simon and Mattson 2016); this 2017 report is an addendum to the original 15 month avian study. Freeborn expanded the Project area for potential siting of wind energy facilities to include additional areas in Minnesota and Iowa (Project Expansion Area). A similar 12 month avian use study was conducted in the Project Expansion Area in Freeborn County, Minnesota and Worth County, Iowa from October 2016 – September 2017; the results of this study are presented under a separate cover.

2 STUDY AREA

The proposed Project area encompasses 16,120 hectares (39,834 acres) in Freeborn County, Minnesota (Figure 1). The Project occurs in the Western Corn Belt Plains Ecoregion (U.S. Environmental Protection Agency [USEPA] 2013), characterized by glaciated till plains and undulating loess plains. Much of the region was originally dominated by tallgrass prairie, riparian forest, oak-prairie savannas, and woody and herbaceous wetlands. Today, most of the area has been cleared for farms producing corn, soybeans, and livestock (USEPA 2013).

Many smaller streams in this ecoregion have been tilled, ditched, and tied into existing drainage systems, resulting in a reduction in wetland and aquatic habitats (USEPA 2013). A few streams are present in and adjacent to the Project area, including Woodbury Creek in the northeast, Mud Lake Creek in the east, Deer Creek and tributaries in the south, Peter Lund Creek in the northwest, and the Shell Rock River and its tributaries in the west (Figure 1).

According to the 2011 U.S. Geological Survey National Land Cover Database (NLCD; USGS NLCD 2011 Homer et al. 2015), the majority (96.9%) of the Project area consists of cultivated croplands (i.e., agriculture) and developed areas (Table 1 and Figure 2). Corn (*Zea mays*) and soybean (*Glycine max*) are the most common crops. Herbaceous land cover comprises 1.0% of the Project area. Hay/pasture and deciduous forest land cover types each comprise less than 1.0% of the Project area. The remaining land cover types all comprise less than 0.1% of the Project area.

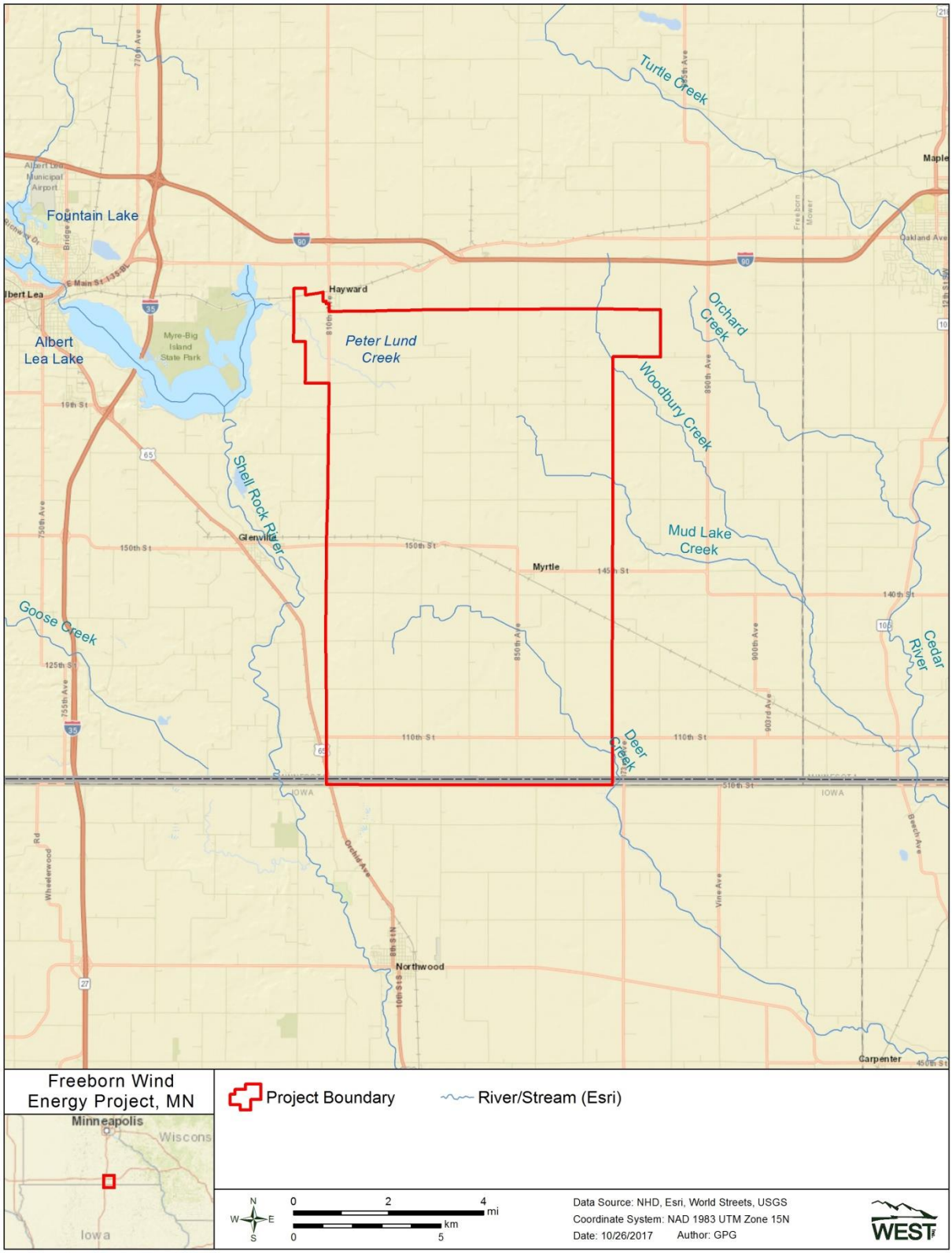


Figure 1. Location of the Freeborn Wind Energy Project in Freeborn County, Minnesota.

Table 1. 2011 National Land Cover Database land cover types within the Freeborn Wind Energy Project area.

Cover Type	Hectares	Acres	Percent (%)
Cultivated Crops	14,701.6	36,328.5	91.0
Developed, Open Space	849.8	2,100.0	5.3
Herbaceous	162.0	400.4	1.0
Hay/Pasture	133.2	329.1	0.8
Deciduous Forest	131.1	324.0	0.8
Developed, Low Intensity	56.3	139.1	0.4
Emergent Herbaceous Wetlands	40.0	98.9	0.3
Developed, Medium Intensity	21.5	53.1	0.1
Open Water	6.5	16.0	<0.1
Woody Wetlands	7.9	19.6	<0.1
Barren Land	5.3	13.1	<0.1
Evergreen Forest	2.9	7.1	<0.1
Developed, High Intensity	2.0	4.9	<0.1
Mixed Forest	0.0	0.0	0.0
Shrub/Scrub	0.0	0.0	0.0
Total	**16,120.2**	**39,833.8**	**100.0**

Source: U.S. Geological Society National Land Cover Database 2011, Homer et al. 2015

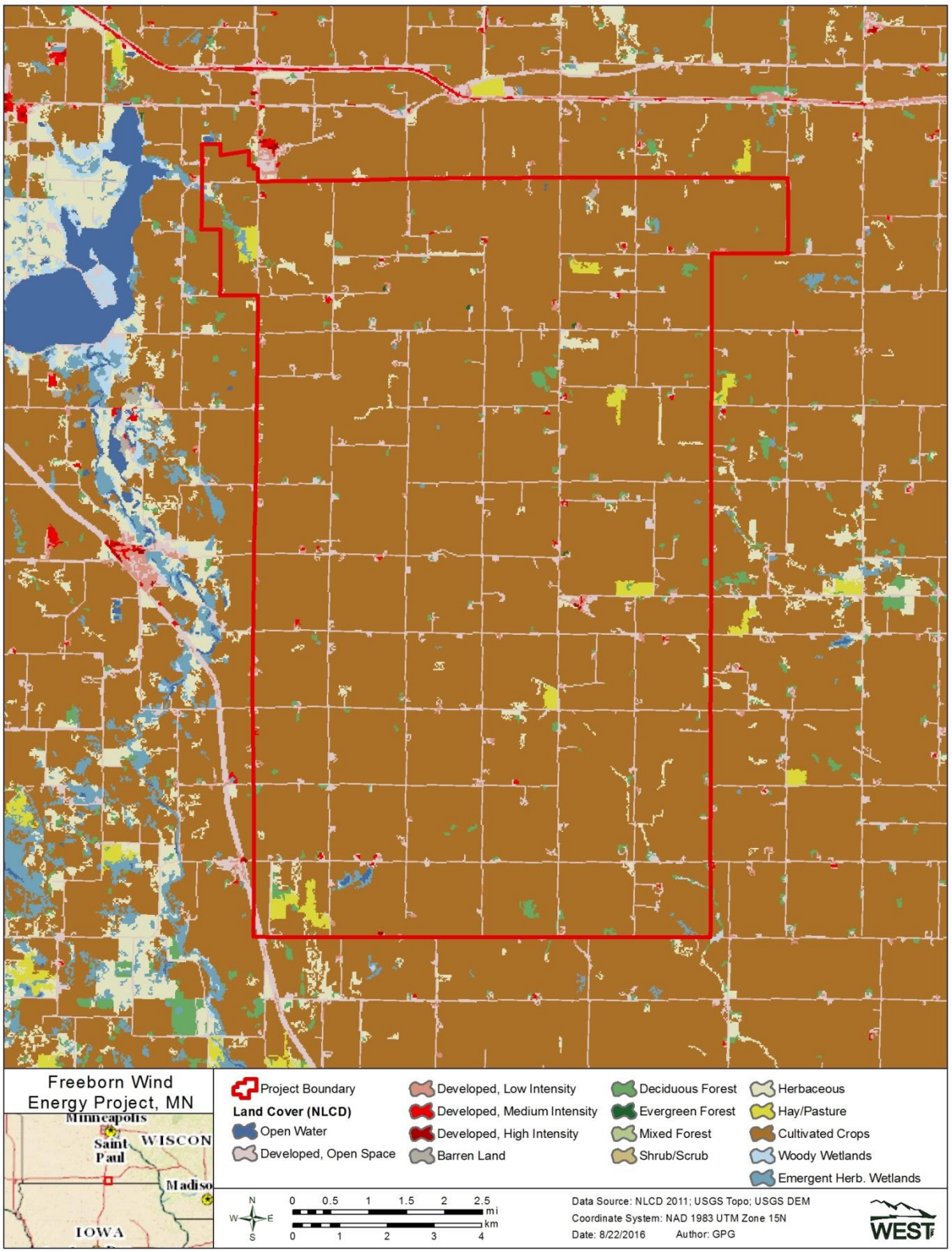


Figure 2. National Land Cover Database land cover types within and adjacent to the Freeborn Wind Energy Project area in Freeborn County, Minnesota.

3 METHODS

3.1 Large Bird Use Surveys

Large bird use surveys were conducted using methods described by Reynolds et al. (1980). Eighteen observation points consisting of 800-meter (m; 2,625-foot [ft]) radius circular plots were established within the Project area[1]. Circular plots covered approximately 31% of the Project area (Figure 3). Observation points (the center of the 800-m [2,625-ft] plot) were separated by at least 1,600 m (5,249 ft) to avoid overlap and were located along public roads using a systematic sampling scheme with a random start generated by ArcGIS (a Geographic Information System software program).

Large bird use surveys were conducted once per month during the following seasons: summer (May 27 – September 2) and fall (September 3 – September 22). Surveys were conducted during daylight hours; survey periods were varied to approximately cover all daylight hours during a season. Observation points were planned to be surveyed the same number of times.

Point count surveys were conducted for 60 minutes. All large birds seen were recorded during each survey using a unique observation number, regardless of distance. In some cases, observations represented repeated sightings of the same individual. Observations of large birds outside the 800-m (2,625-ft) plot were recorded. These data were included in the development of species composition, relative abundance, and species diversity metrics, but were not included in analyses of avian use and flight heights. Large birds included the subtypes waterbirds, waterfowl, rails and coots, grebes and loons, gulls and terns, shorebirds, diurnal raptors, owls, vultures, upland game birds, doves/pigeons, large corvids (e.g., ravens, magpies, and crows), and goatsuckers.

[1] The majority of Point 1 was originally located in the Project area in the northwest corner; however, the Project area was moved to the east in March 2015, following feedback from the MNDOC, MNDNR, and USFWS, which placed a large portion of Point 1 out of the Project boundary (see Figure 3).

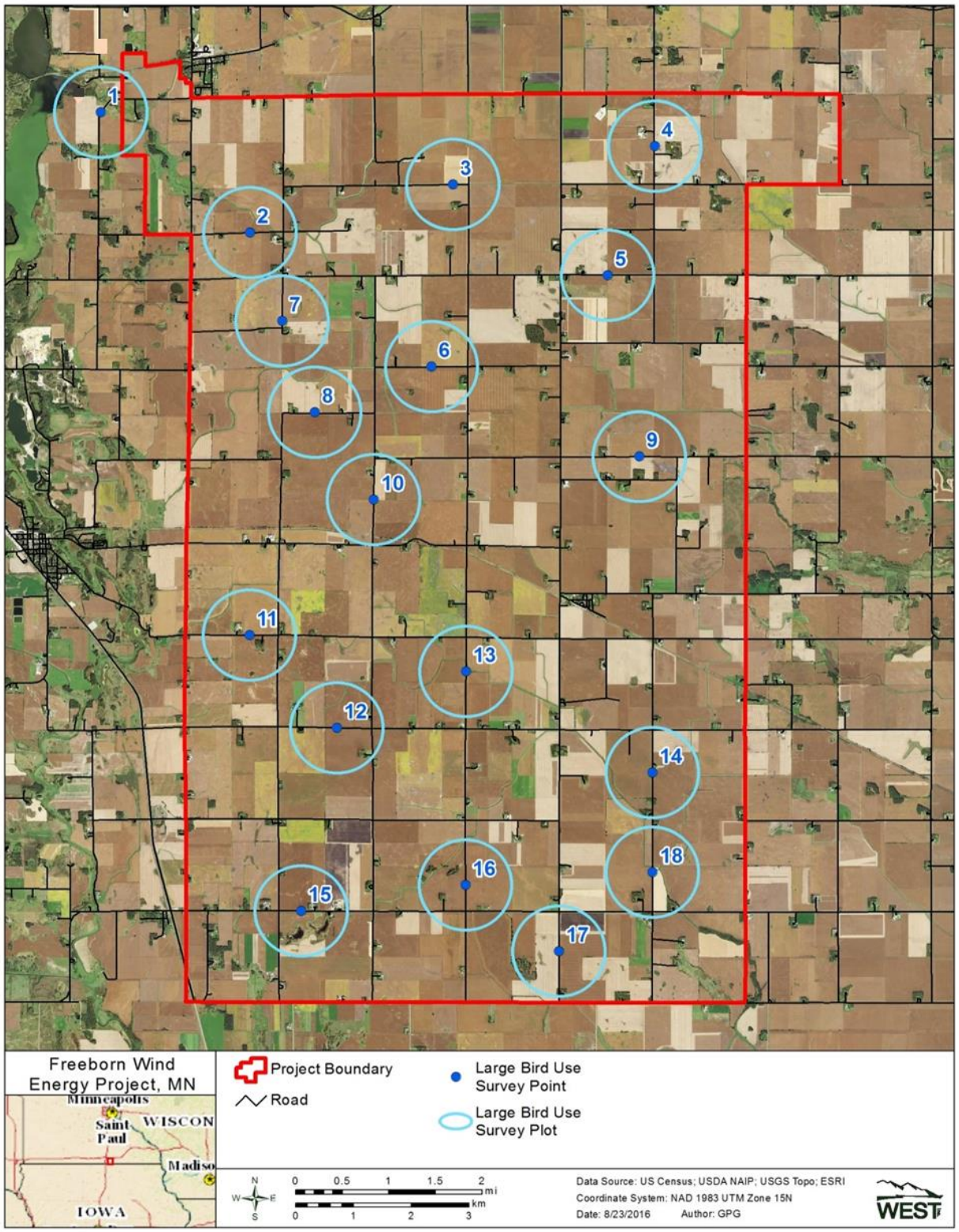


Figure 3. Location of large bird use survey plots in the Freeborn Wind Energy Project area where surveys were conducted from May 26 – September 22, 2017.

The following information was recorded during each large bird use survey: date, start and end time, and weather information (i.e., temperature, wind speed, wind direction, precipitation, and cloud cover). Additionally, the following data were recorded for each observation:

- Species (or best possible identification)
- Number of individuals
- Distance from plot center when first observed
- Closest distance observed
- Flight height above ground
- Flight direction
- Activity (flying or perched)

Approximate flight height, flight direction, and distance from plot center at first observation were recorded to the nearest 5-m (16-ft) interval; the approximate lowest and highest heights were also recorded.

For bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*) observations, flight height, distance, and activity (i.e., flying or perched) were recorded during each 1-minute interval the eagle was within the 800-m (2625-ft) plot and at or below 200 m (656 ft) above ground level, per the ECPG (USFWS 2013). In addition, the time eagles were observed outside of plots or flying at higher altitudes was recorded, but not included in statistical analyses. The perch locations and flight paths of eagles were mapped to qualitatively assess areas of eagle use within the Project area.

Wildlife incidental observations were recorded to provide information on wildlife seen outside of standardized surveys. All sensitive species were recorded along with unusual species or behavior observations, and birds observed outside of standardized survey plots. Incidental observations were recorded in a similar fashion to standardized surveys; the observation number, date, time, species, number of individuals, sex/age class, distance from observer, activity, and flight height above ground (for bird species) were recorded. The location of sensitive species was recorded by Universal Transverse Mercator coordinates using a hand-held Global Positioning System unit.

3.2 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 inspecting data forms for completeness, accuracy, and legibility. A data technician then compared a sample of records from an electronic database to the raw data forms and corrected any errors. Irregular codes or data suspected as questionable were discussed with the observer and/or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

A Microsoft® SQL database was developed to store, organize, and retrieve survey data. Data were keyed into the electronic database using a pre-defined format to facilitate subsequent QA/QC and data analysis. All data forms and electronic data files were retained for reference. QA/QC measurements implemented for report writing included review of the final document by a technical editor, statistician, peer (research biologist), project manager, independent reviewer, and senior manager.

4 DATA ANALYSIS

4.1 Species Composition, Relative Abundance, and Diversity

Species composition (i.e., species and bird types observed during the standardized surveys) and relative abundance (i.e., number of observations and groups of each species and bird type by season), and diversity (i.e., total number of species observed within each season) were compiled for all birds observed during point count surveys, irrespective of distance from observer (i.e., includes incidental observations). In addition, percent composition for each bird type was calculated by total percent of bird observations and total percent of bird observations by season to assess percent composition of bird types based on all bird observations, regardless of distance from observer.

4.2 Bird Use, Percent of Use, and Frequency of Occurrence

Bird use was calculated as the number of large birds per 800-m (2,625-ft) per 60-minute survey. Bird use by season was estimated using a 2-step calculation: (1) for each survey event, the sum of number of bird observations was divided by the number of plots surveyed (average number observations/plot) and 2) for all survey events within the season; the sum of number of observations/plot was divided by the number of survey events. Overall bird use was calculated as the weighted average of seasonal values by the number of calendar days in each season (as defined by the season dates). Percent of use was calculated as the proportion of large bird use attributable to a particular bird type or species, and frequency of occurrence was calculated as the percent of surveys in which a particular bird type or species was observed.

4.3 Flight Height

Flight height data were used to estimate bird use within the approximate turbine rotor-swept height (RSH) of 25 – 150 m (82 – 492 ft) above ground level. The flight height of each single bird or group when first observed was used to calculate the percentage of birds or groups flying below the 0-25 m (0-82 ft), within 25-150 m (82-492 ft), and above (≥ 150 m [492 ft]) the RSH.

4.4 Spatial Use

Bird use at each plot was used to document spatial use within the Project area. Use was calculated as the total number of bird observations made at a given plot divided by the number of survey events at that plot over the entire study period (number observations/800-m [2,625-ft] plot per 60-minutes survey). Large bird type groups are divided among waterbirds (e.g., herons, egrets, cormorants, and pelicans), waterfowl (e.g., ducks and geese), rails and coots, grebes

and loons, gulls and terns, shorebirds, diurnal raptors, owls, vultures, upland game birds, doves/pigeons, large corvids (e.g., ravens, magpies, and crows), and goatsuckers. Waterfowl are separated from other waterbirds due to differences in foraging and flight behaviors.

Eagle flight paths were mapped during large bird use surveys and digitized to qualitatively show flight locations and flight direction (north/south, east/west) within survey plots. Aerial imagery was used to aid in recording locations of observations as accurately as possible.

4.5 Eagle Minutes

Following survey protocols described in the ECPG (USFWS 2013), eagle minutes were recorded within three-dimensional plots (i.e., cylinders) including the area within 800 m (2,625 ft) of the survey points and up to 200 m (656 ft) above ground level. Eagle minutes were defined as the number of minutes an eagle was observed in flight within these three-dimensional cylinders during the 60-minutes survey periods. Observations of perched eagles did not apply to eagle minutes. These observations were then summed and mapped to document eagle minutes per plot. Eagle minutes were summed by season and divided by the number of survey minutes per season to standardize the sum by level of effort. Temporal variation was evaluated by calculating eagle minutes per month over the 5-month study period. Spatial variation was evaluated by calculating eagle minutes per plot, averaged across the 5-month study period, and mapped, accordingly.

5 RESULTS

5.1 Large Bird Use Surveys

A total of 90 60-minute large bird use surveys were conducted in the Project area during 5 visits.

5.1.1 Large Bird Species Composition, Relative Abundance, and Diversity

A total of 1,352 large bird observations were recorded within 226 separate groups (Appendix A). The most commonly recorded large bird type was waterfowl, which comprised 34.0% of large bird observations during the 5-month study period, and 39.2% of observations during summer (Appendix A). The majority of waterfowl observations were comprised of snow geese (*Chen caerulescens;* 290 observations in five groups), with all observations recorded during summer (Appendix A).

Gulls/terns were the second most abundant bird type observed, accounting for 28.8% of large bird observations during both seasons (Appendix A). Four raptor species were observed during large bird use surveys, which accounted for 3.0% of large bird observations (41 observations). Bald eagles accounted for 7.3% of raptor observations (three observations) and 0.2% of large bird observations (Appendix A). Eagles were observed more often during fall (two observations; 66.7%) compared to summer (one observation; 33.3%; Appendix A).

Eighteen species were observed during large bird use surveys; species diversity was highest during summer (18 species) compared to fall (10 species).

5.1.2 Large Bird Seasonal Use, Percent of Use, and Frequency of Occurrence

Large bird use over the study period was 5.4 observations/800-m plot/60-minute survey and was higher during fall compared to summer (9.8 and 4.5 observations/800-m/60-minute survey, respectively; Table 2; Appendix B).

Table 2. Bird use[1], percent of total use (%), and frequency of occurrence (%) for each bird type by season observed during the large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.

Type/Species	Bird Use		% of Use		% Frequency	
	Summer	Fall	Summer	Fall	Summer	Fall
Waterbirds	0.5	6.8	10.5	68.9	8.3	16.7
Waterfowl	1.2	0.0	27.2	0.0	11.1	0.0
Shorebirds	0.4	<0.1	8.6	0.6	29.2	5.6
Diurnal Raptors	0.3	0.3	7.1	2.8	25.0	16.7
Accipiters	*<0.1*	*0.1*	*0.9*	*1.1*	*4.2*	*11.1*
Buteos	*0.3*	*0.1*	*5.6*	*0.6*	*18.1*	*5.6*
Northern Harrier	*<0.1*	*0.0*	*0.3*	*0.0*	*1.4*	*0.0*
Eagles	*<0.1*	*0.1*	*0.3*	*1.1*	*1.4*	*5.6*
Vultures	0.8	1.2	17.3	11.9	33.3	44.4
Upland Game Birds	0.1	0.0	3.1	0.0	8.3	0.0
Large Corvids	1.2	1.6	26.2	15.8	36.1	50.0
Large Bird Overall	**4.5**	**9.8**	**100.0**	**100.0**		

[1] Number of observations/800-meter plots/observation period

Waterbirds

Waterbird use over the study period was 1.5 observations/800-m plot/60-minute survey and use was higher during fall (6.8 observations/800-m plot/60-minute survey) compared to summer (0.5 observation/800-m plot/60-minute survey; Table 2; Appendix B). Waterbirds accounted for 68.9% of all large bird use in fall and 10.5% in summer. Waterbirds were observed during 16.7% of fall surveys and 8.3% of summer surveys (Table 2; Appendix B). American white pelican (*Pelecanus erythrorhynchos*) accounted for the most waterbird use, composing 67.8% of all waterbird use in fall (Appendix B).

Waterfowl

Waterfowl use over the study period was 1.0 observations/800-m plot/60-minute survey, with all waterfowl use documented in summer (1.2 observations/800-m plot/60-minute survey; Table 2; Appendix B). Waterfowl accounted for 27.2%% of all large bird use in summer and were observed during 11.1% of summer surveys (Table 2; Appendix B). Snow geese made up the most waterfowl use during summer survey (0.8 observation/800-m plot/60-minute survey; Appendix B).

Shorebirds

Shorebird use over the study period was 0.3 observation/800-plot/60-minute survey, with higher use in summer (0.4 observation/800-m plot/60-minute survey) compared to fall (<0.1 observation/800-m plot/60-minute survey; Table 2; Appendix B). Shorebirds comprised 8.6% of large bird use in summer and 0.6% in fall. Shorebirds were observed more frequently during summer surveys (29.2%) compared to fall (5.6%; Table 2; Appendix B).

Diurnal Raptors

Diurnal raptor use over the study period was 0.3 observation/800-m plot/60-minute survey, and was the same during summer and fall (0.3 observation/800-m plot/60-minute survey; Table 2; Appendix B). Diurnal raptors comprised 7.1% of all large bird use in summer compared to 2.8% in fall. Diurnal raptors were observed most frequently during summer surveys (25.0%) compared to fall surveys (16.7%; Table 2; Appendix B).

Buteo use was highest during summer (0.2 observation/800-m plot/60-minute survey); buteos were observed during 18.1% of summer surveys, comprised only of red-tailed hawk (*Buteo jamaicensis*; Table 2; Appendix B). Accipiter use was slightly higher during fall (0.1 observation/800-m plot/60-minute survey) compared to summer (<0.1 observation/800-m plot/60-minute survey); accipiters were observed during 11.1% of fall surveys, comprised only of Cooper's hawk (*Accipiter cooperii;* Table 2; Appendix B).

Eagle use over the study period was <0.1 observation/800-m plot/60-minute survey, comprised only of bald eagle, and was slightly higher in fall (0.1 observation/800-m plot/60-minute survey) compared to summer (<0.1; Table 2; Appendix B). Eagles accounted for 1.1% of large bird use in fall and 0.3% of use in summer. Eagles were observed during 5.6% of fall surveys and 1.4% of summer surveys (Table 2; Appendix B).

Northern harrier (*Circus cyaneus*) use was only documented during summer (<0.1 observation/800-m plot/60-minute survey; northern harriers were observed during 1.4% of summer surveys (Table 2; Appendix B).

Vultures

Vulture use over the study period was 0.8 observation/800-m plot/60-minute survey, with use higher in fall (1.2 observation/800-m plot/60-minute survey) compared to 0.8 in summer (Table 2; Appendix B). Vultures accounted for 17.3% of all large bird use in summer and 11.9% in fall. Vultures were observed during 44.4% of fall surveys and 33.3% of summer surveys (Table 2; Appendix B).

Upland Game Birds

Upland game bird use was only documented in summer (0.1 observation/800-m plot/60-minute survey; Table 2; Appendix B). Upland game birds comprised 3.1% of all large bird use in summer and were observed during 8.3% of summer surveys (Table 2; Appendix B).

Large Corvids

Large Corvid bird use over the study period was 1.2 observations/800-m plot/60-minute survey, with use higher in fall (1.6 observations/800-m plot/60-minute survey) compared to 1.2 in summer (Table 2; Appendix B). Large corvids comprised 26.2% of all large bird use in summer and 15.8% in fall. Large corvids were observed during 50.0% of fall surveys and 36.1% of summer surveys (Table 2; Appendix B).

5.1.3 Flight Height Characteristics

Of the 117 groups (419 observations) of large birds observed flying within 800-m (2,625-ft) plots, 76.4% of groups were recorded in the estimated RSH (Table 3). Of these groups, 22 groups of 22 observations (i.e., one observation per group) of diurnal raptors were recorded, with 50.0% of the raptor flights recorded within the estimated RSH (Table 3). Considering only eagle observations in flight, 66.7% were observed flying within the RSH within 800-m (2,625-ft) radius plots (Table 3). Of all other raptor observations, buteos had the highest number of groups recorded in flight (14 groups); 50.0% were flying within the RSH based on initial observation (Table 3). Flying waterbirds were observed in eight groups of 152 observations, and 99.3% of the groups were flying within the RSH (Table 3).

