AVIAN AND BAT PROTECTION PLAN

AWA Goodhue, LLC

Goodhue County, Minnesota

December 15, 2011

Prepared For:

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c/o American Wind Alliance LLC
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Prepared for:

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Project Number: 20081147.00

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Permit Section 6.7 and Special Condition 13.1

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1.0 OVERVIEW

1.1 Project Description

AWA Goodhue, LLC (AWA Goodhue) received a site permit from the Minnesota Public Utilities Commission (MPUC) on August 23, 2011 to construct a 78 MW large wind energy conversion system in Goodhue County, Minnesota. The Project Area approved under the Site Permit covers approximately 32,684 acres (51 square miles) (**Exhibit 1**), which is mostly agricultural land. Upon completion of construction, the MPUC will amend the Project Area approved in the Site Permit to cover only the properties necessary for the efficient operation of the project. In this ABPP, we have referred to this final Project Area as the “Operational Project Area” for purposes of the ongoing wildlife survey work. The approximate boundary of the Operational Project Area plus a two mile buffer is depicted in **Exhibit 2**.

The Project has been revised to involve construction of 48 1.6 MW GE turbines with a total nameplate capacity of 76.8 MW, two project substations, collector and feeder lines, an operation and maintenance (O&M) facility, two permanent meteorological towers, associated access roads and a new approximately four mile 69 kV transmission line. The final turbine layout depicts 52 total turbines locations, of which 48 are primary turbines and will actually be constructed and four are alternate locations (see Exhibit 1). The number of turbines proposed has been reduced by shifting entirely to 1.6 MW machines. The four alternate turbine locations exist in case any proposed turbine locations are eliminated due to unforeseen constraints. The factors relied upon in selecting the site for the Project and developing the turbine layout are discussed in **Appendix A**.

1.2 Purpose of Avian and Bat Protection Plan (ABPP)

AWA Goodhue, LLC is committed to being a good steward of the environment and adhering to the law. As part of this commitment, AWA Goodhue has developed an Avian and Bat Protection Plan (ABPP) for the AWA Goodhue Wind Project. This ABPP is the culmination of over three years of coordination between AWA Goodhue, DOC-EFP, MDNR and USFWS to adequately address wildlife issues. This coordination included ongoing telephone and email coordination, several comment letters and multiple meetings and/or conference calls.

The purpose of the AWA Goodhue ABPP is to provide a framework for fulfilling the conditions set forth under Section III.C.2 of the project MPUC Site Permit and for complying with other applicable federal and state laws. Specific objectives are to ensure that:

1. Avian and bat fatalities and secondary effects on wildlife are minimized at the AWA Goodhue Wind Project;
2. Project-related actions comply with federal and state wildlife regulations;
3. The wildlife-related conditions contained in the MPUC Site Permit (i.e. Sections 6.1, 6.7 and 13.1) for the Project are fulfilled;

4. Bird and bat injuries and fatalities are effectively documented, so as to provide the basis of ongoing development of avian protection procedures;
5. Ongoing surveys, monitoring and management efforts are undertaken to avoid and minimize adverse wildlife impacts throughout all phases of the project;
6. Adequate ABPP implementation training is provided to the Construction Contractor and Operations and Maintenance staff;
7. Coordination between AWA Goodhue, wildlife agencies, DOC-EFP and the MPUC is continuous and understanding is maximized.
8. Extensive, detailed records on pre- and post-operational eagle movements are compiled to inform future management decisions on the Project and facilitate the future refinement and validation of the USFWS draft risk assessment model for eagles.

1.3 ABPP Content

This ABPP is specific to the AWA Goodhue wind project. It describes protocols to responsibly address wildlife risks and conduct studies to understand the interaction of wildlife with the AWA Goodhue wind project. The organization and content of this ABPP is based on a number of sources, which include, but are not limited to:

1. A white paper prepared by the U.S. Fish and Wildlife Service (USFWS 2010a);
2. Recommendations prepared by the Wind Turbine Guidelines Advisory Committee (WTGAC 2008a);
3. ABPPs prepared across the United States for other wind power projects;
4. Specific requirements set forth in the MPUC Site Permit;
5. Draft Avian and Bat Survey Protocols for Large Wind Energy Conversion Systems issued by the MDNR;
6. Bald Eagle Conservation Plan Guidance issued by the USFWS; and
7. Extensive input and feedback obtained from the USFWS, MDNR and DOC-EFP through a series of written reviews and coordination meetings.