Table 3. Flight height characteristics by bird type[1] and raptor subtype during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.

Bird Type	# Groups Flying	# Obs Flying	Mean Flight Height of Groups		% of Total Obs Flying	% of Groups within Flight Height Categories		
			Height (meters [m])	Height (feet [ft])		0-25 m (0-82 ft)	25-150 m (82–492 ft)[2]	> 150 m (> 492 ft)
Waterbirds	8	152	40.6	133.3	97.4	0.7	99.3	0.0
Waterfowl	9	78	37.4	122.8	88.6	2.6	97.4	0.0
Shorebirds	8	10	15.8	51.7	34.5	90.0	10.0	0.0
Diurnal Raptors	22	22	36.2	118.9	78.6	45.5	50.0	4.5
Accipiters	*4*	*4*	*22.5*	*73.8*	*80.0*	*50.0*	*50.0*	*0.0*
Buteos	*14*	*14*	*41.4*	*135.9*	*73.7*	*42.9*	*50.0*	*7.1*
Northern Harrier	*1*	*1*	*7.0*	*23.0*	*100.0*	*100.0*	*0.0*	*0.0*
Eagles	*3*	*3*	*40.0*	*137.5*	*100.0*	*33.3*	*66.7*	*0.0*
Vultures	39	76	41.9	137.5	98.7	28.9	71.1	0.0
Upland Game Birds	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Large Corvids	31	81	19.1	62.7	71.7	66.7	33.3	0.0
Large Bird Overall	**117**	**419**	**32.6**	**106.9**	**83.6**	**23.4**	**76.4**	**0.2**

[1] For observations (Obs) within 800-m plots
[2] The likely rotor-swept height is 25–150 m (82–492 ft) above ground level

5.1.4 Large Bird Spatial Use

For all large bird species combined, bird use was highest at Point 1 (20.2 observations/800-m plot/60-minute survey; adjacent to Albert Lea Lake and the confluence of Peter Lund Creek), largely due to high waterbird use at that location (16.2 observations/800-m plot/60-minute survey). Large bird use ranged from 1.4 to 16.0 observations/800-m plot/60-minute survey at all other points (Appendix C).

Waterbird use was observed at six observation points, with Point 1 having the highest use (16.2 observations/800-m plot/60-minute survey; Appendix C). Waterbird use ranged from 0.2 to 14.0 observations/800-m plot/60-minute survey at the remaining five points with waterbird data (Appendix C).

Waterfowl were observed at seven observation points, with use was highest at Point 11 (12.0 observations/800-m plot/60-minute survey) just over 1.6 km (1.0 mi) east of the Shell Rock River. Remaining waterfowl use ranged from 0.2 to 2.0 observations/800-m plot/60-minute survey at the other six survey points with waterfowl use (Appendix C).

Shorebird use was observed at 14 observation points, with Point 13 having the highest use (1.0 observations/800-m plot/60-minute survey; Appendix C). Shorebird use ranged from 0.2 to 0.8 observations/800-m plot/60-minute survey at the remaining 13 points with shorebird data (Appendix C).

Diurnal raptor use was observed at 13 observation points. Diurnal raptor use was highest at Point 1 (1.0 observations/800-m plot/60-minute survey, adjacent to Albert Lea Lake and the confluence of Peter Lund Creek) and ranged from 0.2 to 0.6 observation/800-m plot/60-minute survey at the other survey points (Appendix C). Of the diurnal raptors, buteos were observed at 10 points, with highest use at Points 1 and 4 (0.6 observation/800-m plot/60-minute survey; Appendix C). Accipiters were observed at five points, with use at all five points being (0.2 observation/800-m plot/60-minute surveys; Appendix C). Eagle use was observed at two observation points, Points 1 and 2 (0.4 and 0.2 observation/800-m plot/60-minute survey, respectively; Figure 4; Appendix C).

Vulture use was observed at 17 observation points, with Point 3 having the highest use (4.8 observations/800-m plot/60-minute survey; Appendix C). Vulture use ranged from 0.2 to 2.2 observations/800-m plot/60-minute survey at the remaining 16 points with vulture data (Appendix C).

Large corvid use was observed at 17 observation points, with Point 12 having the highest use (4.6 observations/800-m plot/60-minute survey; Appendix C). Large corvid use ranged from 0.4 to 2.0 observations/800-m plot/60-minute survey at the remaining 16 points (Appendix C).

Figure 5[2] presents mapped bald eagle flight paths recorded from each survey point, with the highest number of flight paths documented at Point 1, located largely outside of the Project area near Albert Lea Lake (see Footnote 1; Figure 5). Point 2 was the only other point that documented eagle flight paths. Overall, flight patterns were concentrated to the northwest corner of the Project area (Figure 5).

[2] Flight paths on Figure 5 may represent more than one eagle using the same flight path.

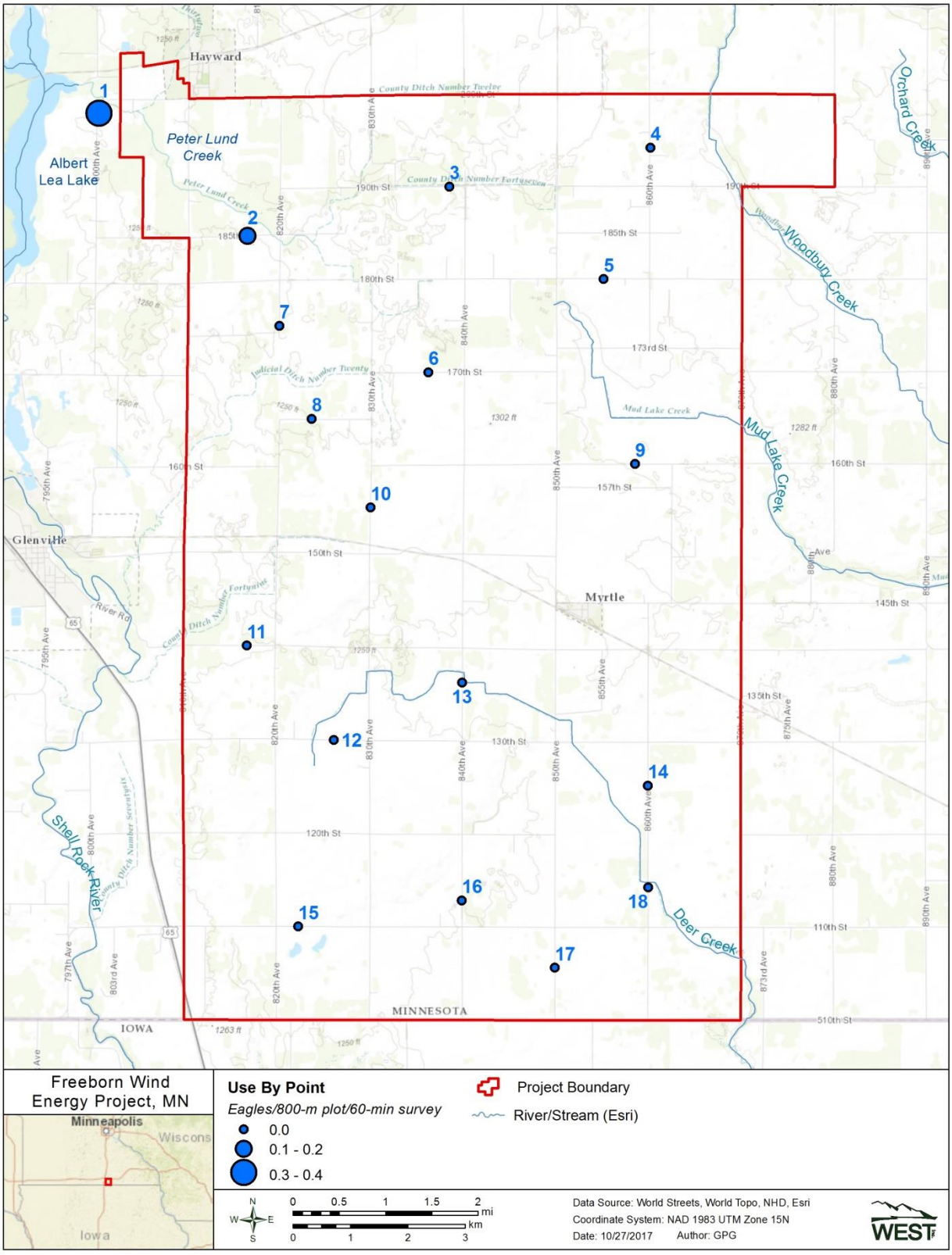


Figure 4. Eagle use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.

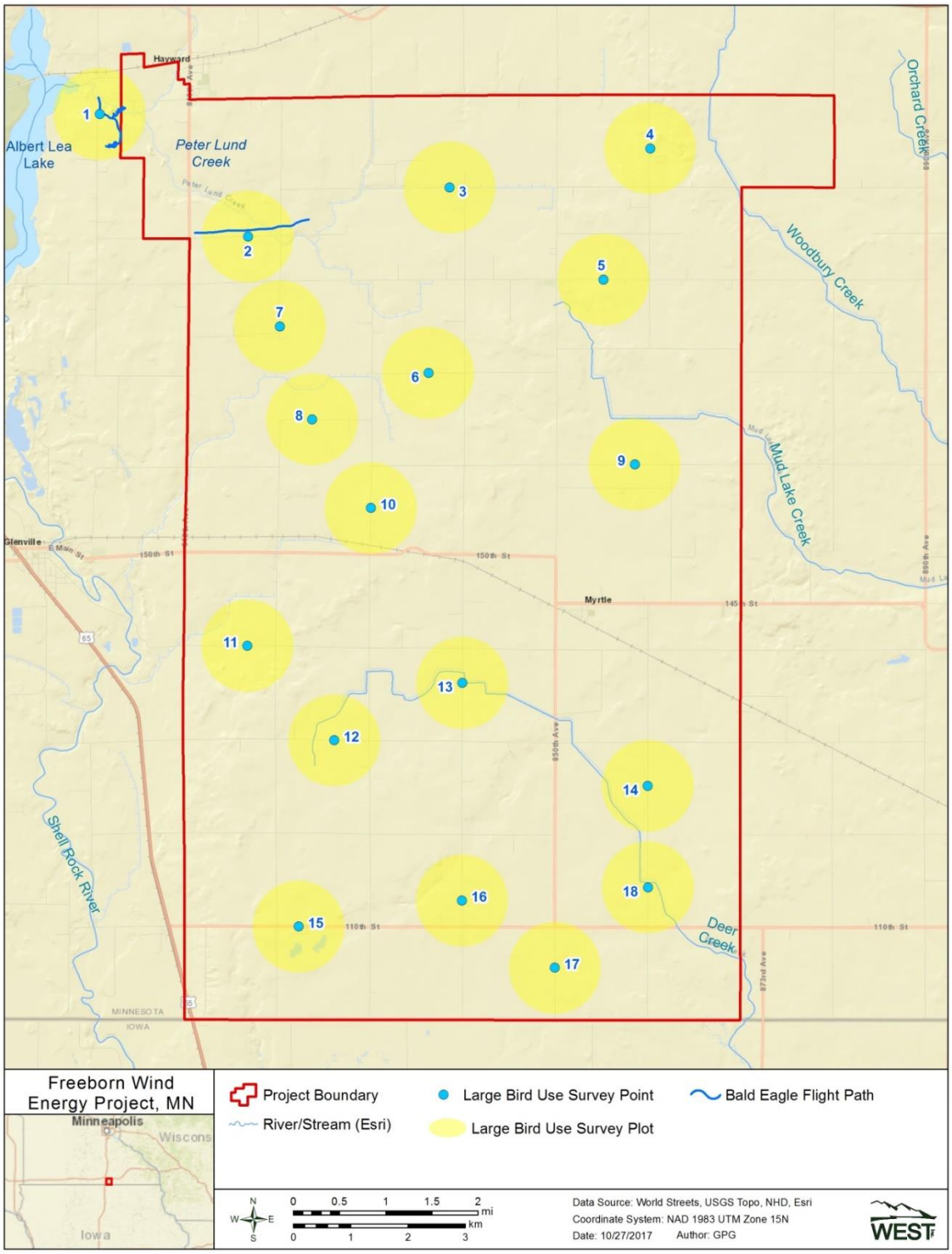


Figure 5. Bald eagle flight paths recorded during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.

5.1.5 Eagle Minutes

A total of 21 eagle minutes were documented during 90 large bird use survey observation hours. Eagle minutes per minute of survey were higher during fall (0.0176) compared to summer (0.0005; Table 4). The majority of eagle minutes were recorded during September (19 eagle minutes) followed by June (2 eagle minutes), and no eagle minutes were recorded during the other 3 months of the study (Table 5; Figure 6). Eagle minutes were documented at two of the observation points, Points 1 and 2 (Figure 7). Point 1, which largely falls outside of the Project area in the northwest corner, had the highest eagle minutes (19 minutes) followed by Point 2 (2 minutes; Figure 7).

Table 4. Eagle minutes documented during large bird surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.

Season	Eagle Minutes	Survey Effort (hours)	Survey Effort (minutes)	Eagle minutes per minute survey
Summer (05/27/17 – 09/02/17)	2	72	4,320	0.0005
Fall (09/03/17 – 09/22/17)	19	18	1,080	0.0176
Total	**21**	**90**	**5,400**	**0.0039**

Table 5. Number of flying eagle observations[1] with a duration of 1 minute or more and eagle minutes by month during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.

Month/Year	Eagle Observations	Eagle Minutes
May, 2017	0	0
June, 2017	1	2
July, 2017	0	0
August, 2017	0	0
September, 2017	2	19
Total	**3**	**21**

[1] Observations of eagles flying with an 800-m (2,625-ft x 200-m (656-ft) cylinder

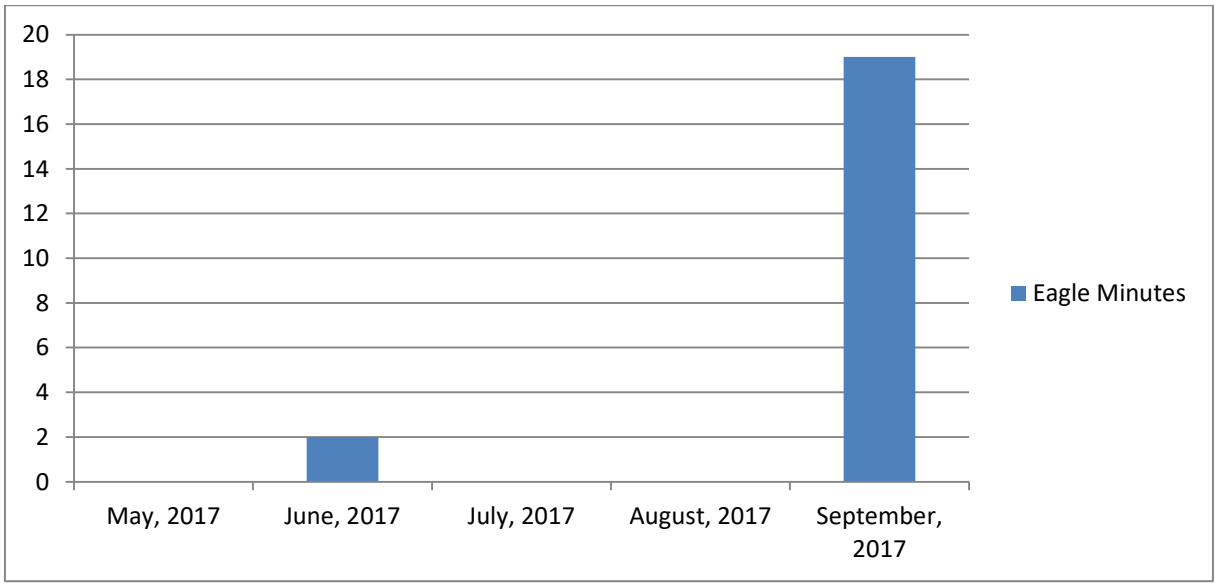


Figure 6. Number of eagle minutes recorded by month during large bird use surveys in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.

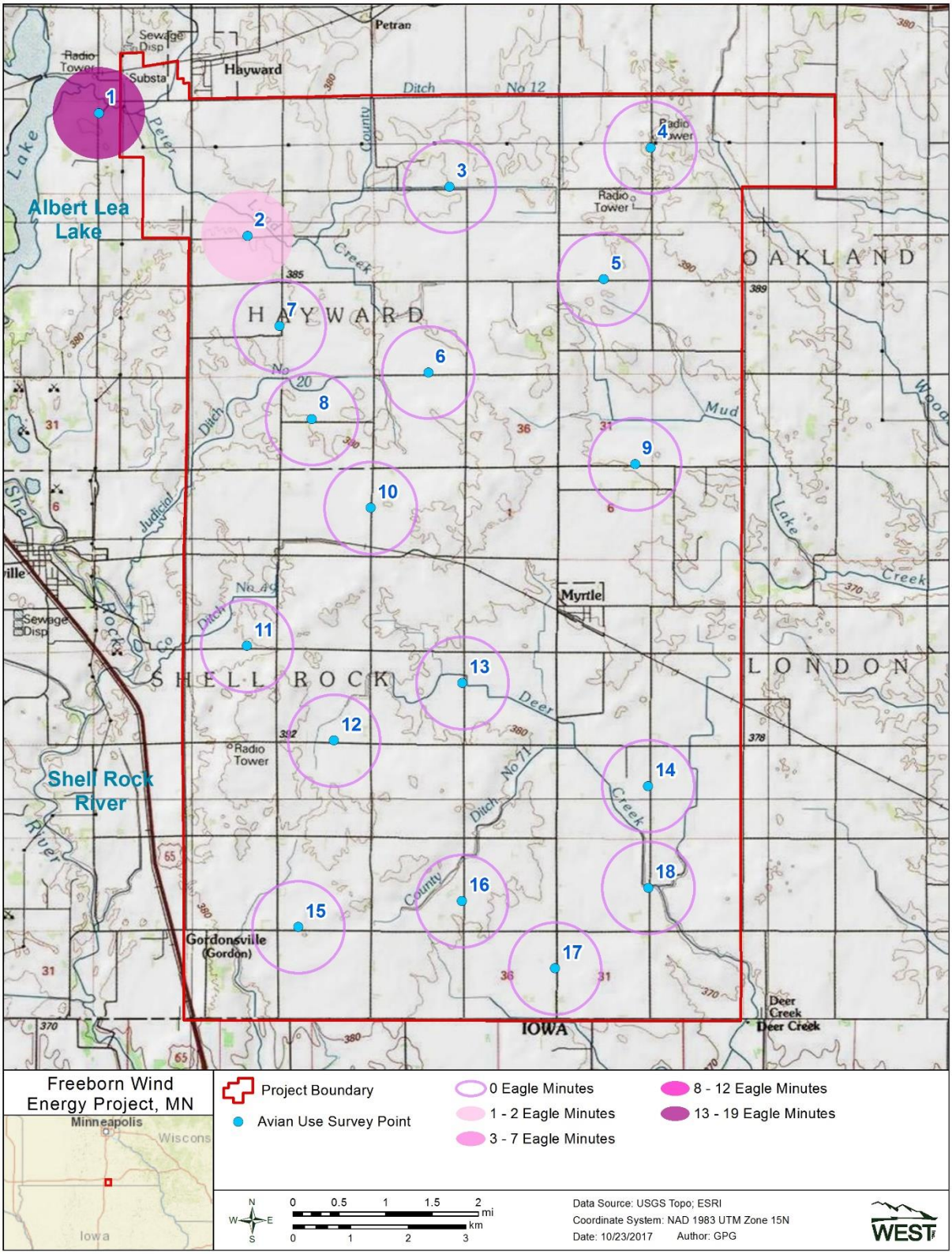


Figure 7. Number of eagle minutes recorded during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.

5.2 Threatened, Endangered, and Sensitive Species Observations

No federal- or state-threatened or endangered species were observed during large bird use surveys. Three sensitive species were observed during large bird use surveys (Table 6). American white pelican, a state-listed special concern species, comprised the majority of sensitive species observations, with 147 observations (Table 6).

For bald eagle, which is a USFWS Bird of Conservation Concern and is protected under the Bald and Golden Eagle Protection Act (BGEPA 1940), there were three observations (Table 6). One hundred-twenty observations of Franklin's gull (*Leucophaeus pipixcan*), a state-listed special concern, were recorded during large bird use surveys (Table 6).

Table 6. Summary of sensitive species observed in the Freeborn Wind Energy Project area during large bird use surveys (LB) from May 26 – September 22, 2017.

Species	Scientific Name	Status	LB		Total	
			# of grps	# of obs	# of grps	# of obs
American white pelican	*Pelecanus erythrorhynchos*	SCS	4	147	4	147
Bald eagle	*Haliaeetus leucocephalus*	BGEPA, BCC	3	3	3	3
Franklin's gull	*Leucophaeus pipixcan*	SCS	1	120	1	120
Overall	**3 Species**		**8**	**270**	**8**	**270**

SCS = state-listed special concern species (Minnesota Department of Natural Resources 2013); BCC=U.S. Fish and Wildlife Service (USFWS) Birds of Conservation Concern (USFWS 2008); BGEPA=Bald and Golden Eagle Protection Act (BGEPA 1940)

5.3 Incidental Observations

No incidental bird observations were observed or recorded while in transit between survey points during the 5-month study period.

6 REFERENCES

Bald and Golden Eagle Protection Act (BGEPA). 1940. 16 United States Code (USC) § 668-668d. Bald Eagle Protection Act of 1940, June 8, 1940, Chapter 278, Section (§) 2, 54 Statute (Stat.) 251; Expanded to include the related species of the golden eagle October 24, 1962, Public Law (PL) 87-884, 76 Stat. 1246. [as amended: October 23, 1972, PL 92-535, § 2, 86 Stat. 1065; November 8, 1978, PL 95-616, § 9, 92 Stat. 3114.].

ESRI. 2017. World Street Map. ArcGIS Resource Center. ESRI, producers of ArcGIS software, Redlands, California. Data accessed January 2017. Information online: https://www.arcgis.com/home/item.html?id=3b93337983e9436f8db950e38a8629af

Homer, C. G., J. A. Dewitz, L. Yang, S. Jin, P. Danielson, G. Xian, J. Coulston, N. D. Herold, J. D. Wickham, and K. Megown. 2015. Completion of the 2011 National Land Cover Database for the Conterminous United States-Representing a Decade of Land Cover Change Information. Photogrammetric Engineering and Remote Sensing 81(5): 345-354. Available online: http://www.mrlc.gov/nlcd2011.php

Minnesota Department of Natural Resources (MDNR). 2012. Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems in Minnesota. Draft. MDNR, Division of Ecological and Water Resources. October 2, 2012.

Minnesota Department of Natural Resources (MNDNR). 2013. Minnesota's List of Endangered, Threatened, and Special Concern Species. Effective August 19, 2013. 18 pp. Information avaialable at: http://files.dnr.state.mn.us/natural_resources/ets/endlist.pdf

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

Reynolds, R. T., J. M. Scott, and R. A. Nussbaum. 1980. A Variable Circular-Plot Method for Estimating Bird Numbers. Condor 82(3): 309-313.

Simon, S. and T. Mattson. 2016. Avian Studies for the Freeborn Wind Energy Project, Freeborn County, Minnesota. Final Report: January 2015 – March 2016. Prepared for Freeborn Wind Energy LLC, Chicago, Illinois. Prepared by Western EcoSystems Technology, Inc. (WEST), Golden Valley, Minnesota. 44 pages + appendices.

U.S. Environmental Protection Agency (USEPA). 2013. Primary Distinguishing Characteristics of Level III Ecoregions of the Continental United States. Map scale 1:3,000,000. USEPA National Health and Environmental Effects Research Laboratory, Corvallis, Oregon. Accessed May 2015. Information and downloads available online at: https://archive.epa.gov/wed/ecoregions/web/html/level_iii_iv-2.html#Level%20III

U.S. Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. December 2008. Division of Migratory Bird Management. Arlington, Virginia. Available online: https://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf

U.S. Fish and Wildlife Service (USFWS). 2012. Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online: http://www.fws.gov/cno/pdf/Energy/2012_Wind_Energy_Guidelines_final.pdf

U.S. Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance: Module 1 - Land-Based Wind Energy, Version 2. US Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Executive Summary and frontmatter + 103 pp.

Available online: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

U.S. Fish and Wildlife Service (USFWS). 2016. Endangered Species in Minnesota. County Distribution of Federally-Listed Threatened, Endangered, Proposed, and Candidate Species. Information available at: https://www.fws.gov/midwest/endangered/lists/minnesot-cty.html

U.S. Geological Survey (USGS). 2017. USGS Topographic Maps. Last updated January 17, 2017. Homepage available at: https://nationalmap.gov/ustopo/index.html

U.S. Geological Survey (USGS) National Land Cover Database (NLCD). 2011. National Land Cover Database 2011 (NLCD 2011). Multi-Resolution Land Characteristics Consortium (MRLC), National Land Cover Database (NLCD). USGS Earth Resources Observation and Science (EROS) Center, Sioux Falls, South Dakota. Available online: http://www.mrlc.gov/nlcd2011.php; Legend: http://www.mrlc.gov/nlcd11_leg.php

Appendix A. All Bird Types and Species Observed at the Freeborn Wind Energy Project Area During Large Bird Use Surveys from May 26 – September 22, 2017

Appendix A. Summary of observations by bird type and species for the large bird use surveys conducted in the Freeborn Wind Energy Project[1] area May 26 – September 22, 2017.

Type/Species	Scientific Name	Summer			Fall			Total		
		# grp	# obs	% obs	# grp	# obs	% obs	# grp	# obs	% obs
Waterbirds		**9**	**35**	**3.0**	**5**	**123**	**60.6**	**14**	**158**	**11.7**
American white pelican	*Pelecanus erythrorhynchos*	2	27		2	120		4	147	
Double-crested cormorant	*Phalacrocorax auritus*	1	1		0	0		1	1	
Great blue heron	*Ardea herodias*	2	3		2	2		4	5	
Great egret	*Ardea alba*	1	1		0	0		1	1	
Sandhill crane	*Grus canadensis*	3	3		1	1		4	4	
Waterfowl		**19**	**450**	**39.2**	**1**	**10**	**4.9**	**20**	**460**	**34.0**
Canada goose	*Branta canadensis*	5	140		1	10		6	150	
Mallard	*Anas platyrhynchos*	4	13		0	0		4	13	
Snow goose	*Chen caerulescens*	5	290		0	0		5	290	
Unidentified duck	*NA*	5	7		0	0		5	7	
Shorebirds		**21**	**28**	**2.4**	**1**	**1**	**0.5**	**22**	**29**	**2.1**
Killdeer	*Charadrius vociferus*	21	28		1	1		22	29	
Gulls/Terns		**3**	**390**	**33.9**	**0**	**0**	**0**	**3**	**390**	**28.8**
Franklin's gull	*Leucophaeus pipixcan*	1	120		0	0		1	120	
Unidentified gull	*NA*	2	270		0	0		2	270	
Diurnal Raptors		**33**	**36**	**3.1**	**5**	**5**	**2.5**	**38**	**41**	**3.0**
Accipiters		*3*	*3*		*2*	*2*		*5*	*5*	
Cooper's hawk	*Accipiter cooperii*	3	3		2	2		5	5	
Buteos		*28*	*31*		*1*	*1*		*29*	*32*	
Red-tailed hawk	*Buteo jamaicensis*	28	31		1	1		29	32	
Northern Harrier		*1*	*1*		*0*	*0*		*1*	*1*	
Northern harrier	*Circus cyaneus*	1	1		0	0		1	1	
Eagles		*1*	*1*		*2*	*2*		*3*	*3*	
Bald eagle	*Haliaeetus leucocephalus*	1	1		2	2		3	3	
Vultures		**56**	**101**	**8.8**	**17**	**36**	**17.7**	**73**	**137**	**10.1**
Turkey vulture	*Cathartes aura*	56	101		17	36		73	137	
Upland Game Birds		**6**	**10**	**0.9**	**0**	**0**	**0**	**6**	**10**	**0.7**
Ring-necked pheasant	*Phasianus colchicus*	5	5		0	0		5	5	
Wild turkey	*Meleagris gallopavo*	1	5		0	0		1	5	
Large Corvids		**39**	**99**	**8.6**	**11**	**28**	**13.8**	**50**	**127**	**9.4**
American crow	*Corvus brachyrhynchos*	39	99		11	28		50	127	
Overall Large Birds		**186**	**1,149**		**40**	**203**		**226**	**1,352**	

[1] Regardless of distance from observer

Appendix B. Large Bird Use, Percent of Use, and Frequency of Occurrence during Large Bird Use Surveys at the Freeborn Wind Energy Project Area from May 26 – September 22, 2017

Appendix B. Large bird use (number of large bird observations/800-meter plot/60-minute survey), percent of total use (%), and frequency of occurrence (%) for each large bird type and species by season during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.

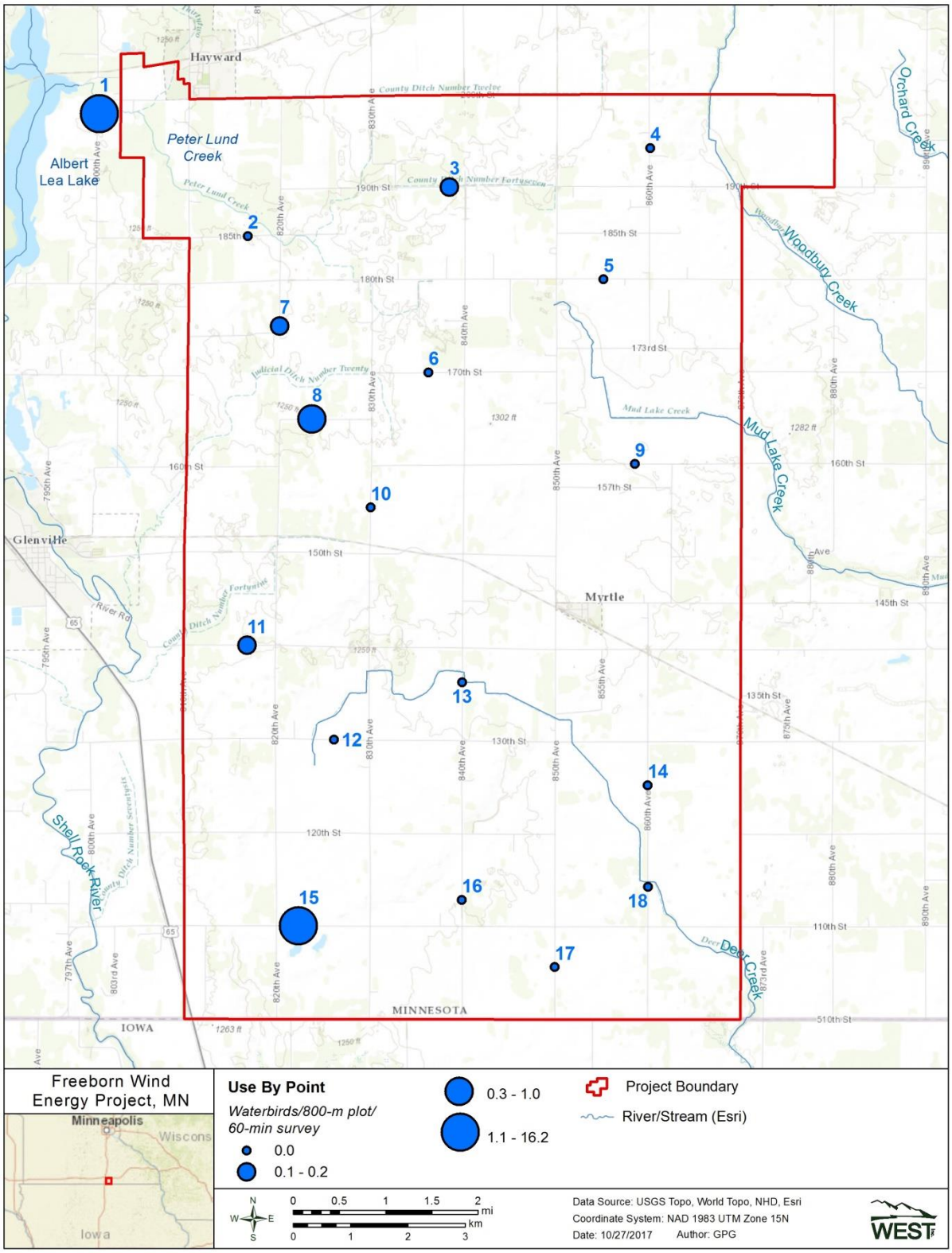
Type/Species	Bird Use			% of Use		% Frequency	
	Summer	Fall	Study Period	Summer	Fall	Summer	Fall
Waterbirds	**0.5**	**6.8**	**1.5**	**10.5**	**68.9**	**8.3**	**16.7**
American white pelican	0.4	6.7	1.4	8.3	67.8	2.8	11.1
Double-crested cormorant	<0.1	0.0	<0.1	0.3	0.0	1.4	0.0
Great blue heron	<0.1	<0.1	<0.1	0.9	0.6	2.8	5.6
Great egret	<0.1	0.0	<0.1	0.3	0.0	1.4	0.0
Sandhill crane	<0.1	<0.1	<0.1	0.6	0.6	2.8	5.6
Waterfowl	**1.2**	**0.0**	**1.0**	**27.2**	**0.0**	**11.1**	**0.0**
Canada goose	0.2	0.0	0.1	3.4	0.0	2.8	0.0
Mallard	0.2	0.0	0.2	4.0	0.0	5.6	0.0
Snow goose	0.8	0.0	0.7	18.5	0.0	1.4	0.0
Unidentified duck	<0.1	0.0	<0.1	1.2	0.0	2.8	0.0
Shorebirds	**0.4**	**<0.1**	**0.3**	**8.6**	**0.6**	**29.2**	**5.6**
Killdeer	0.4	<0.1	0.3	8.6	0.6	29.2	5.6
Diurnal Raptors	**0.3**	**0.3**	**0.3**	**7.1**	**2.8**	**25**	**16.7**
Accipiters	*<0.1*	*0.1*	*0.1*	*0.9*	*1.1*	*4.2*	*11.1*
Cooper's hawk	<0.1	0.1	0.1	0.9	1.1	4.2	11.1
Buteos	*0.2*	*<0.1*	*0.2*	*5.6*	*0.6*	*18.1*	*5.6*
Red-tailed hawk	0.2	<0.1	0.2	5.6	0.6	18.1	5.6
Northern Harrier	*<0.1*	*0.0*	*<0.1*	*0.3*	*0.0*	*1.4*	*0.0*
Northern harrier	<0.1	0.0	<0.1	0.3	0.0	1.4	0.0
Eagles	*<0.1*	*0.1*	*<0.1*	*0.3*	*1.1*	*1.4*	*5.6*
Bald eagle	<0.1	0.1	<0.1	0.3	1.1	1.4	5.6
Vultures	**0.8**	**1.2**	**0.8**	**17.3**	**11.9**	**33.3**	**44.4**
Turkey vulture	0.8	1.2	0.8	17.3	11.9	33.3	44.4
Upland Game Birds	**0.1**	**0.0**	**0.1**	**3.1**	**0.0**	**8.3**	**0.0**
Ring-necked pheasant	<0.1	0.0	0.1	1.5	0.0	6.9	0.0
Wild turkey	<0.1	0.0	0.1	1.5	0.0	1.4	0.0
Large Corvids	**1.2**	**1.6**	**1.2**	**26.2**	**15.8**	**36.1**	**50.0**
American crow	1.2	1.6	1.2	26.2	15.8	36.1	50.0
Overall	**4.5**	**9.8**	**5.4**	**100.0**	**100.0**		

Appendix C. Large Bird Use by Point for All Birds, Major Bird Types, and Diurnal Raptor Subtypes during Large Bird Use Surveys Conducted in the Freeborn Wind Energy Project Area from May 26 – September 22, 2017

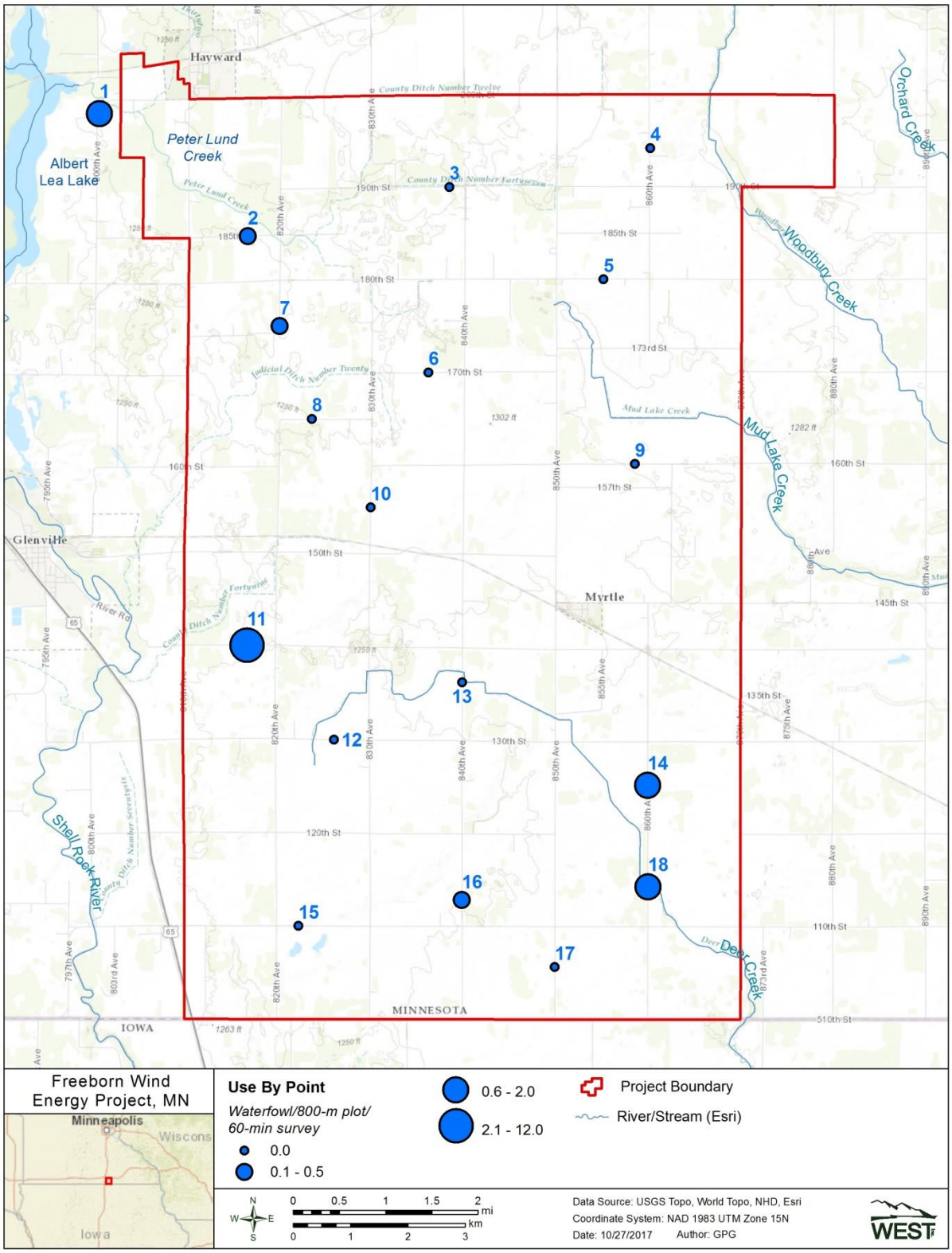
Appendix C1. Large bird use (number of observations/800-m plot/60-minute survey) by point for all birds[1], major bird types, and diurnal raptor subtypes observed at the Freeborn Wind Energy Project during the large bird use surveys from May 26 – September 22, 2017.

Bird Type	Survey Point																	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Waterbirds	16.2	0.0	0.2	0.0	0.0	0.0	0.2	0.4	0.0	0.0	0.2	0.0	0.0	0.0	14.0	0.0	0.0	0.0
Waterfowl	1.4	0.4	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	12.0	0.0	0.0	1.2	0.0	0.2	0.0	2.0
Shorebirds	0.8	0.0	0.4	0.0	0.4	0.2	0.2	0.4	0.8	0.2	0.2	0.4	1.0	0.0	0.4	0.0	0.2	0.2
Diurnal Raptors	1.0	0.6	0.2	0.6	0.6	0.0	0.0	0.2	0.0	0.4	0.2	0.4	0.4	0.0	0.0	0.4	0.4	0.2
Accipiters	*0.0*	*0.0*	*0.2*	*0.0*	*0.2*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*	*0.0*	*0.2*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.2*
Buteos	*0.6*	*0.4*	*0.0*	*0.6*	*0.4*	*0.0*	*0.0*	*0.0*	*0.0*	*0.4*	*0.2*	*0.2*	*0.4*	*0.0*	*0.0*	*0.4*	*0.2*	*0.0*
Northern Harrier	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.2*	*0.0*
Eagles	*0.4*	*0.2*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
Vultures	0.4	0.2	4.8	2.2	1.2	0.6	0.4	0.2	0.0	0.4	0.8	0.2	0.2	0.6	1.0	0.6	0.4	1.2
Upland Game Birds	0.0	0.6	0.0	0.0	0.0	1.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0
Large Corvids	0.4	0.6	1.2	1.0	0.0	0.8	1.0	0.8	1.8	0.4	1.4	4.6	2.0	3.0	0.4	0.6	0.8	1.8
All Large Birds	**20.2**	**2.4**	**6.8**	**3.8**	**2.2**	**2.6**	**2.2**	**2.0**	**2.8**	**1.4**	**14.8**	**5.6**	**3.6**	**4.8**	**16.0**	**1.8**	**1.8**	**5.4**

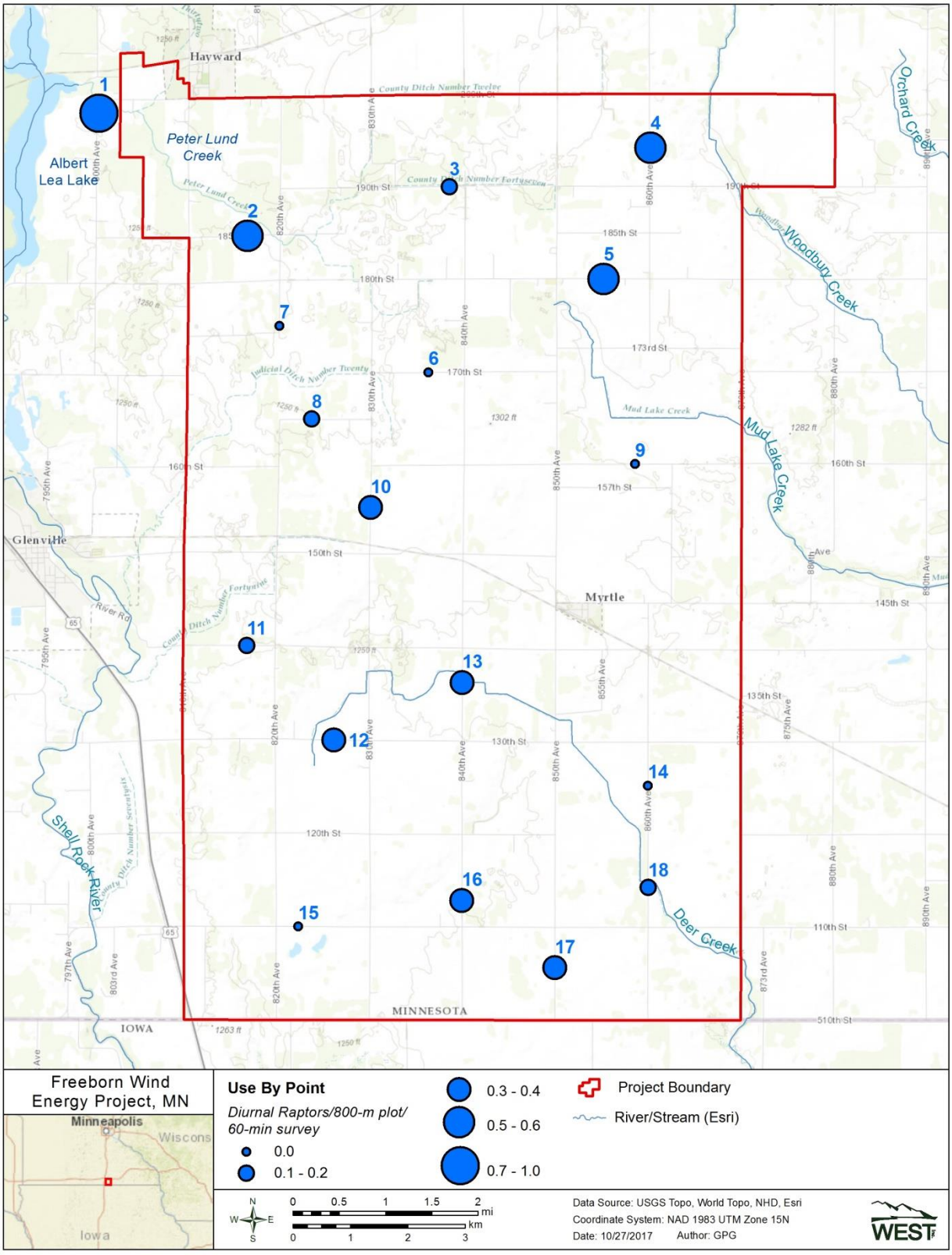
[1] 800-meter; 2,625-foot plot for large birds



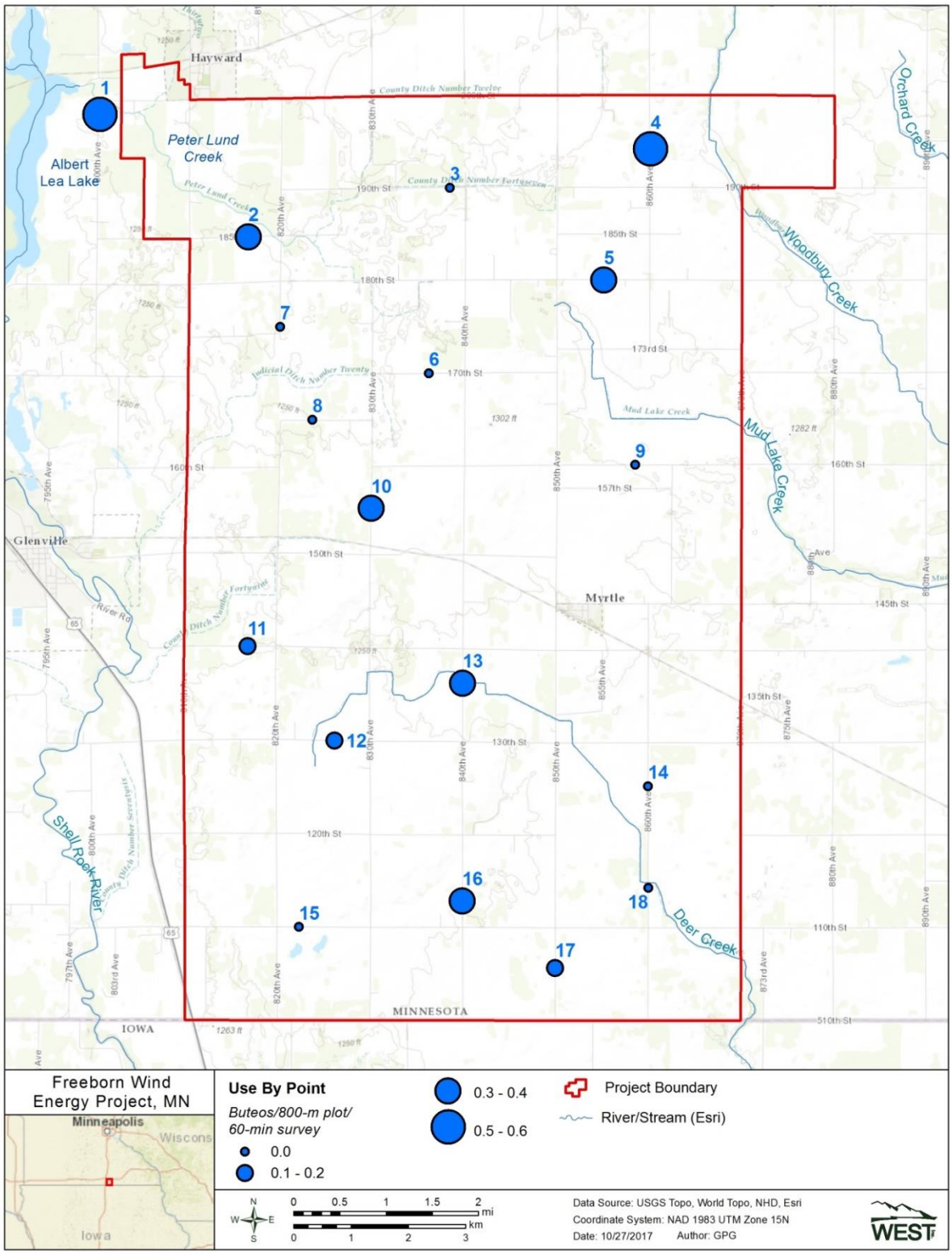
Appendix C2. Waterbird use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.



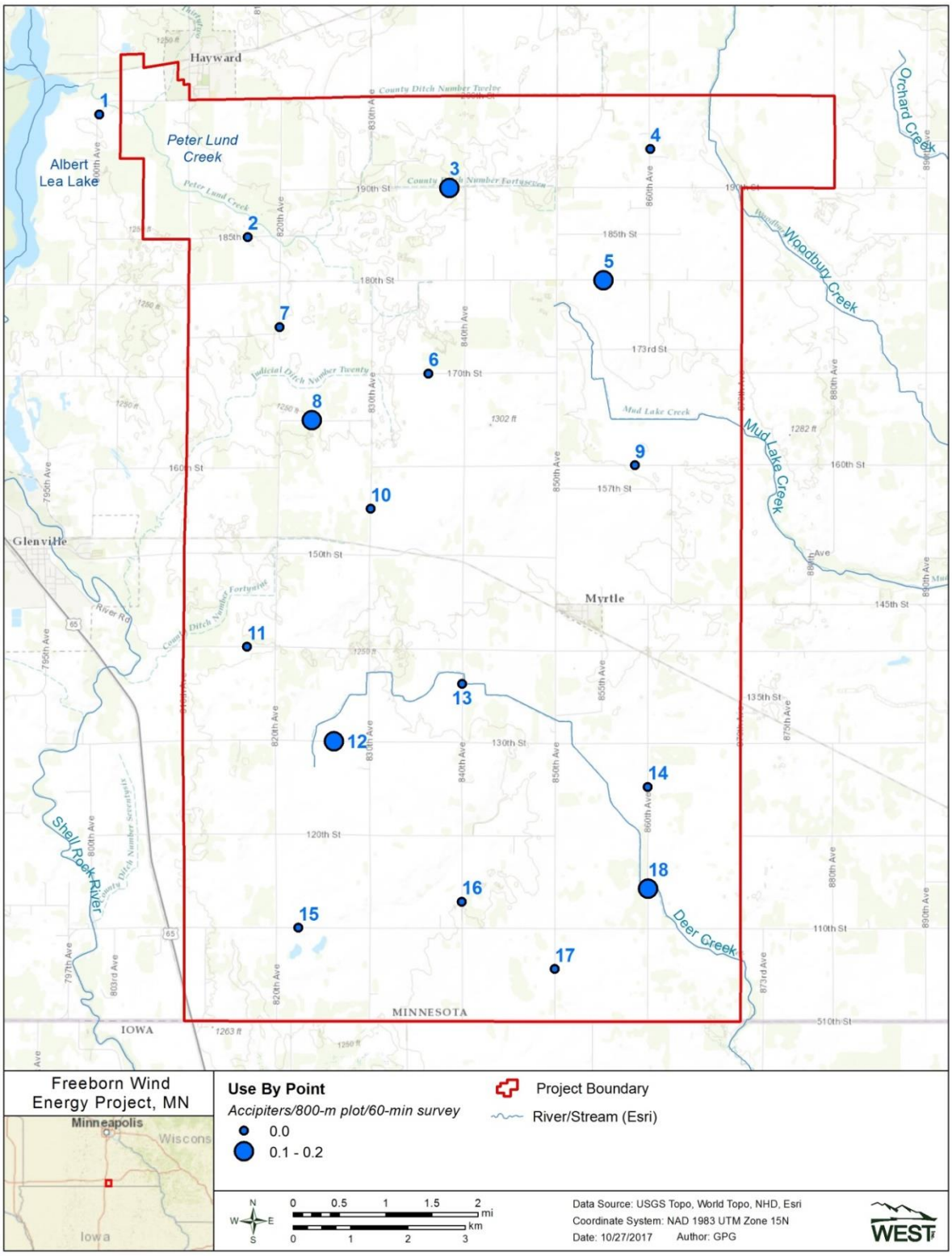
Appendix C2 (continued). Waterfowl use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.



Appendix C2 (continued). Raptor use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.



Appendix C2 (continued). Buteo use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.



Appendix C2 (continued). Accipiter use by observation point during large bird use surveys conducted in the Freeborn Wind Energy Project area from May 26 – September 22, 2017.

ATTACHMENT D

HANKARD ENVIRONMENTAL
ACOUSTICS AND VIBRATION CONSULTING

May 2, 2018

Daniel Litchfield
Director, Renewable Department
Invenergy LLC
One South Wacker Drive, Suite 1800
Chicago, IL 60606

Re: Freeborn Wind Transmission Line Noise – Response to Information Inquiry Number 3

Mr. Litchfield,

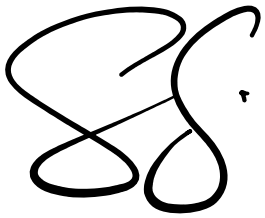
It is our understanding that the Freeborn Wind Transmission Line Project (Project) was requested to consider the potential of routing the Project's 161 kV transmission line with one of two existing transmission lines versus the one originally proposed new alignment in the route permit. The Minnesota Commerce Department subsequently requested the Project address the following comment (Ref: Minnesota Commerce Department Information Inquiry #3 on April 30, 2018):

> 2. Please provide corona noise estimates—either engineering estimates, "math" estimates, or similar citation—for the co-location (under/overbuild) routing options.

The two new potential routing options would add the Project's 161 kV transmission line to substantially smaller (quieter) existing lines (i.e.: 69 kV or 115 kV). As suggested by the Minnesota Commerce Department, the Project could conduct additional detailed predictions for each line configuration as was done for the original route permit (i.e.: consider geometry of each support post structure, gather conductor sizing details and estimate the maximum conductor surface gradient, etc.) or predict a conservative worst-case scenario assuming all use the larger (louder) 161 kV lines. The latter is a reasonable option because the original route permit noise analysis (Ref: *Pre-Construction Noise Analysis for the Proposed Freeborn Wind Energy Center to Glenworth Substation Transmission Line*, Hankard Environmental, July 26, 2017) showed the predicted maximum 161 kV corona noise levels to have an L_{10} of 27 dBA and an L_{50} of 24 dBA both of which are significantly below their residential noise level limits 55 dBA and 50 dBA, respectively, at only the transmission line right-of-way.

The worst-case scenario would be a three bundled line including the Project's 161 kV line and either two 115 kV lines or two 69 kV lines. To be conservative, if we assume the total noise from three louder 161 kV lines in the bundle and loudest tower type from the original route permit, the noise level at the right-of-way would increase by 5 dB. This would result in predicted corona levels during foul weather of 32 dBA (L_{10}) and 29 dBA (L_{50}) versus residential limits of 55 dBA and 50 dBA, respectively. These worst-case predicted levels at the right-of-way are 21 to 23 dB below the residential limits at the right-of-way. Considering all of this, operation of any of these potential transmission lines is expected to be significantly below the Minnesota Noise Limits at all residences and no mitigative measures are proposed.

Sincerely,



Jeff Cerjan – *INCE Member*
Senior Acoustical Consultant

CC: *Mike Hankard, Hankard Environmental*

STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS
FOR THE PUBLIC UTILITIES COMMISSION

In the Matter of the Application of Freeborn Wind Energy LLC for a Route Permit for the Freeborn Wind Transmission Line in Freeborn County, Minnesota	OAH 5-2500-35036 MPUC IP-6946/TL-17-322

FREEBORN WIND ENERGY LLC'S PROPOSED FINDINGS OF FACT, CONCLUSIONS OF LAW, AND RECOMMENDATIONS

TABLE OF CONTENTS

Page

TABLE OF CONTENTS
(continued)

Page

STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS
FOR PUBLIC UTILITIES COMMISSION

In the Matter of the Application of Freeborn Wind Energy LLC for a Route Permit for the Freeborn Wind Transmission Line in Freeborn County, Minnesota	OAH 5-2500-35036 MPUC IP-6946/TL-17-322

FREEBORN WIND ENERGY LLC'S PROPOSED FINDINGS OF FACT, CONCLUSIONS OF LAW, AND RECOMMENDATIONS

This matter was assigned to Administrative Law Judge ("ALJ") Jim Mortenson to prepare a report setting forth findings, conclusions, and recommendations on Freeborn Wind Energy LLC's ("Freeborn Wind" or "Applicant") Application for a Route Permit ("Route Permit") for the Freeborn Wind Farm to Glenworth Substation 161 kilovolt ("kV") Transmission Line Project in Freeborn County, Minnesota ("Application") (MPUC Docket No. 17-322). Freeborn Wind is seeking to construct a seven-mile, 161 kilovolt transmission line that would connect its proposed Freeborn Wind Farm to the Glenworth Substation (the "Project" or "Transmission Line").

A public hearing was held before ALJ James R. Mortenson on May 31, 2018 at the Riverland Community College in Albert Lea, Minnesota.

Lisa Agrimonti and Christina Brusven, Fredrikson & Byron, P.A., 200 South Sixth Street, Minneapolis, Minnesota 55402, appeared on behalf of Freeborn Wind.

Andrew Levi, 85 Seventh Place East, Suite 200, St. Paul, Minnesota 55101 appeared on behalf of the Department of Commerce, Energy Environmental Review and Analysis ("DOC-EERA").

Michael Kaluzniak, Minnesota Public Utilities Commission ("Commission") Staff, 121 Seventh Place East, Suite 350, St. Paul, Minnesota 55101 appeared on behalf of the Commission.

STATEMENT OF ISSUE

Has the Applicant satisfied the factors set forth in Section 216E.03, subdivision 7, of the Minnesota Statutes and Chapter 7850 of the Minnesota Rules for a Route Permit for the proposed Project?

SUMMARY OF RECOMMENDATIONS

The ALJ concludes that Freeborn Wind has satisfied the criteria set forth in Minnesota law for a Route Permit and that both the Orange Route and the Orange Route with the Purple Parallel Segment ("Purple Parallel Route") meet the routing criteria and minimize impacts to the human and natural environments.

Given the Applicant's preference for the Purple Parallel Route, the Commission should GRANT the Route Permit for the Purple Parallel Route with the modification the Applicant proposed to maintain the entire route on participating landowners' property. That modification would narrow the route at 130th street to match the Orange Route in this area.

In the alternative, the Commission should grant a Route Permit for the Orange Route.

Based on information in the Application, the Environmental Assessment ("EA"), the testimony at the public hearing, written comments, and exhibits received in this proceeding, the ALJ makes the following:

FINDINGS OF FACT

I. APPLICANT

1. Freeborn Wind is an affiliate of Invenergy LLC ("Invenergy"). Invenergy is a large-scale energy developer headquartered in Chicago, Illinois.[1]

2. Invenergy has developed, built, owned, and operated many operating wind farms, natural gas facilities, solar projects, and battery storage projects throughout the United States, as well as in Japan, Poland, Scotland, and Uruguay.[2] Invenergy has a proven development track record of 102 large-scale projects with 10,071 MW of wind energy and over 15,915 MW of total projects as of the date of the Application.[3] As part of Invenergy's various generation projects, Invenergy has permitted and built 401 miles of transmission lines greater than 69 kV and continues to operate 251 miles of those lines.[4]

3. Invenergy operates the Cannon Falls Energy Center ("CFEC") in Cannon Falls, Minnesota. The CFEC is a 357 MW natural gas combustion turbine power plant that provides natural-gas fired peaking power. All of the electricity generated by the CFEC is committed to Northern States Power Company d/b/a Xcel Energy ("Xcel Energy").[5]

4. Freeborn Wind will develop, design, and permit the Project.[6]

5. Freeborn Wind has entered into an agreement with Xcel Energy whereby Xcel Energy will acquire Freeborn Wind upon conclusion of all development activities and subsequently construct, own, and operate the Project.[7] On September 21, 2016, Freeborn Wind entered into a Purchase and Sale Agreement ("PSA") with Xcel Energy, and Invenergy Wind

[1] Freeborn Wind Application for a Route Permit for the 161 kV Freeborn Wind Farm Transmission Line and Associated Facilities in Freeborn County at 5, 6-7 (Sept. 20, 2017) (eDocket No. 20179-135684-02) (hereinafter "Application").
[2] Application at 5.
[3] Application at 5.
[4] Application at 5.
[5] Application at 5.
[6] Direct Testimony of Dan Litchfield at 3 (May 24, 2018) (eDocket No. 20185-143327-02) (hereinafter "Litchfield Direct").
[7] Application at 5-6.

Development North America LLC.[8] The Commission approved the Purchase and Sale Agreement on September 1, 2017.[9] Xcel Energy's acquisition of Freeborn Wind was part of a 1,550 MW wind portfolio proposed by Xcel Energy and approved by the Commission.[10] Xcel Energy will assume the obligations of Freeborn Wind, whether made by the company or imposed by the Commission.[11]

II. ROUTE PERMIT APPLICATION UNDER THE ALTERNATIVE PERMITTING PROCESS AND RELATED PROCEDURAL HISTORY

6. The Minnesota Power Plant Siting Act ("PPSA") provides that no person may construct a high voltage transmission line ("HVTL") without a Route Permit from the Commission.[12] Under the PPSA, an HVTL includes a transmission line that is 100 kV or more and is greater than 1,500 feet in length.[13] The proposed 161 kV transmission line is an HVTL greater than 1,500 feet in length and, therefore, a Route Permit is required from the Commission prior to construction.[14]

7. The Commission's rules establish two tracks for the permitting of HVTL. The "full permitting process" includes preparing an environmental impact statement ("EIS") and holding a contested case hearing.[15] The "alternative permitting process" generally applies to modestly sized projects.[16] It requires an EA instead of an EIS and a public hearing instead of a contested case hearing.[17]

8. Because Freeborn Wind's proposed transmission line would operate at a voltage between 100 and 200 kilovolts, it is eligible for the alternative permitting process authorized by Minn. Stat. § 216E.04, subd. 2(3) and Minn. R. 7850.2800, Subp. 1(C).[18]

9. Freeborn Wind notified the Commission on June 15, 2017 by letter that it plans to file a Route Permit Application for the Project and that it intends to use the Alternative Permitting Process of Minn. R. 7850.2800 - .3900 for the Project.[19] This letter complies with the requirement of Minn. R. 7850.2800, Subp. 2, to notify the Commission of this election at least 10 days prior to submitting an application for a Route Permit.

---

[8] Litchfield Direct at 3.
[9] *In the Matter of the Petition of Xcel Energy for Approval of the Acquisition of Wind Generation from the Company's 2016-2030 Integrated Resource Plan*, MPUC Docket No. E002/M-16-777, Order Approving Petition, Granting Variance, and Requiring Compliance Filing (Sept. 1, 2017) (eDocket No. 20179- 135205-01).
[10] Litchfield Direct at 3.
[11] Litchfield Direct at 3; Application at 5-6.
[12] Minn. Stat. § 216E.03, subd. 2.
[13] Minn. Stat. § 216E.01, subd. 4.
[14] Application at 7.
[15] *See* Minn. R. 7850.1700–.2700 (full permitting procedures).
[16] *See* Minn. R. 7850.2800, subp. 1 (describing criteria for eligible projects); accord Minn. Stat. § 216E.04, subd. 2.
[17] *See* Minn. R. 7850.2900–.3900 (alternative permitting procedures).
[18] Minn. R. 7850.2800, subp. 1(C); Order Finding Application Complete, Varying Scoping Time Frame, and Referring the Matter to the Office of Administrative Hearings at 2 (Dec. 5, 2017) (eDocket No. 201712-137952-01); Application at 7.
[19] Notification of Pending Route Permit Application (June 15, 2017) (eDocket No. 20176-132807-01).

10. On September 20, 2017, Freeborn Wind filed its Application with the Commission for the Project under the Alternative Permitting Process under Minn. Stat. § 216E.04, subd. 2(3) and Minn. R. 7850.2800 to 7850.3900.[20]

11. On September 22, 2017, the Commission issued a Notice of Comment Period on Completeness of Route Permit Application requesting initial comments by October 10, 2017 and reply comments by October 17, 2017.[21] On October 4, 2017, the Commission issued a Revised Notice, extending the comment period due to technical difficulties with the comment system. The Revised Notice requested initial comments by October 24, 2017 and reply comments by October 31, 2017. The Notice requested comments on whether Freeborn Wind's Application was complete within the meaning of the Commission's rules; whether there were contested issues of fact with respect to the representations made in the Application; and whether the Commission should appoint an advisory task force.[22]

12. On October 4, 2017, the Minnesota Pollution Control Agency ("MPCA") filed comments on completeness of the Application. The MPCA stated that the Shell Rock River in the Project area is listed as impaired, and is therefore subject to increased stormwater treatment requirements, both during and after construction, as per the MPCA's Construction Stormwater Program. Additionally, MPCA stated the Application should include the Clean Water Act Section 401 permit requirement in Section 7.4.[23]

13. On October 16, 2017, Freeborn Wind filed documentation confirming that it completed the notice requirements of Minn. R. parts 7850.2100 and provided notice of the Application to local government officials, landowners, and the general service list on September 27, 2017, and that newspaper notice was also completed on October 4, 2017.[24]

14. On October 24, 2017, DOC-EERA filed comments and recommendations on the completeness of the Application. DOC-EERA recommended that the Commission accept the Application as complete, but require Freeborn Wind to provide additional information on the procedures and practices proposed to acquire Project right-of-way ("ROW") and any additional state permits that may be required. DOC-EERA also recommended that the Commission take no action on an advisory task force.[25]

---

[20] *See* Application at 7.

[21] Notice of Comment Period on Completeness of Route Permit Application (Sept. 22, 2017) (eDocket No. 20179-135743-01).

[22] Revised Notice of Comment Period on Completeness of Route Permit Application (Oct. 4, 2017) (eDocket No. 201710-136114-01).

[23] MPCA Comments (Oct. 4, 2017) (eDocket No. 201710-136085-01).

[24] Affidavits of Mailing and Publication (Oct. 16, 2017) (eDocket No. 201710-136534-01); *see also* Freeborn Wind Notice of Freeborn Wind Notice of Filing of Route Permit Application (Sept. 27, 2017) (eDocket No. 20179-135845-01).

[25] DOC-EERA Comments and Recommendations on Application Completeness (Oct. 24, 2017) (eDocket No. 201710-136798-01).

15. Fifteen public comments were received during the initial and reply comment periods on the completeness of the Application. The comments were largely related to the potential impacts of the Project and requested the appointment of an advisory task force.[26]

16. Freeborn Wind filed reply comments on October 31, 2017, providing the additional information requested by DOC-EERA.[27]

17. On November 2, 2017, DOC-EERA filed a letter stating that Freeborn Wind's reply comments provided the requested information.[28]

18. On November 3, 2017, the Commission issued a Notice of Commission Meeting scheduled on November 16, 2017.[29]

19. On November 8, 2017, Commission Staff filed Briefing Papers for the November 16, 2017 Commission meeting. Staff recommended that the Commission refer this matter to an ALJ for a "summary proceeding" which would involve findings of fact, conclusions of law and a recommendation.[30] On November 16, 2017, Staff filed amended decision options.[31]

20. On November 15, 2017, Freeborn Wind filed a response opposing Staff's recommendation that the Commission refer this matter to an ALJ for a "summary proceeding." Freeborn Wind requested instead that the ALJ prepare a summary report, whereby the ALJ would summarize comments received.[32]

21. On December 5, 2017, the Commission issued an Order finding the Application complete; varying Minn. R. 7850.3700, subp. 3, to extend the 10-day time limit for the DOC-EERA to issue its scoping decision in order to allow for Commission review; requesting that DOC-EERA file comments with draft route alternatives for the Commission's input before issuing a final scoping decision; and referring this matter to the Office of Administrative Hearings, requesting that the assigned ALJ prepare a report setting forth findings, conclusions, and recommendations on the merits of the proposed Project and alternatives to the proposed Project, applying the criteria set forth in statute and rule, and provide comments and recommendations, if any, on the conditions and provisions of the proposed permit.[33]

22. On December 6, 2017, the Commission and DOC-EERA issued a Notice of Environmental Assessment Scoping and Public Information Meeting, requesting response to four questions regarding the Project: 1) What potential human and environmental impacts should be studied? 2) What are possible methods to minimize, mitigate, or avoid potential impacts that should be studied? 3) Are there any alternative routes or route segments that should be studied to

---

[26] *See, e.g.,* Comment by Allie Olson (Oct. 24, 2017) (eDocket No. 201710-136751-01); Comment by Lisa Hajek (Oct. 24, 2017) (eDocket No. 201710-136801-01).
[27] Freeborn Wind Reply Comments on Completeness (Oct. 31, 2017) (eDocket No. 201710-137023-02).
[28] DOC-EERA Letter (Nov. 2, 2017) (eDocket No. 201711-137115-01).
[29] Notice of Commission Meeting (Nov. 3, 2017) (eDocket No. 201711-137152-02).
[30] Staff Briefing Papers (Nov. 8, 2017) (eDocket No. 201711-137241-01).
[31] Staff Amended Decision Options (Nov. 16, 2017) (eDocket No. 201711-137448-01).
[32] Freeborn Wind Response to Staff Briefing Papers (Nov. 15, 2017) (eDocket No. 201711-137397-01).
[33] Order Finding Application Complete, Varying Scoping Time Frame, and Referring the Matter to the Office of Administrative Hearings (Dec. 5, 2017) (eDocket No. 201712-137952-01).

address potential impacts? 4) Are there any unique characteristics within the Project area that should be considered?[34]

23. On December 14, 2017, Freeborn Wind filed documentation confirming that it had published notice of the EA Scoping and Public Information Meeting in the *Albert Lea Tribune* on December 8, 2017.[35]

24. On December 19, 2017, Commission Staff and DOC-EERA held the EA Scoping and Public Information Meeting in Albert Lea, Minnesota.[36]

25. On January 2 and January 3, 2018, three individuals filed public comments.[37] On January 3, 2018, the Association of Freeborn County Landowners ("AFCL") filed comments.[38]

26. Also on January 3, 2018, the Minnesota Department of Transportation ("MnDOT") filed comments requesting that the EA evaluate the locations of the proposed utility poles in relation to U.S. Highway 65 ("US 65"), and that Freeborn Wind coordinate any route construction work or delivery of materials that may affect MnDOT ROW.[39]

27. On January 8, 2018, DOC-EERA filed public comments that it received regarding the EA scoping process.[40]

28. On January 25, 2018, DOC-EERA filed comments summarizing the EA scoping process and informing the Commission of the route and route segments that DOC-EERA intended to recommend are included in the scoping decision for the EA.[41] DOC-EERA considered the comments submitted during the scoping process regarding the various alternatives proposed. DOC-EERA identified the "Purple Route" and the "Gold Route" segments as alternative routes that co-locate or parallel the Project with existing transmission infrastructure.[42] DOC-EERA recommended that the Deputy Commissioner of Commerce include in the scoping decision the original route proposed by Freeborn Wind (which it calls the "Teal Route"), the Orange Route (which limits the route to participating landowners' property), and the Purple Route. DOC-EERA did not recommend the Gold Route be included in the scope due to impacts to non-participating landowners and other issues.[43]

---

[34] Notice of Environmental Assessment Scoping and Public Information Meeting (Dec. 6, 2017) (eDocket No. 201712-137985-01).
[35] Freeborn Wind Affidavit of Publication (Dec. 14, 2017) (eDocket No. 20172-138188-01).
[36] *See* Order Proposing Additional Route Segment for Consideration in EA and Delegating Authority at 1 (March 5, 2018) (eDocket No. 20183-140767-01).
[37] Comment by Linda Herman (Jan. 2, 2018) (eDocket No. 20181-138508-01); Comment by Kathy Nelson (Jan. 3, 2018) (eDocket No. 20181-138565-01); Comment by Sue Madson (Jan. 3, 2018) (eDocket No. 20181-138564-01).
[38] Comment by AFCL (Jan. 3, 2018) (eDocket No. 20181-138611-01).
[39] Comment by MnDOT (Jan. 3, 2018) (eDocket No. 20181-138602-01).
[40] Meeting Notes (Jan. 8, 2018) (eDocket No. 20181-138726-01).
[41] EERA Comments on Scoping Process (Jan. 25, 2018) (eDocket No. 20181-139336-01).
[42] The "Purple Route" refers to the Orange Route as modified by the Purple Route Segment. The "Gold Route" refers to the Orange Route as modified by the Gold Route Segment.
[43] EERA Comments on Scoping Process at 10 (Jan. 25, 2018) (eDocket No. 20181-139336-01).

29. On January 26, 2018, the Commission issued a Notice of Commission Meeting scheduled for February 8, 2018.[44]

30. On February 7, 2018, DOC-EERA filed a letter indicating that it would consider the issues raised by AFCL's proposed permit conditions in the EA.[45]

31. On February 8, 2018, the Commission met to consider what action it should take regarding route alternatives to be evaluated in the EA.[46] In its March 5, 2018 Order Proposing an Additional Route Segment for Consideration in the Environmental Assessment and Delegating Authority, the Commission agreed with DOC-EERA that the Teal Route, the Orange Route, and the Purple Route should be included in the scoping decision for the EA, and proposed that the Gold Route also be included in the EA.[47] The Commission also requested that the EA examine the possibility of (a) paralleling the existing transmission line corridor and (b) using existing transmission line ROW (either by reconstruction of the existing structures or an under/over build) for the Purple Route and the Gold Route. The Commission also delegated authority to administer this Route Permit proceeding to the Executive Secretary.[48]

32. On March 8, 2018, DOC-EERA filed the EA Scoping Decision, Generic Route Permit Template, and Notice of EA Scoping Decision.[49]

33. On April 2, 2018, a prehearing conference was held before ALJ Jim Mortenson, and on April 4, 2018, the ALJ issued the First Prehearing Order, establishing a schedule for the proceedings.[50] On May 17, 2018, the ALJ issued an Amended First Prehearing Order.[51]

34. On April 24, 2018, Freeborn Wind filed a copy of an email received from Lisa Joyal, Endangered Species Review Coordinator, Minnesota Department of Natural Resources ("MDNR"), regarding Freeborn Wind's Natural Heritage Information System Data Request Form for the Project. The email serves as a concurrence for the rare features assessment in the Commission Route Permit Application and can be used in lieu of a formal Natural Heritage Letter.[52]

---

[44] Notice of Commission Meeting – February 8, 2018 (Jan. 26, 2018) (eDocket No. 20181-139386-08).
[45] EERA Letter (Feb. 7, 2018) (eDocket No. 20182-139858-01).
[46] Notice of Commission Meeting – February 8, 2018 (Jan. 26, 2018) (eDocket No. 20181-139386-08) and Order Proposing Additional Route Segment for Consideration in EA and Delegating Authority (March 5, 2018) (eDocket No. 20183-140767-01).
[47] Order Proposing Additional Route Segment for Consideration in EA and Delegating Authority (March 5, 2018) (eDocket No. 20183-140767-01).
[48] Order Proposing Additional Route Segment for Consideration in EA and Delegating Authority (March 5, 2018) (eDocket No. 20183-140767-01).
[49] Environmental Assessment Scoping Decision (March 8, 2018) (eDocket No. 20183-140868-01); Generic Route Permit Template (March 8, 2018) (eDocket No. 20183-141262-01); Notice of Environmental Assessment Scoping Decision (March 8, 2018) (eDocket No. 20183-140885-01).
[50] First Prehearing Order (April 4, 2018) (eDocket No. 20184-141685-01).
[51] Amended First Prehearing Order (April 4, 2018) (eDocket No. 20185-143153-01).
[52] Freeborn Wind Comments – MDNR National Heritage Concurrence (April 24, 2018) (eDocket No. 20184-142258-02).

35. On May 11, 2018, DOC-EERA filed documentation confirming that notice of the Project had been provided by mail to landowners.[53]

36. On May 14, 2018, DOC-EERA filed the EA.[54] On May 23, 2018, DOC-EERA filed documentation confirming that it had provided the EA and notices of availability of the EA to the Albert Lea Public Library, persons on the Project list, and to the *EQB Monitor*.[55] On May 31, 2018, DOC-EERA filed the Notice of EA Availability for the Project.[56]

37. On May 17, 2018, the Commission issued a Notice of Public Hearing scheduled for May 31, 2018. The Notice also opened a period for public comment ending on June 12, 2018.[57] Approximately 25 comments from members of the public were submitted during the comment period. The MDNR also submitted a comment.[58]

38. On May 24, 2018, Freeborn Wind filed the Direct Testimony of Dan Litchfield.[59]

39. On May 25, 2018, Freeborn Wind filed an Affidavit of Publication for the Notice of Public Hearing.[60]

40. On May 31, 2018 a public hearing was held in Albert Lea, Minnesota. The transcripts from the public hearing were filed on June 7, 2018.[61]

41. On June 14, 2018, Freeborn Wind filed a request for an extension of the deadline for the filing of the Proposed Findings, Conclusions of Law, and Recommendations, and Freeborn Wind's Reply Comments. Freeborn Wind requested that the deadline be extended to June 18, 2018.[62] On June 15, 2018, Freeborn Wind filed a letter confirming that DOC-EERA was agreeable to such an extension.[63] The ALJ issued an order granting Freeborn Wind's request on June 15, 2018.[64]

III. CERTIFICATE OF NEED

42. Minn. Stat. Section 216B.243, subd. 2 states that "no large energy facility" shall be sited or constructed in Minnesota without the issuance of a Certificate of Need by the Commission. The proposed Project is not classified as a "large energy facility" under Minn. Stat. §§ 216B.243 and 216B.2421, subd. 2(3). While the Project is an HVTL with a capacity of

[53] EERA Affidavit of Service by Mail (May 11, 2018) (eDocket No. 20185-142965-01).
[54] Environmental Assessment (May 14, 2018) (eDocket Nos. 20185-142993-01; 20185-142993-02; 20185-142993-03; 20185-142993-04).
[55] EA and Notice of Availability (May 23, 2018) (eDocket No. 20185-143273-01).
[56] DOC-EERA Notice of EA Availability (May 25, 2018) (eDocket No. 20185-143469-01).
[57] Notice of Public Hearing (May 17, 2018) (eDocket No. 20185-143158-01).
[58] Comment by MDNR (June 12, 2018) (eDocket No. 20186-143759-01).
[59] Direct Testimony of Dan Litchfield (May 24, 2018) (eDocket No. 20185-143327-02) (hereinafter "Litchfield Direct").
[60] Freeborn Wind Compliance Filing – Affidavit of Publication (May 25, 2018) (eDocket No. 20185-143338-01).
[61] Public Hearing Transcript 5-31-2018 (June 7, 2018) (eDocket No. 20186-143636-01).
[62] Freeborn Wind Extension Request (June 14, 2018) (eDocket No. 20186-143852-01).
[63] Freeborn Wind Letter Confirming EERA Agreement to Extension (June 15, 2018) (eDocket No. 20186-143889-01).
[64] Order Granting Applicant's Request for Extension (June 15, 2018) (eDocket No. 20186-143890-01).

100 kV or more, it is not more than 10 miles long in Minnesota and it does not cross a state line. Therefore, a Certificate of Need is not required for the Project.[65]

IV. DESCRIPTION OF THE PROJECT

43. The proposed Project is an HVTL, as defined by Minn. Stat § 216E.01, subd. 4.[66]

44. The Project includes approximately 7.0 miles of a new single circuit 161 kV HVTL needed to interconnect the proposed up to 200 megawatt ("MW") Freeborn Wind Farm located in Freeborn County, Minnesota and Worth County, Iowa.[67] The Minnesota portion of the Freeborn Wind Farm will consist of up to 84 MW and is under site permit review in MPUC Docket No. IP6946/WS-17-410.[68]

45. The Project will originate at the proposed Freeborn Wind Farm Substation ("Wind Farm Substation") to be located in Freeborn County, Minnesota and run northwest to end at the existing Glenworth Substation located just southeast of Glenville, Minnesota, which is the Point of Interconnection ("POI").[69] Buried 34.5 kV collector lines from the proposed Freeborn Wind Farm will transmit electricity generated from the wind turbines to the Wind Farm Substation.[70] The voltage will be increased from 34.5 kV to 161 kV at the Wind Farm Substation and power transmitted via the Project's aboveground 161 kV transmission line to the Glenworth Substation.[71] Freeborn Wind has a 200 MW interconnection queue position for the Freeborn Wind Farm.

46. The 161 kV voltage was determined by Freeborn Wind, the Midcontinent Independent System Operator, Inc. ("MISO") and ITC Midwest LLC ("ITC") to be the appropriate voltage because it is connecting the Freeborn Wind Farm to the existing 161/69 kV Glenworth Substation. In addition, a 161 kV voltage more efficiently transmits energy than a lower voltage.[72]

47. The 161 kV line will be constructed using primarily wood, laminated wood, or steel poles with braced post insulators. The majority of the Project will consist of wood or laminated brace post poles.[73]

48. Transmission structures for the Teal, Orange, and Purple Parallel routes will typically range in height from 60 to 80 feet above ground.[74] The typical span between poles outside of substation locations will be approximately 550 to 900 feet.[75]

---

[65] Application at 7.
[66] Minn. Stat. § 216E.01, subd. 4.
[67] Application at 1.
[68] A new Freeborn Wind Farm, Wind Farm Substation and collector lines are included as part of the requested approval in the Site Permit Application for the Freeborn Wind Farm project. *In the Matter of the Application of Freeborn Wind Energy LLC for a Large Wind Energy Conversion System Site Permit for the 84 MW Freeborn Wind Farm in Freeborn County*, MPUC Docket No. IP6946/WS-17-410.
[69] Application at 1, 6.
[70] Application at 8. The Freeborn Wind Farm Substation and associated collector lines are being permitted separately as part of the Freeborn Wind Farm Project, Site Permit Application, MPUC Docket No. IP6946/WS-17-410.
[71] Application at 8.
[72] Application at 8.
[73] Application at 16.

49. The proposed 161 kV transmission line will be constructed with T2 477 thousand circular mils ("kcmil") ACSR "Hawk" conductor which has a capacity of 265 MW at 161 kV or a conductor with comparable capacity with a phasing space of 11.0 feet.[76]

50. Depending upon soil conditions, Freeborn Wind proposes to use direct embedded poles for tangent structures. Rock filled culvert or concrete drilled pier foundations may be required in areas with poor soils. Dead-end structures will be installed with concrete drilled pier foundations. Additionally, a cantilever design may be used in some locations with all davit arms and conductors installed on one side of the pole to allow a narrower ROW on the non-conductor side to allow the poles to be closer to the parcel boundary where adjacent landowners are not participating.[77]

51. The proposed 161 kV transmission line will be designed to meet or surpass all relevant local and state codes, North American Electric Reliability Corporation standards, the National Electric Safety Code ("NESC"), and Xcel Energy standards. Appropriate standards will be met for construction and installation, and applicable safety procedures will be followed during and after installation.[78]

52. The typical ROW width for the Project will be 80 feet (40 feet on either side of the centerline) and the typical span will be 550-900 feet.[79] In one location, at the crossing of County Road 108/830th Avenue at one-quarter mile south of 120th Street, a narrowed ROW is proposed to maintain the ROW for the Project within land owned by participating landowners and within public road ROW where Freeborn Wind is seeking a utility permit from Freeborn County.[80]

53. For the majority of the Project along the Teal Route, Freeborn Wind proposed a route width of 200 feet on each side of the centerline (400 feet total width), with expanded areas at the substations, and narrowed areas near three residential parcels, a communication tower, and along US 65.[81]

54. Route widths along the Orange Route are restricted to the greatest extent possible to avoid non-participating landowners. Route widths vary from 225, 250, and 400 feet with wider route widths near substations.[82] Route widths vary from 250, 400, and 600 feet for the Purple Route.[83] Route widths vary from 400 to 600 feet along the Gold Route.[84]

---

[74] Application at 19.
[75] Application at 16.
[76] Application at 16.
[77] Application at 16.
[78] Application at 16.
[79] Application at 16.
[80] Application at 16-17.
[81] Application at 2.
[82] EA at 14.
[83] EA at 14.
[84] EA at 15.

V. ROUTES EVALUATED[85]

A. Routes Proposed by Freeborn Wind.

55. The Project is located entirely within Shell Rock Township in Freeborn County, Minnesota.[86]

56. *Teal Route.* The route initially proposed by Freeborn Wind in its Application is referred to as the "Teal Route." The Teal Route begins at the Wind Farm Substation at the southeast corner of the intersection of 110th Street and 840th Avenue in Shell Rock Township, Freeborn County, Minnesota, approximately seven miles southeast of the Glenworth Substation.[87] From the Wind Farm Substation, the Teal Route travels north and parallel along 840th Avenue, then turns west and crosses through agricultural land to west of 820th Avenue. The line then turns north and west crossing an existing 69 kV transmission line ("ITC Line") owned by ITC. The Teal Route would follow the west side of the ITC Line north to 130th Street. The line then turns west and parallels 130th Street to the south for a distance then crosses to the north and follows the road until it reaches US 65. From there, it follows the east side of the highway north to the interconnection point at the existing Glenworth Substation owned by ITC.[88] The Teal Route was moved to the east side of US 65 to avoid impacts to the Shell Rock Wildlife Management Area ("WMA") and sensitive natural features located on the west side of US 65, and avoids multiple crossings of US 65 and the UP railway.[89]

57. In developing the Teal Route, Freeborn Wind evaluated and rejected two alternate route segments and one alternative route.[90]

58. *Orange Route.* In response to comments at the scoping meeting that the route width should be located entirely on land owned by participating landowners, Freeborn Wind proposed a new route with the same alignment as the Teal Route, but with a narrower route width that avoids non-participants' land. That route is identified as the Orange Route. The Orange Route follows the same alignment as the Teal Route with route widths varying from 225, 250 and 400 feet.[91]

B. Routes Proposed Through Public Participation.

59. Several alternative route segments were introduced in the EA Scoping Decision:

1. Purple Route Segment.[92]

60. The Purple Route Segment was proposed during scoping and follows an existing transmission line corridor.[93] The EA studied two possibilities for this route segment: running the

[85] A map of the routes evaluated in the EA is included as Exhibit A.
[86] Application at 7.
[87] Application at 7.
[88] *See* Application at 9-11; EA at 14.
[89] Application at 14.
[90] For additional detail on Freeborn Wind's analysis of these alternatives, *see* Application at 14-15.
[91] Litchfield Direct at 5; *see also* EA at 14.
[92] The "Purple Route" refers to the Orange Route as modified by the Purple Route Segment.

proposed HVTL parallel to the existing ITC Line (paralleling) ("Purple Parallel") or overbuilding the proposed HVTL above the ITC Line on new structures within the existing ITC ROW (overbuilding) ("Purple Overbuild").[94] The Purple Route Segment includes a small area of the route width of this route segment, located to the east of 810th Avenue crossing 130th Street, with two non-participating landowners,[95] but the Purple Parallel routing option could be constructed entirely on participants' land.[96]

61. Traveling south to north, the Purple Route Segment breaks from the Teal/Orange route in the NE 1/4 of S28, T101, R20W where it continues west approximately 1,000 feet along field lines to the existing ITC Line. The route segment turns north and travels along the ITC Line for approximately one and one-quarter miles until it reaches 130th Street where it rejoins the Teal and Orange routes. Route widths vary from 250, 400, and 600 feet.[97] Constructing the Purple Overbuild Route south of 120th Street would cause some of the ROW to be on a non-participant's land. Overbuilding for the first half mile north of 120th could be done all on participating land. The remaining half mile towards 130th Street would require two new transmission easements. For these reasons, Freeborn Wind does not support the Purple Overbuild Route.[98]

2. Gold Route Segment.[99]

62. The Gold Route Segment was proposed during scoping and follows existing transmission line corridors.[100] The EA studied two possibilities for this route segment: running the proposed HVTL parallel to the existing ITC Line and Dairyland Power Cooperative double circuit 69 kV transmission line ("Dairyland Line") (paralleling) ("Gold Parallel") or overbuilding the proposed HVTL above the ITC and Dairyland Lines on new structures within existing ROW (overbuilding) ("Gold Overbuild").[101]

63. Traveling south to north, the Gold Route Segment breaks from the Teal/Orange routes at 130th Street. It follows the ITC Line north until it reaches the existing Dairyland Line at the boundary of S21 and S16, T101, R20W. At this point it turns west and follows the Dairyland Line along 140th Street and River Road. The route segment crosses the Shell Rock River and rejoins the proposed route in the NW 1/4 of S17, T101, R20W south of the Glenworth Substation. Route widths vary from 400 to 600 feet.[102]

---

[93] *See* EA at 14, 19.
[94] EA at 14. The "Purple Parallel Route" refers to the Orange Route as modified by the Purple Parallel Route Segment. The "Purple Overbuild Route" refers to the Orange Route as modified by the Purple Overbuild Route Segment. *See* EA at 100-101.
[95] *See* EA, Map 6 (Landowner Participation – Map 2 of 3).
[96] Pub. Hrg. Tr. at 13 (Litchfield).
[97] EA at 14.
[98] Freeborn Wind Reply Comments at 2 (June 18, 2018) (hereinafter "Freeborn Wind Reply Comments").
[99] The "Gold Route" refers to the Orange Route as modified by the Gold Route Segment.
[100] *See* EA at 15.
[101] EA at 15. The "Gold Parallel Route" refers to the Orange Route as modified by the Gold Parallel Route Segment. The "Gold Overbuild Route" refers to the Orange Route as modified by the Gold Overbuild Route Segment. *See* EA at 100-101.
[102] EA at 15.

VI. TRANSMISSION LINE STRUCTURE TYPES AND SPANS

64. The proposed structures for the Project are wood, laminated wood, or steel poles with braced post insulators. Wood or laminated braced post poles are proposed to be used for the majority of the Project. Additionally, a cantilever design may be used in some locations with all davit arms and conductors installed on one side of the pole to allow a narrower ROW on the non-conductor side to allow the poles to be closer to the parcel boundary where adjacent landowners are not participating.[103]

65. Depending upon soil conditions, Freeborn Wind proposes to use direct embedded poles for tangent structures. Rock filled culvert or concrete drilled pier foundations may be required in areas with poor soils. Dead-end structures will be installed with concrete drilled pier foundations.[104]

66. The proposed 161 kV transmission line will be designed to meet or surpass all relevant local and state codes, North American Electric Reliability Corporation standards, the NESC, and Xcel Energy standards. Appropriate standards will be met for construction and installation, and applicable safety procedures will be followed during and after installation.[105]

67. The standard alignment will be with delta-designed poles centered in the ROW, with 40 feet of ROW on each side of the centerline.[106] For the single-circuit 161 kV delta-designed poles, there will be two conductors on one side and one conductor on the other side, and a braced post structure TSP-161 structure type will be used.[107]

68. For certain segments, Freeborn Wind proposes to use a vertical configuration, with all conductors located on one side of the pole.[108] This design is needed to create the correct approach angle for the segment of turn 2 to turn 3 that uses the 22-foot wide ROW across County Road 108/830th Avenue.[109] For the single-circuit 161 kV vertical-designed poles, a braced post structure TSP-161 structure type will be used.[110]

69. The typical span between poles outside of substation locations will be approximately 550 to 900 feet.[111]

VII. TRANSMISSION LINE CONDUCTORS

70. The proposed 161 kV transmission line will be constructed with T2 477 kcmil aluminum conductor steel-supported ("ACSR") "Hawk" conductor which has a capacity of 265 MW at 161 kV or a conductor with comparable capacity with a phasing space of 11.0 feet.[112]

---

[103] Application at 16.
[104] Application at 16.
[105] Application at 16.
[106] Application at 16.
[107] Application at 19.
[108] Application at 16.
[109] Application at 16-17.
[110] Application at 19.
[111] Application at 16.

VIII. TRANSMISSION LINE ROUTE WIDTHS

71. Along the Teal Route, the area of the Project route width is approximately 344.8 acres and the area of the ROW is approximately 64.1 acres.[113]

72. For the Teal Route, Freeborn Wind requested a route width of 200 feet on each side of the proposed transmission line route centerline (400 feet total width).[114] The proposed ROW for the Project (generally 80 feet), would be located entirely on land owned by participants in the Project. The route width for the Teal Route would include non-participant parcels.[115]

73. Route widths along the Orange Route would avoid non-participating landowners.[116] Route widths along the Orange Route vary from 225, 250, and 400 feet with wider route widths near substations.[117]

74. Route widths vary from 250, 400, and 600 feet for the Purple Route.[118] The Purple Route includes a small area with two non-participating landowners,[119] but the Purple Parallel routing option could be constructed entirely on participants' land.[120]

75. Route widths along the Gold Route vary from 400 to 600 feet.[121]

76. Freeborn Wind is requesting approval of different route widths depending on the existing land uses of the adjacent properties. Freeborn Wind requested an expanded route width at the substations and narrowed route width near three residential parcels, a communication tower, and along US 65. Freeborn Wind requests a varying route width extending up to 292 feet from the Glenworth Substation parcel boundary, and a route width of 200 feet off of the Wind Farm Substation site boundary.[122]

IX. TRANSMISSION LINE RIGHT-OF-WAY

77. The entire length of the proposed Project will require new ROW.[123]

78. The typical ROW width for the Project will be 80 feet (40 feet on either side of the transmission line centerline) and the typical span will be 550- 900 feet.[124]

79. ROW will be centered over the anticipated alignment when conductors are on both sides of a structure (40 feet on either side). The ROW will be staggered over the anticipated

---

[112] Application at 16.
[113] Application at 16.
[114] Litchfield Direct at 4; Application at 12.
[115] Litchfield Direct at 4.
[116] Litchfield Direct at 5.
[117] EA at 14.
[118] EA at 14.
[119] *See* EA, Map 6 (Landowner Participation – Map 2 of 3).
[120] Pub. Hrg. Tr. at 13 (Litchfield).
[121] EA at 15.
[122] Application at 12.
[123] Application at 16.
[124] Application at 16.

alignment when conductors are on one side of the structure only (30 feet on the non-conductor side and 50 feet on the conductor side). Freeborn Wind anticipates the ROW along the Teal and Orange routes would abut existing ITC Line or Dairyland Line ROW but not overlap.[125]

80. In one location, at the crossing of County Road 108/830th Avenue at one-quarter mile south of 120th Street, a narrowed ROW is proposed to maintain the ROW for the Project within land owned by participating landowners and within public road ROW where Freeborn Wind is seeking a utility permit from Freeborn County. A vertical design with a 22-foot ROW will be used on this single, short span.[126] Freeborn Wind engineers developed a design in this limited area that can be operated in a 22-foot ROW, which is within the 66-foot wide County Road 108 ROW. To ensure adequate clearances, Freeborn Wind proposes a special design using two dead-end structures. The two poles will be located 123 feet apart and the 22-foot ROW would apply only to the area between the two poles. The area needed for construction will be contained on the participating landowners' parcels. The existing distribution line will be buried in this location. Freeborn Wind continues to talk with adjacent landowners and Freeborn County and may propose to change the design and alignment if a voluntary easement is obtained or to meet Freeborn County requirements.[127] When the proposed line is parallel to a roadway, poles will generally be placed within the private ROW adjacent to the roadway ROW.[128]

X. PROJECT SCHEDULE

81. In the Application, the anticipated construction start date was May 2020 with commercial operations of the Freeborn Wind Farm and transmission line commencing in December 2020.[129]

82. Xcel Energy has advised that it intends to advance the construction timetable and commence civil construction of the transmission line in the early fall of 2019 with construction completion in late 2019, and commercial operations of the Freeborn Wind Farm still commencing in the fourth quarter of 2020. The commercial operations date will be dependent on several factors including weather, permitting, and other development activities. This construction schedule applies to the Orange Route or the Purple Parallel Route. A different schedule would apply to other route alternatives.[130]

XI. PROJECT COSTS

83. Total Project costs are estimated to be approximately $3.8-8.05 million, depending on which route option is approved and a variety of other factors, including timing of construction, cost of materials, and labor.[131] Total costs are summarized below in Table 1:[132]

[125] EA at 15.
[126] Application at 17.
[127] Application at 17.
[128] Application at 17.
[129] Application at 9.
[130] Litchfield Direct at 4.
[131] EA at 22 and Application at 9.
[132] EA at 22.

Table 1 – Estimated Project Costs

Item(s)	Teal	Orange	Purple Overbuild Option*	Purple Parallel Option*	Gold Overbuild Option*	Gold Parallel Option*
Land acquisition and permitting	$400,000	$400,000	$450,000	$450,000	$550,000	$550,000
Design, procurement, and construction	$3,000,000	$3,000,000	$3,500,000	$3,000,000	$7,100,000	$3,200,000
Post-construction close-out and permit compliance	$400,000	$400,000	$400,000	$400,000	$400,000	$400,000
Total	**$3,800,000**	**$3,800,000**	**$4,350,000**	**$3,850,000**	**$8,050,000**	**$4,150,000**

***** Total includes the cost to construct the entire HVTL; not simply the route segment.

84. Operating and maintenance costs after construction of the transmission line will be nominal for several years because the line will be new and minimal initial vegetation management is required. The anticipated annual operating and maintenance costs for the 161 kV transmission line is approximately $1,500 per mile. The principal operating and maintenance costs include inspections which are typically ground-based and occasionally done by aerial inspections, generally on a yearly basis.[133]

XII. PERMITTEE

85. The permittee for the Project is Freeborn Wind Energy LLC.[134]

XIII. SUMMARY OF PUBLIC COMMENTS AND FREEBORN WIND RESPONSES

A. Public Comments and Freeborn Wind Reponses.

86. Approximately 60 members of the public attended the public hearing held in Albert Lea, Minnesota. Approximately 20 people spoke at the public hearing.[135] Approximately 25 comments were received during the public comment period.

87. Members of the public, including some participating landowners, voiced their support for the Project at the public hearing or through written comments. They described the benefits the Project would bring to the community, such as tax revenue from the Freeborn Wind Farm that would be enabled by the Project, jobs, economic development, stable, reliable income

[133] Application at 9.
[134] Application at 1; Litchfield Direct at 3.
[135] *See* Pub. Hrg. Tr.

for landowners, and the growth of clean, sustainable energy sources.[136] Freeborn Wind agrees with these comments.

88. Multiple commenters requested that a determination on the Route Permit be delayed until the Commission makes a final determination on the Freeborn Wind Farm Site Permit (MPUC Docket No. IP-6946/WS-17-410).[137] Freeborn Wind argues that such a delay is neither warranted nor necessary because the Site Permit docket is a separate proceeding on which the Commission has not rendered a decision; such a request is outside the scope of this proceeding; the Route Permit can be determined independently of the Site Permit; and the Commission can determine the timing of its decisions.[138]

89. Concerns about impacts to non-participating landowners were expressed at the public hearing and through public comment. For example, several commenters objected to the Gold Route due to its impact on non-participants.[139]

90. Freeborn Wind has stated that it does not support the Gold Route because impacts along the Gold routing options are unavoidable and will be long-term and significant, and the Gold Route has the most impacts relating to noise, recreation, and land use and zoning. Freeborn Wind also states that the Gold Route would affect non-participants such as those who spoke in opposition to the Gold Route at the public hearing.[140] Similarly, Freeborn Wind states that it does not support the Purple Overbuild Route because it would require constructing the Project on non-participants' land.[141]

91. Concerns about land rights were expressed at the public hearing and through public comment. For example, one commenter argued that Freeborn Wind has not acquired sufficient property rights to construct the Project.[142]

92. Freeborn Wind stated in testimony and at the public hearing, as well as in its Reply Comments, that it has, through voluntary agreements and engineering design, obtained the private real estate rights necessary to construct the Project within the Orange Route and the Purple Parallel Route.[143] Freeborn Wind states that prior to construction it will coordinate with the applicable local and state road jurisdictional authorities to obtain the necessary permits for road access and public road ROW use. For example, Freeborn Wind states that it is seeking a utility permit from Freeborn County for the crossing of County Road 108/830th Avenue at one-

---

[136] *See, e.g.,* Pub. Hrg. Tr. at 13-15 (Hammersly); Pub. Hrg. Tr. at 36-41 (Rauenhorst); Pub. Hrg. Tr. at 18-19 (Kramer); Comment by Lioba Forman (June 12, 2018) (eDocket No. 20186-143755-01); Comment by O'Connor (June 4, 2018) (eDocket No. 20186-143559-01); Comment by Valerie Wolff Cipra and Clark Cipra (May 23, 2018) (eDocket No. 20185-143283-01); Public Comment Batch 1 (June 13, 2018) (eDocket No. 20186-143782-01) (Don Burns, John Forman, Devonlee Haugebak, Mark Haugebak, Glen Mathiason, Winnebago-Worth Counties Betterment Council, Jennifer Vogt-Erickson); Public Comment (June 13, 2018) (eDocket No. 20186-143803-01).

[137] *See, e.g.,* Comment by Clark Ericksen (June 1, 2018) (eDocket No. 20186-143500-01); Comment by Dorenne Hansen (June 1, 2018) (eDocket No. 20186-143501-01); Public Hrg. Tr. at 15 (Olson).

[138] *See* Freeborn Wind Reply Comments at 5-6. The ALJ agrees that no delay is warranted.

[139] *See, e.g.,* Pub. Hrg. Tr. at 31-32 (Sherry Adams); 42 (Brad Nelson); 49-50 (Clark Ericksen); 64 (Travis Jacobsen).

[140] *See* Freeborn Wind Reply Comments at 2, 7-8.

[141] *See* Freeborn Wind Reply Comments at 2.

[142] Comment by Dorenne Hansen (June 1, 2018) (eDocket No. 20186-143501-03).

[143] *See* Freeborn Wind Reply Comments at 6-7; Litchfield Direct at 5; Pub. Hrg. Tr. at 13 (Litchfield).

quarter mile south of 120th Street, where Freeborn Wind has proposed a narrowed ROW to maintain the ROW for the Project within land owned by participating landowners and within public road ROW.[144] Freeborn Wind states that it has had multiple constructive discussions with Freeborn County Staff and Shell Rock Township officials, and is confident a thorough Three Part Agreement will be reached that will address issues related to utility permits for use of public ROW as well as repair and maintenance of public road and drainage infrastructure.[145]

93. Freeborn Wind also noted in its Reply Comments that a small portion of the Purple Route, illustrated on Map 6 of the EA (Landowner Participation – Map 2 of 3), shows that a small corner of the Purple Route crosses non-participating land. Freeborn Wind has stated that it would construct the line on ROW belonging to participating landowners.[146] Freeborn Wind has stated that if the Commission approves the Purple Parallel Route, Freeborn Wind would be agreeable to a revision to the route to "clip" the corner to match the Orange Route at the corner of 130th Street between 810th Avenue and 820th Avenue, so that the entire route is contained on participating land.[147]

94. A related concern was raised regarding private versus public interests relative to eminent domain and the construction of infrastructure servicing a private entity.[148] Issues of eminent domain are outside the scope of a Route Permit proceeding.[149]

95. Comments were submitted expressing concern about potential environmental and wildlife impacts.[150] Some public comments expressed concern that eagles will be adversely impacted by the Freeborn Wind Farm and Transmission Line.[151] Public comments asserted that there were additional eagle nests in the Project area.[152] Additionally, some commenters referenced reports of confirmed eagle deaths in Decorah, Iowa due to electrocution from transmission lines.[153]

96. Freeborn Wind states that it has conducted thorough avian use studies and raptor nest surveys and designed the Project to minimize impacts to eagle and other avian species.[154] Freeborn Wind performed two additional reviews of the site to investigate the alleged eagle nests

[144] *See* Freeborn Wind Reply Comments at 8; Application at 17.
[145] *See* Freeborn Wind Reply Comments at 8.
[146] *See* Freeborn Wind Reply Comments at 7.
[147] *See* Freeborn Wind Reply Comments at 7. On that same map, Freeborn Wind also notes that the parcel immediately south of that corner of the Purple Route is shown as a participating landowner. That landowner has signed a Good Neighbor Agreement but has not granted rights for any transmission line facilities to be located on the property. *See* Freeborn Wind Reply Comments at 7.
[148] *See, e.g.,* Comment by Tim Westrum (June 12, 2018) (eDocket No. 20186-143754-01).
[149] EA at 12.
[150] *See, e.g.,* Pub. Hrg. Tr. at 33 (Hansen); Pub. Hrg. Tr. at 43-44 (Richter); Comment by Linda Herman (June 12, 2018) (eDocket No. 20186-143740-01).
[151] *See, e.g.,* Pub. Hrg. Tr. at 33 (Hansen); Pub. Hrg. Tr. at 43-44 (Richter); Comment by Linda Herman (June 12, 2018) (eDocket No. 20186-143740-01).
[152] *See* Comments by Dorenne Hansen (June 1, 2018) (eDocket Nos. 20186-143501-01; 20186-143501-02; 20186-143501-03).
[153] *See, e.g.,* Comment by Dorenne Hansen (June 1, 2018) (eDocket No. 20186-143501-01).
[154] Freeborn Wind Reply Comments at 12.

asserted in public comments and none were identified.[155] Freeborn Wind states that it already investigated and addressed all of the eagle nest locations asserted in public comments and that there are no raptor nests or bald eagle nests within the transmission line route; the closest bald eagle nest is located approximately 0.3 miles west of the Orange Route centerline along the Shell Rock River, approximately 130 feet from an existing 161 kV transmission line.[156]

97. Freeborn Wind also states that the Transmission Line will be constructed in accordance with Avian Power Line Interaction Committee ("APLIC") standards, which are designed to minimize the impacts to avian species and prevent avian electrocutions.[157] Freeborn Wind states that a transmission line designed to APLIC standards, such as the Project, will have substantially less risk to avian species.[158]

98. In response to concerns expressed in public comments about electrocution risk, Freeborn Wind submitted its transmission line specifications to Western EcoSystems Technology's ("WEST") power line Program Manager to evaluate the design of the Project. As an attachment to its Reply Comments, Freeborn Wind provided the results of WEST's assessment, confirming that the Project is designed in accordance with APLIC standards.[159] The WEST Report concluded that based on the design and size of the 161 kV transmission structures proposed to support the Project, no bald eagle electrocution risk would apply since at-risk structures for eagle perching typically involve distribution or sub-transmission lines with voltages of 69 kV or less, such as the line voltage involved in the 2014 electrocution of one of the Decorah, Iowa bald eagle fledglings.[160] In addition, Freeborn Wind states that adverse avian impacts such as occurred in Decorah, Iowa are the result of lines that have not been constructed to APLIC standards.[161]

99. Public comments raised concerns about the potential impacts to bats, including assertions about the risk of collision and electrocution.[162] Commenters referenced risks from wind turbines as a basis for concern regarding bat collisions and electrocution. Freeborn Wind states that it fully addressed this concern in the Site Permit docket and that these commenters presented no credible support for their assertions relating to bat electrocution and collisions.[163] Further, Freeborn Wind states that it has taken numerous measures, as outlined in the Application, EA, and Draft Avian and Bat Protection Plan, to minimize the risk of fatalities to birds and bats.[164]

---

[155] *See* Freeborn Wind Reply Comments at 9-10; *see also* Freeborn Wind Reply Comments, Attachment C (Giampoli Direct Testimony and Schedules 6, 7, 8).
[156] Freeborn Wind Reply Comments at 12. As an example, Freeborn Wind references the nest Ms. Hansen claims is located between a proposed Freeborn Wind Farm turbine and the Project (to the west of 840th Avenue and north of 110th Street in Glenville, Minnesota), which Freeborn Wind investigated and found to be a small, inactive raptor nest, not an eagle nest. *Id.* at 12.
[157] *See* Freeborn Wind Reply Comments at 10-11 and Attachment B (WEST Electrocution Risk Review).
[158] *See* Freeborn Wind Reply Comments at 10 and Attachment B (WEST Electrocution Risk Review).
[159] *See* Freeborn Wind Reply Comments, Attachment B (WEST Electrocution Risk Review).
[160] *See* Freeborn Wind Reply Comments, Attachment B at 4 (WEST Electrocution Risk Review).
[161] *See* Freeborn Wind Reply Comments at 10.
[162] *See, e.g.,* Comment by Linda Herman (June 12, 2018) (eDocket No. 20186-143740-01).
[163] *See* Freeborn Wind Reply Comments at 21.
[164] *See* Freeborn Wind Reply Comments at 21; Application at 51-52 and Appendix F (Draft ABPP).

100. Some public commenters expressed concern about impacts on habitat, aesthetics, and recreation along the Shell Rock River.[165]

101. Freeborn Wind states that the Project will not have a significant impact on habitat along the Shell Rock River crossing because the HVTL would be located adjacent to an existing ROW near the Shell Rock River meaning these effects would largely be limited to one side of the ROW and would not create newly fragmented areas.[166] Additionally, as requested by the MDNR, Freeborn Wind states that it will install bird diverters on the span of its transmission line that will cross the Shell Rock River, which will minimize risk to swans and other waterfowl.[167]

102. Freeborn Wind states that although the river crossing is unavoidable, the Orange Route best minimizes impacts to recreation at the river crossing, while the Gold Route has the most impacts relating to recreation and its impacts cannot be minimized as well as other routing options.[168] Freeborn Wind also notes that crossing the Shell Rock River along the Gold Route would require additional clearances achieved through either increasing the ROW width or decreasing the span length, and larger overbuild structures.[169]

103. Some commenters expressed concern about impacts to wildlife habitat, including the potential disruption of interior forest dwellers.[170]

104. Freeborn Wind states that because a majority of the Project area is classified as developed or cultivated cropland, no impacts to interior forest dwellers are anticipated and any impacts to wildlife habitat will be limited to areas near the Shell Rock River, and quality habitat conversion will be minimal given the proximity to US 65.[171] Freeborn Wind also states that it will implement the minimization measures recommended by MDNR along the Shell Rock River crossing. Additionally, Freeborn Wind has stated that construction impacts to trees and woodlands will be minimized because the Project area is primarily agricultural, and any tree clearing activity will be minimized.[172]

105. A concern was raised in public comment about wetland and water quality impacts.[173]

106. Freeborn Wind states that it does not propose to build any wind turbines in wetlands and believes that the transmission line poles can be sited outside of wetlands.[174] Freeborn Wind states that it is conducting a detailed in-field wetland delineation study and report and will propose final pole placement after incorporating this information and getting an approved route from the Commission. Freeborn Wind also states that the Project will comply

[165] Comment by Stephanie Richter (June 1, 2018) (eDocket No. 20186-143507-01).
[166] *See* Freeborn Wind Reply Comments at 11.
[167] *See* Freeborn Wind Reply Comments at 11.
[168] *See* Freeborn Wind Reply Comments at 12.
[169] *See* Freeborn Wind Reply Comments at 12; s*ee* EA at 20-21.
[170] *See* Comment by Dorenne Hansen (June 1, 2018) (eDocket No. 20186-143501-01); Comment by AFCL (June 12, 2018) (eDocket No. 20186-143756-01).
[171] *See* Freeborn Wind Reply Comments at 13, 21.
[172] *See* Freeborn Wind Reply Comments at 13.
[173] Comment by Dorenne Hansen (June 1, 2018) (eDocket No. 20186-143501-01).
[174] *See* Freeborn Wind Reply Comments at 13.

with its Stormwater Pollution Prevention Plan and that if it is impossible to avoid wetlands, Freeborn Wind will work with applicable regulatory authorities to obtain any necessary permits that govern the construction techniques in these areas.[175]

107. One commenter at the public hearing requested a property value guarantee.[176] Freeborn Wind states that the record does not support this request and references the EA's thorough discussion of peer-reviewed literature and conclusion that any impacts to property values are anticipated to be minimal.[177]

108. Public comments raised concerns about karst in the Project area.[178]

109. Freeborn Wind states that, in addition to DOC-EERA's determination that no karst features or areas were identified within the route width of any routing option, Freeborn Wind conducted a geotechnical evaluation to evaluate the likelihood of karst in the proposed turbine locations in the Freeborn Wind Farm docket.[179] Freeborn Wind provided the results of this evaluation as Attachment E to its Reply Comments. Freeborn Wind states that this evaluation confirms there is no karst bedrock within 50 feet of the soil surface and that the proposed turbine locations would not impact any karst areas, and that while the evaluation focused on the proposed turbine locations, based on the data presented by the geotechnical evaluation and MDNR information, it can be concluded that the Transmission Line is not likely to impact karst.[180] Additionally, Freeborn Wind has stated that it will conduct a geotechnical investigation for the transmission line structure locations when a route is determined.[181]

110. Public comments raised concerns that "leaching" from concrete used for structure foundations may cause surface and groundwater impacts.[182]

111. Freeborn Wind states that cured (hardened) concrete does not leach chemicals and leaching of concrete would only be a concern (if at all) prior to setting and hardening of the concrete, meaning that cured (hardened) concrete does not leach chemicals.[183] Freeborn Wind states that dewatering would only be necessary if bentonite slurry cannot be utilized to create a seal against groundwater.[184] If dewatering is required, Freeborn Wind states that it will implement dewatering strategies to prevent potential contamination from the portion of uncured concrete that comes into contact with the soil. Freeborn Wind also notes that the concrete mix used for the Project follows the building code requirements for concrete exposure and thus is very similar to any exterior concrete in constant contact with the ground, such as foundations for houses, barns, offices, and sidewalks. Additionally, the chemical properties of the groundwater are investigated during the subsurface investigation, and if the groundwater is determined to be

[175] *See* Freeborn Wind Reply Comments at 13-14; Application at 48.
[176] Pub. Hrg. Tr. at 60 (Van Pelt).
[177] *See* Freeborn Wind Reply Comments at 18.
[178] *See, e.g.,* Comment by Kathy Nelson (June 12, 2018) (eDocket No. 20186-143734-01); Comment by Allie Olson (June 12, 2018) (eDocket No. 20186-143739-01).
[179] *See* Freeborn Wind Reply Comments at 19.
[180] *See* Freeborn Wind Reply Comments at 19-20.
[181] *See* Freeborn Wind Reply Comments at 20.
[182] *See, e.g.,* Comment by Kathy Nelson (June 12, 2018) (eDocket No. 20186-143734-01).
[183] *See* Freeborn Wind Reply Comments at 20.
[184] *See* Freeborn Wind Reply Comments at 20; EA at Appendix C, Information Inquiry #3.

acidic or potentially corrosive to concrete (which could potentially cause leaching) the concrete would be designed with a chemically resistant mix design to increase the concrete durability and resistance to chemical attack. Freeborn Wind has committed to working with the MPCA if dewatering is required.[185]

112. AFCL raised concerns about the Allied Radio Matrix for Emergency Response ("ARMER") System.[186] Freeborn Wind refers to the conclusion of the Statewide Maintenance and Operations Manager with MnDOT's Office of Statewide Radio Communications that "MnDOT has no concerns with the new transmission line affecting the ARMER system."[187] Freeborn Wind states that there is no evidence supporting AFCL's assertion that MnDOT's determination is insufficient by itself.[188]

113. Carol Overland, attorney for the AFCL, asked about the Project's interconnection queue positions at the Public Hearing and raised the issue in a public comment.[189] Ms. Overland has pointed to the one reference in Xcel Energy's filings that mention a Project size of 150 MW, which Freeborn Wind explains was in error.[190] These concerns are related to the Freeborn Wind Farm, not the transmission line.

114. Freeborn Wind states in its Reply Comments that Freeborn Wind owns two interconnection queue positions associated with the Project: J407 for 200 MW and J885 for 64 MW.[191] Freeborn Wind explained that the first queue position, J407, was filed for study by MISO on November 14, 2014. Freeborn Wind states the desired point of interconnection was initially the Hayward Substation but was moved to the Glenworth Substation due to increased wildlife activity observed near the Hayward substation, which is much closer to Albert Lea Lake. This queue position has completed its study and Freeborn Wind has executed a Large Generator Interconnection Agreement with MISO and the transmission owner, ITC Midwest. Freeborn Wind states that it filed a new queue position, J885, that would allow for a potential 64 MW expansion of the Project solely in Worth County and that would connect to the grid via the Wind Farm's Project substation.[192]

B. Local Government and State Agency Participation.

115. MnDOT submitted a comment requesting that the EA assess the placement of the proposed utility poles in relation to US 65. MnDOT noted that Freeborn Wind would need to submit a Utility Accommodation on Trunk Highway Right-of-Way (Form 2525) if the Commission approved a route permit that would place the HVTL in an area that occupies a portion of MnDOT ROW. Additionally, MnDOT requested that Freeborn Wind coordinate any route construction work or delivery of materials that may affect MnDOT ROW.[193] Freeborn

[185] *See* Freeborn Wind Reply Comments at 20.
[186] Comment by AFCL at 11 (June 12, 2018) (eDocket No. 20186-143756-01).
[187] *See* Freeborn Wind Reply Comments at 22; EA at 34.
[188] *See* Freeborn Wind Reply Comments at 22.
[189] *See, e.g.*, Pub. Hrg. Tr. at 22 (Overland).
[190] *See* Freeborn Wind Reply Comments at 16.
[191] *See* Freeborn Wind Reply Comments at 15-16.
[192] *See* Freeborn Wind Reply Comments at 16.
[193] Comment by MnDOT (Jan. 3, 2018) (eDocket No. 20181-138602-01).

Wind has stated that it will submit the required form and coordinate with MnDOT as requested.[194]

116. On April 24, 2018, Freeborn Wind filed a copy of an email received from Lisa Joyal, Endangered Species Review Coordinator at the MDNR, regarding Freeborn Wind's Natural Heritage Information System Data Request Form for the Project. The email states that it serves as a concurrence for the rare features assessment in the Commission Route Permit Application and can be used in lieu of a formal Natural Heritage Letter.[195]

117. On June 12, 2018, MDNR submitted comments. MDNR recommended that Freeborn Wind install bird diverters on the span of its transmission line that will cross the Shell Rock River in order to minimize risk to swans and other waterfowl.[196] Pursuant to the Route Permit, Freeborn Wind will comply with this recommendation.[197]

118. MDNR also recommended that the "wire/border zone method" be applied at the crossing of Shell Rock River and its associated floodplain/wetlands.[198] The wire/border zone method allows for different types and heights of vegetation based on whether the vegetation is directly underneath the conductor (wire zone) or elsewhere in the ROW (border zone).[199] Freeborn Wind will comply with this recommendation.[200]

FACTORS FOR A ROUTE PERMIT

119. The PPSA, Minnesota Statutes Chapter 216E, requires that route permit determinations "be guided by the state's goals to conserve resources, minimize environmental impacts, minimize human settlement and other land use conflicts, and ensure the state's electric energy security through efficient, cost-effective power supply and electric transmission infrastructure."[201]

120. Under the PPSA, the Commission and the ALJ must be guided by the following responsibilities, procedures, and considerations:

> (1) evaluation of research and investigations relating to the effects on land, water and air resources of large electric power generating plants and high-voltage transmission lines and the effects of water and air discharges and electric and magnetic fields resulting from such facilities on public health and welfare, vegetation, animals, materials and aesthetic values, including baseline studies, predictive modeling, and evaluation of new or improved methods for minimizing adverse impacts of water and air

[194] Litchfield Direct at 8.
[195] Freeborn Wind Comments – MDNR National Heritage Concurrence (April 24, 2018) (eDocket No. 20184-142258-02).
[196] *See* Comment by MDNR (June 12, 2018) (eDocket No. 20186-143759-01).
[197] Generic Route Permit Template at Condition 5.3.15; *See* Freeborn Wind Reply Comments at 11.
[198] Comment by MDNR (June 12, 2018) (eDocket No. 20186-143759-01).
[199] EA at 86.
[200] *See* Freeborn Wind Reply Comments at 11.
[201] Minn. Stat. § 216E.03, Subd. 7.

discharges and other matters pertaining to the effects of power plants on the water and air environment;

(2) environmental evaluation of sites and routes proposed for future development and expansion and their relationship to the land, water, air and human resources of the state;

(3) evaluation of the effects of new electric power generation and transmission technologies and systems related to power plants designed to minimize adverse environmental effects;

(4) evaluation of the potential for beneficial uses of waste energy from proposed large electric power generating plants;[202]

(5) analysis of the direct and indirect economic impact of proposed sites and routes including, but not limited to, productive agricultural land lost or impaired;

(6) evaluation of adverse direct and indirect environmental effects that cannot be avoided should the proposed site and route be accepted;

(7) evaluation of alternatives to the applicant's proposed site or route proposed pursuant to subdivision 1 and 2;

(8) evaluation of potential routes that would use or parallel existing railroad and highway rights-of-way;

(9) evaluation of governmental survey lines and other natural division lines of agricultural land so as to minimize interference with agricultural operations;

(10) evaluation of future needs for additional high-voltage transmission lines in the same general area as any proposed route, and the advisability of ordering the construction of structures capable of expansion in transmission capacity through multiple circuiting or design modifications;

(11) evaluation of irreversible and irretrievable commitments of resources should the proposed site or route be approved; and

(12) when appropriate, consideration of problems raised by other state and federal agencies and local entities.[203]

[202] Factor 4 is not applicable because Freeborn Wind is not proposing to site a large electric generating plant in this docket.
[203] Minn. Stat. § 216E.03, Subd. 7.

121. In addition, Minnesota Statutes Section 216E.03, Subdivision 7(e), provides that the Commission "must make specific findings that it has considered locating a route for a high-voltage transmission line on an existing high-voltage transmission route and the use of parallel existing highway right-of-way and, to the extent those are not used for the route, the [C]ommission must state the reasons."

122. In addition to the PPSA, the Commission and the ALJ are governed by Minnesota Rule 7850.4100, which mandates consideration of the following factors when determining whether to issue a route permit for a high voltage transmission line:

> A. effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation, and public services;
>
> B. effects on public health and safety;
>
> C. effects on land-based economies, including, but not limited to, agriculture, forestry, tourism, and mining;
>
> D. effects on archaeological and historic resources;
>
> E. effects on the natural environment, including effects on air and water quality resources and flora and fauna;
>
> F. effects on rare and unique natural resources;
>
> G. application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity;
>
> H. use or paralleling of existing rights-of-way, survey lines, natural division lines, and agricultural field boundaries;
>
> I. use of existing large electric power generating plant sites;[204]
>
> J. use of existing transportation, pipeline, and electrical transmission systems or rights-of-way;
>
> K. electrical system reliability;
>
> L. costs of constructing, operating, and maintaining the facility which are dependent on design and route;
>
> M. adverse human and natural environmental effects which cannot be avoided; and

[204] This factor is not applicable because it applies only to power plant siting.

N. irreversible and irretrievable commitments of resources.[205]

123. There is sufficient evidence on the record for the ALJ to assess the Orange Route and Purple Parallel Route (Freeborn Wind's Proposed Routes) using the criteria and factors set forth above.

APPLICATION OF STATUTORY AND RULE FACTORS

I. APPLICATION OF ROUTING FACTORS TO THE ORANGE AND PURPLE PARALLEL ROUTES AND ROUTE ALTERNATIVES

A. Effects on Human Settlement.

124. Minnesota law requires consideration of the Project's effects on human settlement, including displacement of residences and businesses; noise created during construction and by operation of the Project; and impacts to aesthetics, cultural values, recreation, and public services.[206]

1. Displacement.

125. No displacement of homes or buildings along any routing option will occur as a result of the Project. No residences are within the ROW of any routing option.[207]

126. The Teal Route has 0 residences within the route width; 2 residences within 400 feet of the alignment; 6 residences within 800 feet of the alignment; and 13 residences within the local vicinity of the route.[208]

127. The Orange Route has 0 residences within the route width; 2 residences within 400 feet of the alignment; 6 residences within 800 feet of the alignment; and 13 residences within the local vicinity of the route.[209]

128. The Purple Route has 0 residences within the route width; 0 residences within 400 feet of the alignment, 3 residences within 800 feet of the alignment, and 4 residences within the local vicinity of the route.[210]

129. The Gold Overbuild Route has 3 residences within the route width; 5 residences within 400 feet of the alignment, 7 residences within 800 feet of the alignment, and 10 residences within the local vicinity of the route.[211]

[205] Minn. R. 7850.4100.
[206] *See* Minn. Stat. § 216E.03, Subd. 7(b); Minn. R. 7850.4100(A).
[207] EA at 27, 102.
[208] EA at 29. The EA defines "local vicinity" as 1,600 feet. EA at 24.
[209] EA at 29.
[210] EA at 29.
[211] EA at 29.

130. The Gold Parallel Route has 3 residences within the route width; 4 residences within 400 feet of the alignment, 7 residences within 800 feet of the alignment, and 10 residences within the local vicinity of the route.[212]

131. The record evidence demonstrates that the Orange and Purple Parallel routes will not result in displacement, and that the Gold routing options are the only routes with residences located within the route width. In addition, the Gold routing options have the greatest number of residences within 800 feet of the alignment.[213]

2. Land Use and Zoning.

132. Under Minn. Stat. § 216E.10, subd. 1, a route permit from the Commission preempts all zoning, building and land use rules, regulations, and ordinances promulgated by regional, county, and local governments.[214]

133. All routing options are located within Freeborn County's Agricultural District.[215]

134. The Gold Route would have the most impact on non-participating landowners because it would require placing the Project on non-participants' land. Impacts to non-participating landowners along the Gold routing options are unavoidable, and will be long-term and significant.[216]

135. The Purple Overbuild Route would require constructing the Project on non-participants' land.[217]

136. In contrast, the Orange Route and Purple Parallel Route have the least impact on non-participating landowners because Freeborn Wind has, through voluntary agreements, obtained the rights necessary to construct the Project along the Orange Route and the Purple Parallel Route entirely on participants' land.[218]

3. Noise.

137. The MPCA has established standards for the regulation of noise levels.[219] The most restrictive Noise Area Classification ("NAC") is for residences at 60 A-weighted decibels ("dBA") $L_{50\text{-one hour}}$ and 65 dBA $L_{10\text{-one hour}}$ during the daytime and 50 dBA $L_{50\text{-one hour}}$ and 55 dBA $L_{10\text{-one hour}}$ during the nighttime.[220]

[212] EA at 29.
[213] EA at 29.
[214] Minn. Stat. § 216E.10, subd. 1; EA at 34.
[215] EA at 34.
[216] *See* EA at 34, 36.
[217] Freeborn Wind Reply Comments at 2.
[218] *See* Litchfield Direct at 5 and Pub. Hrg. Tr. at 13 (Litchfield).
[219] *See* Minn. R. Ch. 7030.
[220] Minn. R. 7030.0040, subp. 2.

138. The Project is in a rural area. Ambient noise levels in these locations are generally between 30 and 40 dBA during daytime hours.[221] The maximum calculated noise level during operation of the Project is anticipated not to exceed these noise levels.[222]

139. Freeborn Wind predicted noise levels along the edges of the transmission line ROW, as well as at the residences located near the ROW. All measurements along all routing options were compliant with the Minnesota Noise Standards.[223]

140. During construction of the Project, intermittent and infrequent noise from construction vehicles and equipment will occur in the Project area specific to the particular construction activity.[224] Construction activities for the Project will generate noise similar to agriculture land use activities such as farm equipment and vehicles.[225]

141. At the public hearing, Mr. Andrew Levi from the Minnesota Department of Commerce stated that construction noise might exceed state noise standards, but did not produce any evidence supporting this statement.[226] However, the evidence in the record demonstrates that noise levels during construction will comply with all applicable Minnesota Noise Standards.[227]

142. The record demonstrates that Freeborn Wind has taken steps to avoid and minimize impacts from Project-related noise. For example, noise from intermittent and infrequent construction activities will be mitigated by the distance of the activity from a receptor (e.g., construction activities will not be near residences, farmsteads, etc.), using sound control devices on vehicles and equipment, conducting construction activities during day light hours as much as possible during normal business hours, and not running vehicles and equipment when not needed.[228]

4. Aesthetics.

143. The landscape in the Project area is primarily agricultural cropland with associated farmsteads and rural residences.[229]

144. The Project is consistent with the existing infrastructure in the area. There are electric transmission/distribution lines and the Glenworth Substation located in the Project area, as well as tall communication towers and grain legs on grain storage bins.[230] A 234-foot

[221] EA at 37.
[222] EA at 38; Application at 36; Freeborn Wind Reply Comments, Attachment D (May 2, 2018 Hankard Environmental Letter).
[223] Application at 36; Freeborn Wind Reply Comments, Attachment D (May 2, 2018 Hankard Environmental Letter).
[224] Application at 36.
[225] Application at 36.
[226] Pub. Hrg. Tr. at 12 (Levi). The EA states that any such exceedance of noise standards would be short-term and confined to daytime hours. EA at 37.
[227] *See* Application at 34-36; Freeborn Wind Reply Comments, Attachment D (May 2, 2018 Hankard Environmental Letter).
[228] Application at 36.
[229] Application at 37.
[230] Application at 37.

communications tower dominates the viewshed.[231] All routing options follow existing infrastructure for a portion of their length.[232] Therefore, while the Project will introduce new built features—structures and conductors—on the landscape, the Project is consistent with the existing landscape.[233]

145. Aesthetic impacts along the Teal, Orange, and Gold Overbuild routes are anticipated to be moderate.[234] Impacts along the Purple routing options and the Gold Parallel Route are anticipated to be moderate.[235]

146. Aesthetic impacts are associated with residents viewing the HVTL from their homes. As illustrated on Table 1 below, the record evidence demonstrates that the Gold Route will have the greatest impact on aesthetics at residences. The Gold routing options are the only options with residences located within the route width. In addition, the Gold routing options impact the greatest number of residences located within 400 and 800 feet of the alignment. In contrast, no residences are located within the route width of the Teal, Orange, or Purple routes.[236]

Table 1 – Distance of Residences from Anticipated Alignment

Route or Route Segment	Route Width	400 Feet	800 feet	Local Vicinity (1,600 feet)
Teal	0	2	6	13
Orange	0	2	6	13
Gold Overbuild	3	5	7	10
Gold Parallel	3	4	7	10
Purple (both)	0	0	3	4

147. The record demonstrates that the overbuild options would have greater aesthetic impacts than the other options. While overbuilding the HVTL with existing transmission lines will reduce the number of structures on the landscape, once constructed the structures will be taller and more obtrusive visually. Construction necessitates use of a shoo-fly line if overbuilding, which would create similar visual impacts to the other routing options during construction.[237] Overbuild structures along the ITC Line would be about 85 to 90 feet tall, and structures along the Dairyland Line would be about 90 to 95 feet tall over ground and 120 to 125 feet tall at the Shell Rock River crossing.[238] These overbuild structures are larger and more visually disruptive than the approximately 60- to 80-foot tall structures required for the other routing options.[239]

[231] EA at 28.
[232] EA at 28.
[233] *See* EA at 28; Application at 37.
[234] EA at 28.
[235] Pub. Hrg. Tr. at 11 (Levi).
[236] *See* EA at 29 (Table 5). The EA defines "local vicinity" as 1,600 feet. EA at 24.
[237] EA at 29.
[238] *See* EA at 20.
[239] *See* EA at 20; Application at 37.

148. The Gold Overbuild Route would involve greater aesthetic impacts than any other route option. The Gold Overbuild structures along the ITC Line would be approximately 85 to 90 feet tall, and structures along the Dairyland Line would be approximately 90 to 95 feet tall over ground and 120 to 125 feet tall at the Shell Rock River crossing.[240] These structures are larger than those required for the other options.[241]

149. The record demonstrates that the Orange Route and Purple Parallel Route would involve less aesthetic impacts than the Purple Overbuild Route. The Orange and Purple Parallel routes would involve smaller structures and therefore lesser aesthetic impacts.[242] Structures for the Orange and Purple Parallel routes would be approximately 60 to 80 feet tall,[243] while Purple Overbuild structures would be approximately 85 to 90 feet tall.[244]

150. There are no unmitigated aesthetic impacts to the four residences located along the Orange Route that are within 1,600 feet of the proposed Freeborn Wind Farm and the Transmission Line. All four of these residences are participants in the Project.[245] They signed up for the Project and its aesthetic impacts and are compensated under the easement agreement.[246] Additionally, all of these homes have some form of shelter belt of trees around their properties that will minimize or eliminate the view of turbines and/or the Project.[247]

151. Crossing the Shell Rock River is unavoidable. The Orange and Teal routes best minimize impacts at that crossing. The Teal and Orange routes cross the Shell Rock River adjacent to US 65, at a location previously impacted by highway and railway bridges and another transmission line crossing. Structures will only be slightly taller than the existing ITC Line.[248] In contrast, the Gold Parallel Route option crosses adjacent to the existing Dairyland Line, which extends the existing transmission line crossing horizontally and may draw more attention to the crossing. While the Gold Overbuild option would not introduce a new feature once constructed, the new structure would be larger and taller vertically than the existing Dairyland Line. Additionally, crossing the Shell Rock River along the Gold Route would require additional clearances achieved through either increasing the ROW width or decreasing the span length, and larger overbuild structures.[249]

5. Cultural Values.

152. Construction of the Project is not anticipated to conflict with the cultural values along any of the routing options, as the community's cultural values remain intact despite the

[240] *See* EA at 20.
[241] *See* EA at 2, 20, 29; Application at 37.
[242] *See* Application at 37.
[243] *See* Application at 37.
[244] *See* EA at 20.
[245] *See* Freeborn Wind Reply Comments at 18-19; EA at 89.
[246] Litchfield Direct at 7; Freeborn Wind Reply Comments at 18-19.
[247] *See* Freeborn Wind Reply Comments at 18-19.
[248] EA at 28, 29.
[249] *See* EA at 20, 28, 29-30.

presence of other previously constructed transmission lines and infrastructure facilities in the Project area.[250]

153. The Project is not anticipated to impact or alter the work and leisure pursuits of residents in the Project area or land use in such a way as to impact the underlying culture of the area.[251] Additionally, the presence of the Project will not significantly impact the agricultural land use or general character or cultural values of the area. As demonstrated by other transmission projects in the Midwest, agricultural practices continue throughout construction and operations.[252]

6. Recreation.

154. The Project is located in a relatively rural area. The main land use within the Project area is agriculture (field crops and pastures) and tourist attractions are not associated with the predominant agricultural use of the land.[253] Outdoor recreational opportunities in the Project area include hiking, biking, boating, fishing, camping, swimming, cross country skiing, snowmobiling, hunting, and nature viewing.[254]

155. There are no WMAs, Aquatic Management Areas ("AMA"), Sites of Biodiversity Significance, or Scientific and Natural Areas ("SNA"); or United States Fish & Wildlife Service ("USFWS") Waterfowl Production Areas ("WPA") within the route width of any routing option.[255]

156. The Cedar River State Water Trail is located approximately 9.3 miles east of the Project.[256] Due to this distance, no impacts to the Cedar River State Water Trail are anticipated.[257]

157. There are two WMAs located within five miles of the Project. The Project is within 1,600 feet of the Shell Rock WMA; however, it is located on the opposite side of US 65 from the Project.[258] The Panicum WMA is located approximately 2.1 miles southwest of the Project.[259]

158. The Project intersects the Shell Rock River State Water Trail.[260] However, the Project will not impact the trail once constructed. Temporary construction impacts would be limited to short-term closure of the water trail in this section while stringing between the two structures spanning the Shell Rock River occurs as a safety measure. Freeborn Wind has

[250] Application at 39.
[251] EA at 32.
[252] *See* Application at 39.
[253] Application at 44.
[254] EA at 41.
[255] EA at 83.
[256] Application at 40.
[257] Application at 41.
[258] EA at 41.
[259] Application at 39.
[260] EA at 41.

committed to coordinating with the MDNR to schedule this work.[261] New built features (structures) will be introduced near, but not within, the Shell Rock River Water Trail.[262]

159. A designated snowmobile trail travels north-south between 830th and 840th Avenues. The trail intersects the ROW of the Teal and Orange routes prior to reaching the Purple or Gold route segments. A second snowmobile trail crosses US 65 at the existing Glenworth Substation, and skirts the extreme northwest portion of the common route width. Both snowmobile trails would be impacted equally regardless of which routing option is selected.[263] Poles will not be located within the snowmobile trail and therefore no impacts are anticipated.[264] Additionally, snowmobile trails cross or follow existing built features; therefore, the proposed HVTL is consistent with visitor expectations in this area.[265]

160. There are no other MDNR classified lands, such as State forests, State parks, State trails, AMAs, or SNAs; federal parks, forests, or refuges; or county parks within the local vicinity of the Project.[266]

161. The record demonstrates that impacts to recreational resources will be minimal. New built features (structures) will be introduced near, but not within, the Shell Rock River Water Trail, the Shell Rock River WMA, and existing snowmobile trails. Conductors will span these resources. And while some visual impacts may occur, the Project would not impede recreational activities, such as snowmobiling, canoeing, kayaking, or fishing.[267]

162. The Teal and Orange routes would cross the Shell Rock River adjacent to US 65. The presence of the highway and railway bridges adjacent to the Teal and Orange routes would likely focus recreationalist's attention on passing traffic or trains as opposed to the HVTL. The river crossing is unavoidable, but the overall impact intensity level is anticipated to be minimal.[268]

163. As discussed above, Shell Rock River crossing is unavoidable. However, the crossing along the Orange and Teal routes best minimize impacts, and impacts from crossing along the Gold Route cannot be minimized as well as other routing options.[269]

7. Socioeconomics.

164. Impacts to socioeconomics are anticipated to be minimal and positive for all routing options.[270] The Project will not disrupt local communities or businesses and does not

[261] Application at 40.
[262] EA at 41.
[263] EA at 42.
[264] *See* EA at 41; Application at 40.
[265] EA at 42.
[266] EA at 41.
[267] EA at 41.
[268] EA at 42.
[269] *See, e.g.,* EA at 29, 41, 42;
[270] EA at 43.

disproportionately impact low-income or minority populations. Adverse impacts are not anticipated.[271]

165. The Project will result in both short- and long-term positive socioeconomic impacts to the local community. There will be short-term positive impacts to communities near the Project area as a result of construction activity and an influx of contractor employees during construction of the various projects. Positive economic impacts include increased expenditures; for example, the use of the hotels, restaurants, and other services by the various workers at local businesses during construction.[272] Construction of the Project will generate up to 30 temporary jobs at any given time over an approximately six-month period.[273] Utility personnel or contractors will be used for all construction activities.[274] Additionally, materials such as utility poles and concrete may be purchased from local vendors depending on availability, and terms and conditions.[275] Long-term beneficial impacts from the Project include increased tax revenue from the Wind Farm that would be enabled by the Project.[276]

8. Property Values.

166. While the research indicates that property value impacts vary, the majority conclude that HVTLs have "'no significant impact or a slight negative impact on residential properties.'"[277]

167. The EA provides a thorough discussion of peer-reviewed literature that demonstrates that any impacts to property values are anticipated to be minimal.[278] The use of multiple regression statistical analysis is generally accepted as the current professional and academic standard for evaluating potential property value impacts, as it reflects the actual behavior of property buyers and sellers in terms of recorded sales prices, while controlling for other factors. This type of analysis allows researchers to identify "revealed preferences" or what people actually did, in contrast to survey research, which identifies what people say they would do. This type of research requires large data sets; therefore, it is less subjective and more reliable than paired sales studies. The results are often reported as an average change over a number of properties; however, the effect to individual properties can vary widely.[279]

168. The results of these studies can be summarized, generally, as follows:

- Over time, there is a consistent pattern with about half of the studies finding negative property value effects and half finding none.

- When effects have been found, they tend to be small; almost always less than 10 percent and usually in the range of three percent to six percent.

[271] EA at 43, 44.
[272] EA at 43; Application at 38-39.
[273] EA at 43; Application at 38.
[274] Application at 38.
[275] EA at 43 and Application at 38.
[276] Application at 38-39.
[277] EA at 38.
[278] *See* EA at 38-40.
[279] EA at 39-40.

- Where effects are found, they decay rapidly as distance to the lines increases and usually disappear at about 200 feet to 300 feet.

- Two studies investigating the behavior of the effect over time find that, where there are effects, they tended to dissipate over time.[280]

169. There is no evidence in the record that shows a property value guarantee is warranted for the Project.

B. Effects on Public Health and Safety.

170. Minnesota routing factors require consideration of the Project's potential effect on health and safety.[281]

171. There is no indication that any significant impact on human health and safety will arise from the Project.[282]

1. Construction and Operation of Facilities.

172. The Project will be designed in compliance with local, state, NESC, and Xcel Energy standards regarding clearance to ground, clearance to crossing utilities, clearance to buildings, strength of materials, and ROW widths.[283]

173. Construction crews and/or contract crews will comply with local, state, NESC, and Xcel Energy standards regarding installation of facilities and standard construction practices. Established Xcel Energy and industry safety procedures will be followed during and after installation of the transmission lines. This will include clear signage during all construction activities.[284]

174. The proposed transmission lines will be equipped with protective devices to safeguard the public from the transmission lines if an accident occurs, such as a structure or conductor falling to the ground. The protective devices include breakers and relays located where the line connects to the substation(s). The substations are fenced and contain a locking gate for access. The protective equipment will de-energize the line should such an event occur. Proper signage will be posted warning the public of the risk of coming into contact with energized equipment.[285]

175. The record demonstrates that construction and operation of the Project along any of the routing options will not impact public safety.

---

[280] EA at 40.
[281] Minn. Stat. § 216E.03, Subd. 7(b)(1); Minn. R. 7850.4100(B).
[282] *See, e.g.,* EA at 44-49.
[283] Application at 32.
[284] Application at 32-33.
[285] Application at 33.

2. Electric and Magnetic Fields ("EMFs").

176. EMFs are invisible forces that result from the presence of electricity. EMF occurs naturally and is caused by weather or the geomagnetic field. EMFs are also caused by all electrical devices and are found wherever people use electricity.[286]

177. Electric field strength is measured in kilovolts per meter ("kV/m"). Magnetic field strength is measured in milliGauss ("mG"). The strength of electric and magnetic fields decrease rapidly as the distance from the source increases.[287]

178. There are no federal standards for transmission line electric fields.[288] The Commission has imposed a maximum electric field limit of 8 kV/m measured at one meter above the ground at the edge of the ROW. It has not adopted a standard for magnetic fields.[289]

179. The calculated maximum electric field for the Project directly underneath the transmission line is less than the maximum limit of 8 kV/m prescribed by the Commission.[290]

180. The calculated maximum electric field strength directly underneath the proposed transmission line is 3.32 kV/m. This field strength is below the 5.0 kV/m interaction level for modern, bipolar pacemakers, and although it has the potential to impact older, unipolar pacemakers directly underneath the HVTL, moving away from the HVTL centerline would return the pacemaker to normal operation and the regular presence of implantable medical devices is not expected. Additionally, there are no sensitive receptors such as hospitals or nursing homes located within the route width of any routing option; however, three residences are within the route width of the Gold routing options. Therefore, impacts to implantable medical devices and persons using these devices are not expected to occur.[291]

181. Magnetic fields may interfere with implantable electromechanical medical devices, such as pacemakers, defibrillators, neurostimulators, and insulin pumps.[292] However, interference from magnetic fields in pacemakers is not observed until 2,000 mG—a field strength greater than that associated with transmission lines.[293]

182. The record evidence demonstrates that no cause and effect relationship has been shown between EMF and adverse health effects.[294] No adverse impacts due to EMF are anticipated as a result of the Project.[295]

---

[286] EA at 44.
[287] EA at 44.
[288] EA at 46.
[289] EA at 47.
[290] *See* EA at 47-48.
[291] EA at 49.
[292] EA at 48.
[293] EA at 48-49.
[294] EA at 45-46.
[295] *See* EA at 45-46, 47.

3. Stray Voltage.

183. Stray voltage is "voltage caused by an electric current in the earth, or in groundwater, resulting from the grounding of electrical equipment or an electrical distribution system."[296] Stray voltage encompasses two phenomena: neutral-to-earth voltage ("NEV") and induced voltage. NEV is a type of stray voltage that can occur where distribution lines enter structures.[297]

184. The record demonstrates that no NEV voltage impacts are anticipated as a result of the Project. Transmission lines do not create NEV stray voltage as they do not directly connect to businesses, residences, or farms. Additionally, the proposed HVTL does not interconnect to businesses or residences within any routing option, and does not change local electrical service.[298]

185. Impacts due to induced voltage are not anticipated to occur, and any potential impacts from stray voltage are avoided or minimized by Commission permit requirements.[299] The Commission requires that transmission lines be constructed and operated to meet the standards established by the NESC as well as the Commission's electric field limit of 8 kV/m.[300]

C. Public Service and Infrastructure.

186. Public services supporting rural residences and farmsteads within the Project area include transportation/roadways, electric, and telephone/telecommunications. The largest city proximal to the Project area is the City of Albert Lea located approximately five miles west of the northwestern corner of the Project. The city has its own police and fire departments. Three additional cities are located near the Project area. Other cities with similar services provided by Freeborn County within five miles of the Project area include Glenville, Hayward, and Myrtle.[301]

187. The Project is expected to have minimal effect on existing services and infrastructure of the area. Construction and operation of the Project will be in accordance with associated federal, state, and local permits and laws, as well as industry construction and operation standards and best practices. The Project is designed to have manageable temporary effects on the existing infrastructure during Project construction and operation. Only minor impacts are anticipated.[302]

[296] EA at 50.
[297] EA at 50.
[298] EA at 50.
[299] EA at 51; *see, e.g.,* Generic Route Permit Template at §§ 5.4.1, 5.4.2, 5.5.1
[300] EA at 51.
[301] Application at 41.
[302] *See* EA at 52-55; Application at 41.

1. Emergency Services.

188. Emergency services in the Project area are provided by multiple entities—fire service by Glenville and Myrtle Fire Departments; ambulance service by Gold Cross Ambulance; and law enforcement by Freeborn County Sheriff.[303]

189. The overall impact to emergency services for all routing options will be negligible. Impacts to emergency communications are not anticipated and impacts to emergency response, if they occur, are anticipated to be minimal.[304] For example, any required temporary lane closures would be coordinated and closure protocols established with the local jurisdictions, and would provide for safe access of police, fire, and other rescue vehicles through alternate routes.[305]

190. Impacts to the ARMER System are not anticipated. The Statewide Maintenance and Operations Manager with MnDOT's Office of Statewide Radio Communications reviewed the scoping summary and concluded that "MnDOT has no concerns with the new transmission line affecting the ARMER system."[306]

2. Utilities.

191. Impacts to utilities for all routing options will be minimal. Impacts are anticipated to be limited to electrical and telephone outages.[307]

192. The Project area is not serviced by city water supply or sanitary sewer; these services are provided by individual wells and septic systems. The record evidence demonstrates that impacts to wells and septic systems will not occur.[308]

193. Freeborn-Mower Cooperative Services provides electrical service in the Project area and distribution lines are located throughout. Several planned outages would be necessary to construct the HVTL. Outages on existing power lines would be necessary to construct the Gold and Purple overbuild options.[309] However, outages will not be necessary at perpendicular crossings because Freeborn Wind will use temporary protective guards or clearance structures. Clearances associated with existing power lines will be code compliant. No long-term impacts are anticipated.[310]

194. No natural gas pipelines are located in the Project area. Therefore, impacts will not occur.[311]

[303] EA at 52.
[304] EA at 52.
[305] Application at 41.
[306] EA at 34.
[307] EA at 54.
[308] EA at 53, 54.
[309] EA at 54-55.
[310] EA at 55.
[311] EA at 55.

195. Fiber optic and telephone cables exist in the Project area. However, fiber optic cables are outside the anticipated ROW of all routing options. Telephone outages, if they occur, would be localized and long-term impacts are not anticipated.[312]

3. Transportation.

196. Impacts to roads and highways are expected to be minimal along all routing options.[313]

197. Freeborn Wind has committed to develop structure placement and construction procedures in consultation with state, county, and local roadway authorities to meet requirements for clear zones and roadside obstructions.[314]

198. During construction short-term localized traffic delays and re-routes might occur. Delays will likely be associated with material delivery and worker transportation. Road crossings might also necessitate short-term impacts to traffic when stringing conductors. Freeborn Wind does not intend to locate structures within road ROW, though HVTL ROW might overlap with road ROW. Should this occur, it is unlikely to affect the safety of the traveling public or road/highway operations.[315]

199. Prior to construction, Freeborn Wind will coordinate with the applicable local and state road jurisdictional authorities to obtain the necessary permits for road access and public road ROW use.[316] For example, Freeborn Wind is seeking a utility permit from Freeborn County for the crossing of County Road 108/830th Avenue at one-quarter mile south of 120th Street, where Freeborn Wind has proposed a narrowed ROW in order to maintain the ROW for the Project within land owned by participating landowners and within public road ROW.[317] Freeborn Wind has had multiple constructive discussions with Freeborn County Staff and Shell Rock Township officials, and is confident a thorough Three Part Agreement will be reached that will address all of these issues.[318]

200. The Federal Aviation Administration ("FAA") and MnDOT have each established development guidelines on the proximity of tall structures to public use airports. The FAA has also developed guidelines for the proximity of structures to Very-High-Frequency Omni-Directional Range navigation systems. A structure is considered to pose an adverse effect upon visual flight rules air navigation if its height is greater than 500 feet tall and within two miles of any regularly used visual flight rules route.[319]

---

[312] *See* EA at 54-55.
[313] EA at 52.
[314] EA at 53.
[315] EA at 53.
[316] *See* EA at 52-53; Comment by MnDOT (Jan. 3, 2018) (eDocket No. 20181-138602-01); Litchfield Direct at 8; Application at 62.
[317] Application at 17.
[318] *See* Freeborn Wind Reply Comments at 8.
[319] Application at 42. Freeborn Wind notes that it has received determinations of no hazard from the FAA for turbine locations in the Freeborn Wind Farm. Freeborn Wind Reply Comments at 6 and Attachment A (Exemplar FAA Determination of No Hazard for the Freeborn Wind Farm turbines).

201. The Project's transmission structures will be less than 100 feet tall. Additionally, the closest airports to the Project are the Albert Lea Municipal Airport and the Austin Municipal Airport in Minnesota, and the Northwood Municipal Airport (5D2) in Iowa. These airports are approximately 9, 15.5, and 4 miles from the Project.[320] Accordingly, construction and operation of the Project will not impact safe operation and use of the airport and impacts to airports or airport operations are not expected to occur.[321]

4. Electronic Interference.

202. Power lines have potential to interfere with the normal operation of electronic devices such as radio and television. Impacts from electronic interference are anticipated to be minimal for all routing options.[322]

203. Potential impacts to radio frequencies might occur in the AM frequency range directly underneath the conductors or in close proximity to them within the ROW. Interference is not expected in the FM frequency range.[323] Additionally, impacts to radio frequencies can be avoided by increasing the distance between the receiver and the HVTL or by increasing signal strength through antenna modifications.[324] Additionally, if interference does occur, Freeborn Wind will resolve the interference as it committed to do in the Application and as it will be required to do in accordance with the Route Permit.[325]

204. No residences are within the route width of the Teal, Orange, or Purple routing options; therefore, impacts to television signals along these route options are not anticipated. In contrast, three residences are within the route width of the Gold Route, although impacts are not anticipated. Use of different antennas or satellite dishes, or adjusting the locations of antennas will typically resolve any impacts to television signals.[326] If interference does occur, Freeborn Wind will resolve the interference as it committed to do in the Application and as it will be required to do in accordance with the Route Permit.[327]

205. Impacts to wireless internet and cellular phone signals are not anticipated to occur for any routing option.[328]

206. Impacts are anticipated to be limited to temporary electrical and telephone outages. Electrical outages along the Teal and Orange routes will be short term and localized; outages necessary for the Gold and Purple overbuild options might extend beyond the Project area. Telephone outages, if they occur, would be localized. Potential impacts can be minimized.[329] In situations where an HVTL does cause electronic interference, Commission

[320] EA at 26.
[321] *See* EA at 26.
[322] EA at 32.
[323] EA at 33.
[324] EA at 34.
[325] Application at 37; Generic Route Permit Template at Condition 5.4.3; EA at 34.
[326] EA at 34.
[327] Application at 37; Generic Route Permit Template at Condition 5.4.3; EA at 34.
[328] EA at 34.
[329] EA at 54.

route permits require permittees to take actions which are feasible to restore or provide reception equivalent to reception levels before construction of the HVTL.[330]

D. Effects on Land-Based Economies and Direct and Indirect Economic Impacts.

207. Minnesota's HVTL routing factors require consideration of the Project's impacts to land-based economies, specifically agriculture, forestry, tourism, and mining.[331]

1. Agriculture.

208. Land use within the Project area is primarily agricultural. Cultivated cropland constitutes the majority of land within each of the route widths of the different routing options.[332]

209. The permanent impacts to agricultural lands will be limited to the structure foundations and is estimated to be approximately 0.25 acres.[333]

210. The record demonstrates that the Project will not significantly impact agricultural operations. Agricultural land within a transmission line ROW is generally available for agricultural production and use for pasture land.[334] Further, participants are compensated for the placement of the Project on an ongoing basis, and Freeborn Wind will compensate landowners for any damage to crops, soil compaction, fences, and drain tiles due to construction of the Project pursuant to the terms of the easement agreements.[335] Freeborn Wind has stated that it will place structures along field edges so as to minimize impacts to farming operations.[336] Additionally, to minimize loss of farmland and to ensure reasonable access to the land near the poles, Freeborn Wind stated that it intends to place the poles outside of the public roadway ROWs and as close as practicable to them.[337] Freeborn Wind also stated that, if possible, it will attempt to construct the transmission line before crops are planted or following harvest.[338] Additionally, the Commission requires permittees to compensate landowners for crop losses and damaged drain tile.[339]

211. Impacts to aerial spraying are anticipated to be minimal; the majority of all routing options follow existing ROW or field lines.[340] The Teal and Orange routes follow the existing ITC Line at a distance for a portion of their length. This would result in an approximately 257-foot gap between the HVTL and the existing ITC Line, which may impact aerial spraying in this small section of the transmission line.[341]

---

[330] EA at 34 and Generic Route Permit Template at § 5.4.3.
[331] Minn. Stat. § 216E.03, Subd. 7(b)(5); Minn. R. 7850.4100(C).
[332] EA at 56.
[333] Application at 44.
[334] EA at 36.
[335] EA at 58; Litchfield Direct at 7.
[336] Application at 44.
[337] Application at 44.
[338] Application at 44.
[339] Generic Route Permit Template at § 5.3.19.
[340] EA at 57.
[341] EA at 57-58

212. Construction-related impacts along the Purple and Gold overbuild options would be similar given the use of a shoo-fly line, and the height and size of the shoo-fly structures could impact aerial spraying.[342]

213. Overall impacts to agriculture are anticipated to be minimal along all routing options. While the Purple and Gold overbuild options would reduce long-term impacts to farmland and aerial spraying due to co-location within existing transmission line ROW, the incremental minimal benefit to agriculture is outweighed by the burden placed on non-participants' land.[343] Freeborn Wind has acquired the necessary land rights along the Orange and Purple Parallel routes to construct the Project on participants' land.[344] Further, participating landowners will be well-compensated for the placement of the line on an ongoing basis, and the easement agreements also provide for compensation for crop losses during construction.[345]

214. The presence of the Project will not significantly impact the agricultural land use or general character of the area. As demonstrated by other transmission and wind energy projects in the Midwest, agricultural practices continue during construction and operations.

2. Forestry.

215. There are no active forestry operations, including commercial timber harvest or woodlots, within the route width of any routing option.[346] There are no commercially harvested forested areas or woodlots within 20 miles of the Project.[347] Therefore, impacts to known forestry operations and resources will not occur.

3. Mining.

216. Mining operations do not occur within the route width of any routing option.[348] Therefore, no impacts to mining will occur.

4. Tourism.

217. The main land use within the Project area is agriculture (field crops and pastures) and tourist attractions are not associated with the predominant agricultural use of the land.[349] Tourist activities within Project area are primarily associated with the Shell Rock River State Water Trail and local snowmobile trails.[350]

[342] EA at 58.
[343] *See* EA at 57-58; Litchfield Direct at 5; EA at 36.
[344] Pub. Hrg. Tr. at 13 (Litchfield) and Litchfield Direct at 5.
[345] EA at 58-59; Litchfield Direct at 7.
[346] EA at 27.
[347] Application at 44.
[348] EA at 27.
[349] Application at 44.
[350] EA at 59.

218. Any potential effect on tourism due to construction of the Project is anticipated to be minor and temporary in nature. The Project will not preclude future tourist activities.[351]

219. Power lines can impact tourism if they affect visitor experiences at tourism sites, through aesthetic or noise impacts, or degrade the natural or manmade resources that provide tourist-type activities.[352]

220. As discussed above in the sections on recreation and aesthetics, the Orange Route best minimizes impacts to aesthetics and recreation, particularly along the Shell Rock River, while the Gold Route involves more significant impacts which cannot be minimized as well as along the Orange/Teal Route.[353] Further, as discussed in the noise section above, the Project will comply with the Minnesota Noise Standards.[354]

E. Effects on Archeological and Historic Resources.

221. Minnesota Rule 7850.4100(D) requires consideration of the effects on historic and archaeological resources.

222. To identify potential impacts to archaeological or historic resources, Freeborn Wind conducted a cultural resource literature review of the Teal Route's route width and a surrounding 1-mile buffer. Cultural resource data from the Minnesota State Historic Preservation Office ("SHPO") site files regarding documented archaeological sites, standing historic structures, and previously executed cultural resource surveys was used to identify site types that may be encountered and landforms or areas that have a higher potential for containing significant cultural resources. Collected data includes archaeological site files, architecture inventory files, and previous cultural resources studies and reports.[355]

223. The literature review revealed that no previously documented archaeological sites or inventoried architectural resources are located within the route width of the Teal Route, which encompasses the Orange Route as well. The literature review identified two previously reported architectural resources within the 1-mile study area. The first property is the Glenville Creamery. The second property is the Glenville Methodist Episcopal Church. Both of these structures are located within the City of Glenville, which is approximately 0.9 mile northwest of the northern terminus of the Project.[356]

224. Freeborn Wind contacted the SHPO and the Office of the State Archaeologist ("OSA") in March 2017 to initiate Project coordination. Freeborn Wind sent the SHPO and OSA a Project notice letter and request for comment on April 27, 2017.[357]

---

[351] EA at 59.
[352] EA at 59.
[353] *See supra* pages 28-32.
[354] EA at 38; Freeborn Wind Reply Comments, Attachment D (May 2, 2018 Hankard Environmental Letter).
[355] Application at 45.
[356] EA at 60; Application at 45.
[357] Application at 45.

225. SHPO reviewed the Project and concluded that there are no properties listed in the National or State Registers of Historic Places and no known or suspected archaeological properties in the area that will be affected by the Project.[358]

226. Prior to construction, Freeborn Wind will conduct a Phase I archaeological resources inventory in cooperation with the SHPO to determine if archaeological sites exist and, if so, their boundaries.[359]

227. The record demonstrates that no impacts to archeological and historic resources are anticipated for any routing option.[360]

F. Effects on Natural Environment.

228. Minnesota's HVTL routing factors require consideration of the effect on the natural environment, including effects on air and water quality resources and flora and fauna.[361]

1. Air Quality.

229. No significant impacts to air quality are anticipated from the Project. The overall impact intensity level during construction and operation is anticipated to be minimal for all routing options.[362]

230. Minnesota has an ozone standard of 70 parts per billion ("ppb") measured over a daily eight-hour average of the three-year average of the annual fourth-highest daily maximum. The national ozone standard is 0.070 ppm over a 3-year average of the annual fourth-highest daily maximum eight-hour average concentration. Ozone and nitrous oxide emissions from the Project are anticipated to be well below these limits.[363]

231. Impacts due to construction dust and equipment exhaust are anticipated to be temporary and can be minimized.[364] Freeborn Wind will use Best Management Practices ("BMPs") to minimize fugitive dust emissions during construction, including controlling soil tracking into roadways and wetting road surfaces. Additionally, Freeborn Wind will not run vehicles and equipment unnecessarily, reducing carbon emissions. Additional mitigation might include planting a seasonal cover crop in agricultural row crop fields to stabilize soils, thereby reducing potential wind erosion.[365]

[358] EA at 60; Application at Appendix D.
[359] Application at 45; EA at 60.
[360] EA at 60-61.
[361] Minn. Stat. §§ 216E.03, Subd. 7(b)(1)-(2); Minn. R. 7850.4100(E).
[362] EA at 61.
[363] EA at 62.
[364] EA at 61.
[365] EA at 62.

2. Water Quality and Resources.

232. The Project is within the Shell Rock River watershed, which is part of the Cedar River Basin.[366]

233. The Shell Rock River, from Albert Lea Lake to Goose Creek, is listed on the MPCA Impaired Waters List.[367]

234. Impacts to surface waters are similar for all routing options, except that the Purple Route does not cross surface waters and the Gold Route crosses more public waters than any other route: the Shell Rock River and an unnamed stream.[368] More acres of open water are located within the Gold Route's route width than any other route option.[369] In contrast, the Teal and Orange routes cross only one public water: the Shell Rock River.[370] Additionally, as discussed above in the sections on aesthetics and recreations, the Orange Route best minimizes impacts at the Shell Rock River crossing, while the Gold Route would involve additional impacts that cannot be minimized as well as the Orange Route.[371]

235. The Project will not affect the area's water quality.[372] The record demonstrates that Freeborn Wind has minimized impacts to water resources. The Project design will incorporate spacing of structures to span the Shell Rock River. Temporary construction impacts would occur from installing a temporary access road to the structure locations and workspace around the foundation location for installation of the structures placed on either side of the Shell Rock River.[373] Temporary impacts will be minimized by using construction matting to access the structure locations.[374]

236. Standard mitigation measures regarding water resources are included as Commission permit conditions.[375] Freeborn Wind would be required to obtain all necessary "downstream" permits for construction of the Project. This will include a License to Cross Public Lands and Waters from MDNR, which will require the company to demonstrate that the water crossings are consistent with best practices.[376] Further, as noted in the EA, Freeborn Wind has committed to obtain a National Pollution Discharge Elimination System stormwater permit, which is necessary for the Project.[377]

---

[366] EA at 73.
[367] EA at 74.
[368] EA at 73, 74.
[369] EA at 75.
[370] EA at 73.
[371] *See* EA at 42.
[372] *See* Comment by MPCA (Oct. 4, 2017) (eDocket No. 201710-136085-01) and Freeborn Wind Reply Comments on Completeness at 2 and Attachment A (Oct. 31, 2017) (eDocket No. 201710-137023-02); *see also* Application at 49 and EA at 74-75.
[373] Application at 48.
[374] Application at 48.
[375] *See* EA at 74; Generic Route Permit Template at § 5.3.8.
[376] EA at 74.
[377] EA at 74.

237. The Project will not affect the area's water quality. The Project will comply with its Stormwater Pollution Prevention Plan.[378] During construction, Freeborn Wind will follow standard erosion control measures identified in the applicable Stormwater BMP Manual, such as using silt fences to minimize the potential for erosion and sedimentation into water bodies within the Project area. Freeborn Wind will maintain sound water and soil conservation practices during construction and operation of the transmission line to protect topsoil and adjacent water resources and minimize soil erosion. Practices include using traditional and low-impact development stormwater management approaches, such as managing stormwater on-site, controlling rate and volume of stormwater reaching receiving waters to predevelopment levels, installing vegetated buffers, containing excavated material, protecting exposed soil, stabilizing restored soil, and revegetation. Specific BMPs and practices will be developed once a route has been approved, and as engineering and design of the Project are being finalized and incorporated into the Project-specific Stormwater Pollution Prevention Plan.[379] No impacts are anticipated once the Project is constructed.[380]

238. Impacts to groundwater are anticipated to be minimal for all routing options.[381] If Freeborn Wind uses wood structures, the structures will be treated using industry-standard substances that comply with applicable regulations. For example, pentachlorophenol ("penta") may be used as a preservative for wood protection. Penta is used on wood structures to repel water, improve dimensional stability, and reduce checking and splitting, and is consistent with American Wood Protection Association Standard U1-17.[382] As the EA notes, the U.S. Environmental Protection Agency has concluded that in "considering the total amount of penta available for leaching from utility poles per area while in use, the relatively moderate mobility through the soil profile … and the moderate degradation under aerobic and [anaerobic] conditions…, contamination of water by penta and its metabolites should not be a concern."[383] Penta is not mobile and has a low persistency in the environment. Because of its affinity for soil particles, penta will not move downward into the groundwater. Therefore, effects of penta on ground and drinking water will be minimal.[384]

239. Public comments raised concerns about impacts to groundwater from "leaching" of concrete foundations. However, leaching of concrete would only be a concern (if at all) prior to setting and hardening of the concrete; cured (hardened) concrete does not leach chemicals.[385] Dewatering is not anticipated to be necessary, and would only be necessary where a bentonite slurry cannot be utilized to create a seal against groundwater.[386] If dewatering is required, Freeborn Wind will work with the MPCA to ensure to the extent practicable that Minnesota Administrative Rule 7050.0210 and other applicable rules are followed to minimize the potential

[378] *See* Comment by MPCA (Oct. 4, 2017) (eDocket No. 201710-136085-01) and Freeborn Wind Reply Comments on Completeness at 2 and Attachment A (Oct. 31, 2017) (eDocket No. 201710-137023-02); *see also* Application at 49 and EA at 74-75.
[379] EA at 75; *see also* Application at 49.
[380] EA at 74.
[381] EA at 63.
[382] EA at 64-65.
[383] EA at 65.
[384] EA at 66.
[385] EA at 67.
[386] EA at Appendix C, Information Inquiry #3.

for runoff to surface and groundwater.[387] If dewatering is necessary, Freeborn Wind will implement dewatering strategies to prevent potential contamination from the portion of uncured concrete that comes into contact with the soil.[388] The concrete mix used for the Project follows the building code requirements for concrete exposure and thus is very similar to any exterior concrete in constant contact with the ground, such as foundations for houses, barns, offices, and sidewalks. Additionally, the chemical properties of the groundwater are investigated during the subsurface investigation, and if the groundwater is determined to be acidic or potentially corrosive to concrete (which could potentially cause leaching) the concrete would be designed with a chemically resistant mix to increase the concrete durability and resistance to chemical attack.[389]

240. Portions of the Teal, Orange, and Gold routing options are within areas mapped as "Zone AE" by the Federal Emergency Management Agency ("FEMA"). Structures, should they be placed in the floodplain, are not anticipated to affect flooding. Impacts to the 100-year floodplain are not anticipated.[390] Therefore, the record demonstrates that impacts to floodplains as a result of the Project are not anticipated.

241. Wetlands are present throughout the Project area.[391] Freeborn Wind anticipates that a limited number of structures will be placed within a delineated wetland.[392]

242. Impacts to wetlands are anticipated to be minimal for all routing options and can be minimized, but the record evidence demonstrates that the Orange Route and Purple Parallel Route have the least impacts to wetlands.[393] Impacts to wetlands along the Purple Route will not occur,[394] and the Teal and Orange routes will have minimal impacts.[395] In contrast, the Gold Route will impact more acres of National Wetland Inventory ("NWI") wetlands than any other route option.[396] For example, the Gold Route is the only route option with wooded wetlands located within its route width, and the Gold Route impacts more herbaceous wetlands than any other route option.[397]

3. *Geology and Topography.*

243. The overall impact on geology and topography is anticipated to be negligible for all routing options. Potential impacts are not anticipated. Should impacts occur they can be mitigated.[398]

[387] EA at 68 and Appendix C, Information Inquiry #3.
[388] *See* Freeborn Wind Reply Comments at 20.
[389] *See* Freeborn Wind Reply Comments at 20.
[390] EA at 27.
[391] EA at 79.
[392] EA at 80.
[393] *See* EA at 79-80.
[394] EA at 81.
[395] *See* EA at 79-80.
[396] *See* EA at 79-80.
[397] EA at 75.
[398] EA at 62-63.

244. The record demonstrates that karst features are not anticipated in the Project area. No karst features or areas have been identified within the route width of any routing option.[399] MDNR maintains several GIS layers about karst topography. The first is an inventory of features such as sinkholes, springs, and stream sinks extracted from the karst feature database of Southeastern Minnesota. MDNR also maintains a GIS layer that outlines areas where karst features can form on the land surface and where karst conditions are present in the subsurface. DOC-EERA staff reviewed these layers, no karst features or areas were identified within the route width of any routing option.[400]

245. According to MDNR information, there is one site that the MDNR indicates as an area prone to surface karst features located approximately two miles southwest of the Project. Given this distance and the lack of other documented karst features in the Project area, karst features are not anticipated in the Project area.[401]

246. In recognition that the Minnesota Regions Prone to Surface Karst data set indicates that the Project area is located near a region prone to karst, Freeborn Wind undertook a geotechnical evaluation to evaluate the likelihood of karst in the proposed turbine locations in the Freeborn Wind Farm docket.[402] The geotechnical evaluation explored for voids and examined soil borings. This investigation confirmed there is no karst bedrock within 50 feet of the soil surface and that the proposed turbine locations would not impact any karst areas.[403] While this evaluation focused on the proposed turbine locations, based on the data presented by the geotechnical evaluation and MDNR information, it can be confidently concluded that the Transmission Line is not likely to impact karst.[404] Additionally, Freeborn Wind has committed to geotechnical testing HVTL structure locations prior to construction. Structure design and location will be determined based upon the results of this testing, and will be sited to avoid karst features.[405]

247. Structures will be installed at existing grade; therefore, impacts to topography are not expected. Freeborn Wind does not anticipate any grading will be necessary. Should grading occur it would be restricted to only that necessary to establish a flat, safe workspace—major topographical changes to the landscape would not occur.[406]

4. Vegetation.

248. The majority of the Project area is made up of cultivated cropland or developed areas.[407] The Project area does not contain significant areas of forest.[408]

---

[399] EA at 63.
[400] EA at 63.
[401] Application at 30; *see also* EA at 63.
[402] *See* EA at 63; Freeborn Wind Reply Comments, Attachment E (Geotechnical Report).
[403] Freeborn Wind Reply Comments, Attachment E (Geotechnical Report).
[404] *See* EA at 63; Freeborn Wind Reply Comments, Attachment E (Geotechnical Report).
[405] EA at 63; Freeborn Wind Reply Comments at 19-20.
[406] EA at 63.
[407] *See* Application at 49 and EA at 86.
[408] *See* EA at 68, 75.

249. The record demonstrates that the Gold Route will impact more forested land that other routes. The Gold Route has more forested land located within its route width than any other route option.[409] Tree clearing would occur along the Gold Parallel option. Some removal might occur along the Gold Overbuild option.[410]

250. Tree clearing along the Orange and Teal routes is anticipated to be minimal.[411] Construction impacts to trees and woodlands will be minimized because the Project area is primarily agricultural. The Teal and Orange routes avoid and minimize these impacts. For example, they follow existing ROWs and construction will occur along existing roadways for some portions of the route. Areas where transmission line construction is planned are primarily agricultural and will require minimal tree removal.[412]

251. There are no mapped native prairies within any routing option. However, because not all native prairies have been identified and mapped, Freeborn Wind conducted in-field native prairie evaluations in September 2015 and November 2016 and found that there are 19.3 acres of potential prairie near the Glenworth Substation and north of the Shell Rock River.[413]

252. The Project will not cross mapped native prairie. And while the Teal, Orange, and Gold routing options will cross potential prairie, this resource will be spanned, minimizing impacts.[414]

253. The overbuild options would result in increased direct impacts to vegetation. The Purple and Gold overbuild options will require construction of a temporary shoo-fly line while the existing transmission line is removed.[415] Additionally, while the Purple and Gold overbuild options will not result in additional structures on the landscape, use of a shoo-fly line increases direct and indirect impacts to soils because the shoo-fly line itself must be installed and removed and the existing transmission line must be removed.[416]

254. Maintenance and emergency repair is expected to be infrequent throughout the life of the Project, and potential impacts to vegetation would be short term and more localized than construction-related impacts.[417]

255. Potential impacts to soils are expected to be minimal for all routing options and can be minimized.[418] Soils will be minimally disturbed in the location where each pole will be installed in the ground, grading is required for construction purposes, or temporary access roads are required. Soil removed for pole installation in wetland areas will be managed in accordance with applicable BMPs and permit requirements.[419] Freeborn Wind will minimize soil erosion

[409] *See* EA at 75.
[410] EA at 77.
[411] *See* Application at 50.
[412] Application at 50.
[413] EA at 76.
[414] EA at 77.
[415] EA at 77.
[416] EA at 72.
[417] EA at 77.
[418] EA at 71.
[419] Application at 32.

and assist in reestablishing vegetation through the use of commonly used methods, including soil de-compaction; erosion control blankets with embedded seeds; silt fences; hay bales; hydro seeding; planting individual seeds or seedlings of non-invasive, native species; and monitoring to insure invasive species do not take hold and the vegetation establishes.[420]

256. Freeborn Wind has committed to minimizing the introduction and spread of invasive species. As stated in the EA, Freeborn Wind has committed to reseeding areas disturbed by construction activities with vegetation similar to that which was removed with a seed mixture certified as free of noxious or invasive weeds.[421] Mitigation measures to reduce the spread of invasive and non-native plant species during construction include: regular cleaning of construction equipment and vehicles; minimizing ground disturbance to the greatest degree practicable and rapid revegetation of disturbed areas with native or appropriately certified weed-free seed mixes; conducting field surveys of the ROW prior to construction to identify areas containing noxious weed (weed surveys during construction would identify infestations of the ROW and staging sites); eradicating new infestations as soon as practicable in conjunction with property owners' input.[422]

5. Wildlife.

257. Wildlife species utilizing the local vicinity of the Project are adapted to agriculture and developed landscapes. Terrestrial wildlife species in the Project area are common species associated with disturbed habitats, and are accustomed to human activities occurring in the area, for example, agricultural activities and road traffic. Common mammals that are likely to occur include opossum, eastern cottontail, white-tailed deer, raccoon, and prairie mole; common reptiles and amphibians include gopher snake, American toad, northern leopard frog, and snapping turtle.[423]

258. Freeborn Wind has conducted multiple wildlife studies for the Freeborn Wind Farm documenting avian and bat use of the Freeborn Wind Farm project area, including much of the route options. These include: raptor nest study, eagle nest monitoring, follow-up eagle nest study, large bird use study, small-bird use study, wetland bird use study, and bat acoustic study. Based on these studies, the most commonly observed passerine species include the European starling, common grackle, red-winged blackbird, house sparrow, American robin, horned lark, and song sparrow. Common large birds in the Project area include the American crow, Canada goose, greater white-fronted goose, mallard, and blue-winged teal.[424]

259. The Project is not anticipated to have a significant impact on bats. Impacts to the northern long-eared bat are anticipated to be negligible. Further, the record demonstrates that Freeborn Wind has taken adequate measures, as outlined in the Application, EA, and Draft ABPP, to minimize the risk of fatalities to birds and bats.[425]

[420] Application at 23; *see also* EA at 78.
[421] EA at 78.
[422] EA at 78.
[423] EA at 82.
[424] EA at 82; Application at 51.
[425] *See* EA at 70, 95; Application at 51-52 and Appendix F (Draft ABPP).

260. There are no raptor nests or bald eagle nests within the studied transmission line routes. The closest bald eagle nest is located approximately 0.3 miles west of the Orange Route centerline along the Shell Rock River and is also located approximately 130 feet from an existing 161 kV transmission line.[426]

261. Some public commenters asserted the existence of additional eagle nests not identified in the Application.[427] However, Freeborn Wind conducted additional surveys but did not find any omitted eagle nests in or near the Project area.[428] Freeborn Wind already investigated and addressed all of these locations in the Freeborn Wind Farm Site Permit docket.[429] For example, the record demonstrates that the nest claimed in public comment to be an eagle nest located between a proposed Freeborn Wind Farm turbine and the Project (to the west of 840th Avenue and north of 110th Street in Glenville, Minnesota) is a small, inactive raptor nest, not an eagle nest.[430]

262. The Project was designed to minimize impacts to avian species. Specifically, the Transmission Line will be constructed in accordance with APLIC standards designed to minimize the impacts to eagle and other avian species.[431]

263. APLIC is a committee of wildlife preservationists and utilities who developed guidance documents identifying causes and minimization methods for avian electrocutions and collisions, and, in conjunction with the USFWS, released Avian Protection Plan ("APP") Guidelines. The APLIC Standards provide guidance for developing APPs, as well as designs and other measures aimed at preventing avian electrocutions. The APLIC Standards also include BMPs for conductor spacing and shielding to mitigate impacts to avian species caused by electrocution. A transmission line designed to APLIC standards will have substantially less risk to avian species than one not designed to APLIC standards.[432]

264. The Project will adhere to APLIC design standards that will minimize impacts to avian species.[433] Experts at WEST conducted an assessment of the Project's 161-kV transmission line structure design relative to potential avian electrocution risk. The goal of this assessment was to compare proposed transmission line design and operation to potential electrocution risks to resident and migratory bald eagles, based on the Avian Power Line Interaction Committee's (APLIC) *Suggested Practices for Avian Protection on Power Lines: The*

[426] Application at 51.
[427] *See* Comments by Dorenne Hansen (June 1, 2018) (eDocket Nos. 20186-143501-01; 20186-143501-02; 20186-143501-03).
[428] Freeborn Wind Reply Comments, Attachment C at 10 and Schedule 6 (Giampoli Direct and Schedules 6, 7, and 8).
[429] *See, e.g.*, Freeborn Wind Reply Comments, Attachment C at 11-12 and Schedule 6-8 (Giampoli Direct and Schedules 6, 7, and 8).
[430] Freeborn Wind Reply Comments, Attachment C at 12 (Giampoli Direct and Schedules 6, 7, and 8).
[431] *See* EA at 85; Litchfield Direct at 8-9; and Application at 51; Freeborn Wind Reply Comments, Attachment B (WEST Electrocution Risk Review).
[432] *See* Litchfield Direct at 9; Freeborn Wind Reply Comments, Attachment B (WEST Electrocution Risk Review).
[433] *See* Litchfield Direct at 9; Freeborn Wind Reply Comments, Attachment B (WEST Electrocution Risk Review).

State of the Art in 2006 (APLIC 2006) and WEST's expertise in this area.[434] WEST concluded that:

> In summary, no bald eagle electrocution risk would apply to the 161-kV transmission structures proposed to support the Freeborn Wind Energy Facility, based on the structures' design and size. This determination is based on both the guidelines outlined in APLIC's *Suggested Practices* (2006) and WEST's expertise and experience in assessing risk to birds from power line design and operation. At-risk structures for eagle perching typically involve distribution or sub-transmission lines with voltages ≤69 kV. The line voltage of the 2014 electrocution of one of the Decorah, Iowa bald eagle fledglings was identified as 69 kV.[435]

265. Given the Project design's compliance with APLIC standards, the risk of collision and electrocution of avian species is extremely low. The EA did note that, comparatively, the Purple and Gold overbuild options would have a greater potential for bird collisions due to the height of the poles and number of conductors.[436]

266. Additionally, as requested by the MDNR, Freeborn Wind will install bird diverters on the span of its transmission line that will cross the Shell Rock River, which will minimize risk to swans and other waterfowl.[437]

267. The majority of the Project area is classified as developed or cultivated cropland; therefore, any impacts to wildlife habitat will be limited to areas near the Shell Rock River. While forested wetlands by the Shell Rock River will be converted to low stature wetlands, quality habitat conversion will be minimal given the proximity to US 65. The HVTL would be located adjacent to existing ROW near the Shell Rock River meaning these effects would largely be limited to one side of the ROW and would not create newly fragmented areas.[438]

268. In its comment, MDNR recommended that the "wire/border zone method" be applied at the crossing of Shell Rock River and its associated floodplain/wetlands.[439] The wire/border zone method allows for different types and heights of vegetation based on whether the vegetation is directly underneath the conductor (wire zone) or elsewhere in the ROW (border zone).[440] Freeborn Wind will comply with this recommendation.[441]

269. Potential impacts to wildlife habitat are anticipated to be similar for all routing options. Impacts will be short- and long-term, of a relatively small size, and localized. The overall impact intensity level is expected to be minimal.[442]

---

[434] Freeborn Wind Reply Comments, Attachment B (WEST Electrocution Risk Review).
[435] Freeborn Wind Reply Comments, Attachment B at 4 (WEST Electrocution Risk Review); *see also id.* at 2.
[436] EA at 82, 84.
[437] *See* EA at 85; Freeborn Wind Reply Comments at 11.
[438] EA at 86.
[439] Comment by MDNR (June 12, 2018) (eDocket No. 20186-143759-01).
[440] EA at 86.
[441] *See* EA at 85 and Freeborn Wind Reply Comments at 11.
[442] EA at 82.

270. As described above, the Orange and Purple Parallel routes best minimize potential impacts to wildlife.

G. Effects on Rare and Unique Natural Resources.

271. Minnesota's high voltage transmission line routing factors require consideration of the proposed route's effect on rare and unique natural resources.[443]

272. On April 24, 2018, Freeborn Wind filed a copy of an email received from Lisa Joyal, Endangered Species Review Coordinator, MDNR, regarding Freeborn Wind's Natural Heritage Information System Data Request Form for the Project. The email serves as a concurrence for the rare features assessment in the Commission Route Permit Application and can be used in lieu of a formal Natural Heritage Letter. [444]

273. The Application indicated, and MDNR concurred, that the following rare features are present within the Project area: one record of a state-threatened vascular plant and one record of a vertebrate animal species of special concern. The Application also discussed the northern long-eared bat. DOC-EERA review of the NHIS database found two additional species present within the Project area: one record of a vascular plant of special concern and one record of a vascular plant on the watch list.[445] While the Minnesota Statewide Mussel Survey returned records within the Project area, none indicated the presence of state or federally listed species.[446] Results of a USFWS Information for Planning and Consultation ("IPaC") review indicate the northern long-eared bat might be potentially affected by activities in the Project area. There are no federal critical habitats in the Project area.[447]

274. There are no WMAs, AMAs, Sites of Biodiversity Significance, or SNAs; or USFWS Waterfowl Production Areas within the route width of any routing option. One WMA exists to the west of the Project just across US 65 along with a Minnesota Biological Survey ("MBS") Site of Biodiversity Significance.[448]

275. The record demonstrates that impacts on rare and unique natural resources are anticipated to be negligible for all routing options.[449]

H. Application of Various Design Considerations.

276. Minnesota's HVTL factors require consideration of the Project's applied design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity.[450]

---

[443] Minn. Stat. § 216E.03, Subd. 7(b); Minn. R. 7850.4100(F).
[444] Freeborn Wind Comments – MDNR National Heritage Concurrence (April 24, 2018) (eDocket No. 20184-142258-02).
[445] EA at 69.
[446] EA at 69.
[447] EA at 69.
[448] EA at 83.
[449] *See* EA at 70.
[450] *See* Minn. Stat. § 216E.03, Subd. 7; Minn. R. 7850.4100.

277. The Orange Route and Purple Parallel Route best satisfy this factor. These routes best minimize impacts to the environment and human settlement, such as by avoiding non-participants' land and complying with APLIC standards to all but eliminate risks of avian collision or electrocution with the transmission lines.[451] In contrast, the Gold Route involves greater impacts to wetlands, wildlife, and human settlement.[452] Further, the overbuild options involve the greatest potential impact to avian species from collisions and electrocution.[453]

I. Use or Paralleling of Existing ROW, Survey Lines, Natural Division Lines, and Agricultural Field Boundaries.

278. Minnesota's high voltage transmission line routing factors require consideration of the use or paralleling of existing ROW, survey lines, natural division lines, and agricultural field boundaries.[454]

279. The Orange Route and Purple Parallel Route best satisfy this factor. The majority of the Orange and Purple Parallel routes follow existing roadways, transmission lines, or field lines.[455] The Purple Parallel Route is co-located with existing transmission lines for its entire length.[456] While the Orange Route does not share ROW with an existing transmission line, approximately 1.5 miles of the Orange Route (21%) will be parallel to existing roadways and approximately 49 percent of the route will parallel agricultural field boundaries.[457] Freeborn Wind has acquired sufficient property rights to construct the Project entirely on participants' land along the Orange and Purple Parallel routes.[458]

280. While the Gold Route and Purple Route co-locate the Project with existing transmission lines, the Purple Parallel option best utilizes existing transmission ROW and co-location opportunities along existing transmission lines while best minimizing impacts to human settlement and the natural environment.[459] In contrast, the Gold Route and Purple Overbuild option involve greater impacts to human settlement and the environment.[460]

281. While the Orange Route does not share ROW with an existing transmission line route, it parallels agricultural field boundaries for approximately 49 percent of the route and maximizes use of agricultural field boundaries, minimizes impacts to the environment, and best minimizes impacts to human settlement by avoiding non-participants' land.[461]

282. The evidence on the record demonstrates that the Purple Parallel Route and Orange Route are most consistent with this factor.

---

[451] *See*, *e.g.,* Litchfield Direct at 5, 8-9 and Pub. Hrg. Tr. at 13 (Litchfield); EA at 84-85.
[452] *See*, *e.g.,* EA at 29, 42, 80-81.
[453] *See*, *e.g.,* EA at 84.
[454] Minn. Stat. § 216E.03, Subd. 7(b)(9); Minn. R. 7850.4100(H).
[455] *See*, *e.g.,* EA at 40.
[456] EA at 40.
[457] Application at 17, 56.
[458] Litchfield Direct at 5; Pub. Hrg. Tr. at 13 (Litchfield).
[459] *See*, *e.g.,* EA at 40, 100-101.
[460] *See*, *e.g.,* EA at 29, 42, 84.
[461] *See* Application at 56; EA at 40, 100-101.

J. Use or Paralleling of Existing Transportation, Pipeline, and Electrical Transmission System ROW.

283. Minnesota's high voltage transmission line routing factors require consideration of the proposed route's use of existing transportation, pipeline and electrical transmission system ROW.[462]

284. None of the routes share pipeline ROW.

285. While the Gold Route and Purple Route co-locate the Project with existing transmission lines, the Purple Parallel option best minimizes impacts to human settlement and the natural environment.[463] Additionally, while the Orange Route does not share ROW with an existing transmission line route, the majority of the Orange Route follows existing roadways, transmission lines, or field lines.[464]

286. The evidence on the record demonstrates that the Purple Parallel Route and Orange Route make the greatest use of existing high voltage transmission line ROW while minimizing impacts.

K. Electrical System Reliability.

287. Minnesota's high voltage transmission line routing factors require consideration of the Project's impact on electrical system reliability.[465]

288. The Project will be constructed to meet reliability requirements.[466]

L. Costs of Constructing, Operating, and Maintaining the Facility.

289. Minnesota's high voltage transmission line routing factors require consideration of the proposed route's cost of construction, operation, and maintenance.[467]

290. The evidence on the record demonstrates that it will be most cost-effective to construct the Project along the Orange Route or the Purple Parallel Route.[468]

291. The estimated cost of the Project along the Orange Route is approximately $3.8 million and $3.85 million along the Purple Parallel Route. As shown on Table 2, the Purple Overbuild Route and Gold Route are anticipated to have higher costs than the Orange Route and Purple Parallel Route. Notably, the Gold Route using the co-location design is more than twice

[462] Minn. Stat. § 216E.03, Subd. 7(b)(8); Minn. R. 7850.4100(J).
[463] *See*, *e.g.,* EA at 40, 100-101.
[464] *See*, *e.g.,* EA at 40. Approximately 1.5 miles of the Orange Route (21 percent) will be parallel to existing roadways and approximately 49 percent of the route will parallel agricultural field boundaries. Application at 17, 56.
[465] Minn. Stat. § 216E.03, Subd. 7(b)(10); Minn. R. 7850.4100(K).
[466] *See*, *e.g.,* EA at 104.
[467] Minn. R. 7850.4100(L).
[468] EA at 22.

as costly as the Orange Route ($8,050,000 vs. $3,800,000). Total costs are summarized below in Table 2:[469]

Table 2 – Total Estimated Costs

Route	Estimated Cost
Teal Route	**$3,800,000**
Orange Route	**$3,800,000**
Purple Overbuild Option	**$4,350,000**
Purple Parallel Option	**$3,850,000**
Gold Overbuild Option	**$8,050,000**
Gold Parallel Option	**$4,150,000**

292. Operating and maintenance costs after construction of the transmission line will be nominal for several years because the line will be new and minimal initial vegetation management is required. The anticipated annual operating and maintenance costs for the 161 kV transmission line is approximately $1,500 per mile. The principal operating and maintenance costs include inspections which are typically ground-based and occasionally done by aerial inspections, generally on a yearly basis.[470]

M. Adverse Human and Natural Environmental Effects Which Cannot be Avoided.

293. Minnesota's high voltage transmission line routing factors require consideration of the adverse human and natural environmental effects, which cannot be avoided, for each proposed route.[471]

294. The evidence on the record demonstrates that the Orange Route and the Purple Parallel Route will have fewer unavoidable adverse human and natural environment impacts than the other route options.

N. Irreversible and Irretrievable Commitments of Resources.

295. Minnesota's high voltage transmission line routing factors require consideration of the irreversible and irretrievable commitments of resources that are necessary for each proposed route.[472]

296. Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible commitments of resources are those that result from the use or destruction of a specific resource that cannot be replaced within a reasonable timeframe. Irretrievable resource commitments are those that result from the loss in value of a resource that cannot be restored after the action.[473]

---

[469] EA at 22.
[470] Application at 9.
[471] Minn. Stat. § 216E.03, Subd. 7(b)(5)-(6); Minn. R. 7850.4100(M).
[472] Minn. Stat. § 216E.03, Subd. 7(b)(11); Minn. R. 7850.4100(N).
[473] Application at 53.

297. The Project will require only minimal commitments of resources that are irreversible and irretrievable. Only construction resources, such as concrete, steel, and hydrocarbon fuels, will be irreversibly and irretrievably committed to this Project. During construction, vehicles necessary for these activities would be deployed on site and would need to travel to and from the construction area, consuming hydrocarbon fuels. Other resources would be used in pole construction, pole placement, and other construction activities.[474]

O. Summary of Factors Analysis.

298. The Orange and Purple Parallel routes have lesser impacts than the Gold Route on land use and zoning, noise, recreation, and wildlife. The Orange Route and Purple Parallel Route also compare more favorably in terms of cost. The Orange Route and Purple Parallel Route meet Minnesota's route selection criteria as well as or better than the Gold, Teal, and Purple Overbuild Route alternatives in terms of impacts to aesthetics, public services,

299. Additionally, the Purple Parallel Route meets Minnesota's route selection criteria as well as or better than the Teal, Gold, and Purple Overbuild Route alternatives in terms of impacts to agriculture.

300. As set forth above, because the Orange and Purple Parallel routes make use of existing ROW, impact the fewest forested acres, and generally compare favorably in terms of cost to the route alternatives, the record demonstrates that the Orange and Purple Parallel routes best meet Minnesota's route selection criteria. Based on consideration of all routing factors, the Orange Route and Purple Parallel Route are the best routes for the Project.

II. NOTICE

301. Minnesota statutes and rules require Applicants to provide certain notice to the public and local governments before and during the Application for a Route Permit process.[475]

302. Freeborn Wind provided notice to the public and local governments in satisfaction of Minnesota statutory and rule requirements.

303. Minnesota statutes and rules also require DOC-EERA and the Commission to provide certain notice to the public throughout the Route Permit process.[476] DOC-EERA and the Commission provided the notice in satisfaction of Minnesota statutes and rules.

III. COMPLETENESS OF EA

304. The EA process is the alternative environmental review approved for high voltage transmission lines.[477] The Commission is required to determine the completeness of the EA.[478] An EA is complete if it and the record address the issues and alternatives identified in the Scoping Decision.

---

[474] Application at 53.
[475] Minn. Stat. § 216E.03, Subds. 3a, 4; Minn. R. 7850.2100, Subps. 2, 4.
[476] Minn. Stat. § 216E.03, Subd. 6; Minn. R. 7850.2300, Subp. 2; Minn. R. 7850.3700, Subps. 2, 3, 6.
[477] Minn. R. 4410.4400, Subp. 6.
[478] Minn. R. 7850.3900, Subp. 2.

305. The evidence on the record demonstrates that the EA is adequate because the EA and the record created at the public hearing and during the subsequent comment period address the issues and alternatives raised in the Scoping Decision.

Based on the foregoing Findings of Fact and the record in this proceeding, the ALJ makes the following:

CONCLUSIONS

1. The Commission has jurisdiction to consider the Application.

2. The EA process is the alternative environmental review approved for high voltage transmission lines.[479] Accordingly, the EA process satisfies the requirements of the Minnesota Environmental Policy Act, which does not require that an EIS be completed for the Project.[480] DOC-EERA has conducted an appropriate environmental analysis of the Project for purposes of this Route Permit proceeding and the EA satisfies Minnesota Rule 7850.3700.

3. Freeborn Wind complied with the procedural and notice requirements of Minnesota Statutes Chapter 216E and Minnesota Rules Chapter 7850.

4. A public hearing was conducted near the proposed route. Proper notice of the public hearing was provided, and the public was given the opportunity to speak at the hearing and to submit written comments. All applicable procedural requirements for the Route Permit were met.

5. The evidence on the record demonstrates that the Orange Route and Purple Parallel Route satisfy the Route Permit factors set forth in Minnesota Statutes Section 216E.04, Subdivision 8 (referencing Minnesota Statutes Section 216E.03, Subdivision 7) and Minnesota Rule 7850.4100.

6. The Project is consistent with and reasonably required for the promotion of public health and welfare in light of the state's concern for the protection of its air, water, land, and other natural resources as expressed in the Minnesota Environmental Rights Act.[481]

7. The evidence on the record demonstrates that the Orange Route and Purple Parallel Route both satisfy the routing criteria and minimize human and environmental impacts.

8. The evidence on the record demonstrates that the general Route Permit conditions are appropriate for the Project.

9. Any of the foregoing Findings more properly designated Conclusions are hereby adopted as such.

Based upon these Conclusions, the ALJ makes the following:

[479] *See* Minn. R. 4410.4400 Subp. 6.
[480] *See* Minn. Stat. § 116D.04 Subd. 4a.
[481] *See* Minn. Stat. § 116B.01.

RECOMMENDATIONS

The Commission should issue the permit to Freeborn Wind Energy LLC for the Project:

A Route Permit with the general route permit conditions for a 161 kV HVTL along the Purple Parallel Route based on Applicant's preference and with Applicant's proposed modification to maintain the entire route on participating landowners' property. That modification would narrow the route by 130th Street to match the Orange Route in this area.

In the alternative, the Commission should grant a Route Permit for the Orange Route.

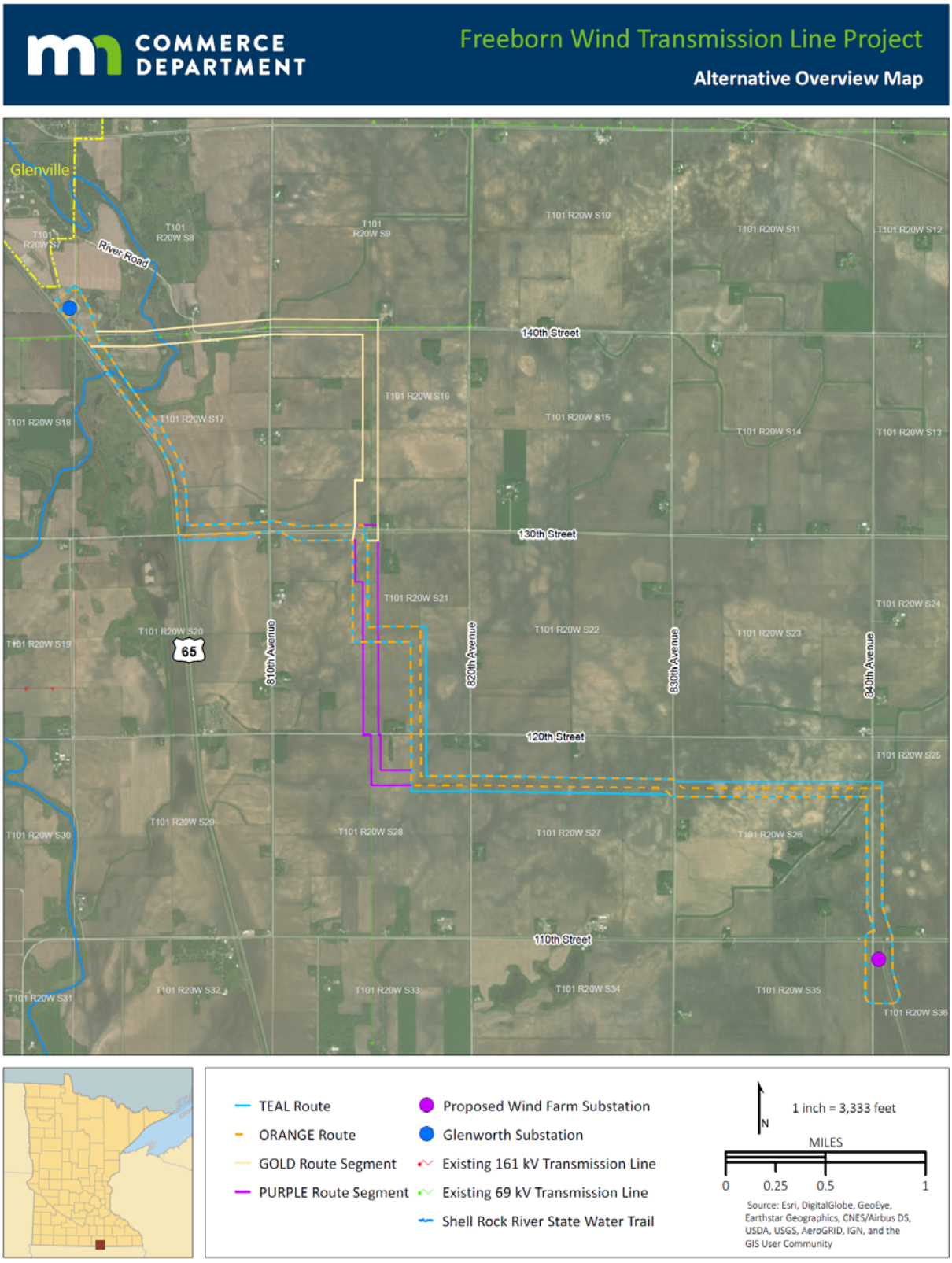
THIS REPORT IS NOT AN ORDER AND NO AUTHORITY IS GRANTED HEREIN. THE MINNESOTA PUBLIC UTILITIES COMMISSION WILL ISSUE THE ORDER THAT MAY ADOPT OR DIFFER FROM THE PRECEDING RECOMMENDATION.

Dated on _____

_____
James R. Mortenson
Administrative Law Judge

64115891.10

Exhibit A – Routes Evaluated in the Environmental Assessment[482]



[482] EA at 16.