1.4 Acronyms and Abbreviations used in the Plan

This document uses a variety of acronyms and shortened terms to describe involved corporations, agencies, units of measure, regulations, programs, and technical terms. These acronyms and abbreviations are supplied in **Appendix B**.

2.0 APPLICABLE WILDLIFE LAWS AND GUIDANCE

A number of federal and state wildlife laws apply to the AWA Goodhue Wind Project and guided various aspects of this ABPP. These laws are summarized in **Appendix C**. Because the MPUC Site Permit for the Project contains very specific conditions that are to be addressed in this ABPP, those conditions are set forth in detail in the next section. Also, the USFWS has recommended that AWA Goodhue apply for an Incidental Take Permit (ITP) under the Bald and Golden Eagle Protection Act (BGEPA). AWA Goodhue accepts this recommendation and will submit an ITP application after approval of this ABPP. The ITP process is discussed in **Appendix C**. AWA Goodhue will work with the USFWS to develop the appropriate terms of the ITP and quantify the allowable take.

3.0 MPUC SITE PERMIT COMPLIANCE

3.1 Site Permit Conditions Relevant to ABPP

3.1.1 Biological and Natural Resource Inventories

Section 6.1 of the Site Permit issued for the Project on August 23, 2011 requires that AWA Goodhue, in consultation with the MPUC and MDNR, design and conduct pre-construction desktop and field inventories to identify potentially affected native prairies, wetlands, and other biologically sensitive areas within the project area, and assess the presence of state and federal threatened, endangered, or special concern species. AWA Goodhue conducted a series of investigations that collectively represent a comprehensive inventory of the biological and natural resources in the project area. These investigations are summarized in **Appendix D**.

3.1.2 ABPP Preparation and Approval

Section 6.7 of the Site Permit requires that AWA Goodhue prepare an ABPP and obtain MPUC approval of the document prior to construction. Section 13.1 of the Site Permit sets forth ABPP Special Conditions relating to eagles, bats and loggerhead shrikes (described in more detail below). This ABPP has been prepared to address these permit conditions and respond to the significant input and feedback received from the USFWS and MDNR during the development and review of this document. The details of these conditions and the manner in which compliance will be achieved are discussed in more detail below.

3.1.3 Eagle Special Condition

Site Permit Section 13.1.1 states:

> "The Permittee shall develop a plan for monitoring Bald and Golden Eagle nest[1] sites near turbine locations and shall develop protocol to

[1] Golden eagles do not nest in Minnesota (Mark Martell, Minnesota Audubon, Pers. Comm.)

> identify proposed point count locations, suggested count duration and number of survey visits. Point counts of 20-30 minutes shall be conducted to document eagle movements in these areas. Multiple point count visits shall be conducted to cover the remainder of the 2011 nesting season (eaglets are expected to fledge by mid-July). Additional point counts shall be conducted in the fall of 2011 and the winter of 2011-2012. Details of the plan shall be included in the Avian and Bat Protection Plan. Ongoing monitoring for eagles shall be conducted in accordance with the Avian and Bat Protection Plan and U.S. Fish and Wildlife Service requirements. The Permittee shall submit the results of the summer, fall, and winter surveys, and any subsequent surveys, to the Commission within one month of completion of the surveys."

This ABPP sets forth the proposed protocol for conducting eagle point counts which are: (1) consistent with the project-specific input received from the USFWS; (2) exceed the recommendations set forth in the Draft Eagle Conservation Plan Guidance (USFWS 2011); and (3) comply with this special condition of the Site Permit. AWA Goodhue has initiated additional surveys recommended in supplemental recommendations provided by the USFWS in a letter dated September 16, 2011. These additional surveys include: (1) point count surveys conducted during the fall 2011 and spring 2012 migration periods; (2) monthly aerial surveys during the winter of 2011-2012 to search for Important Eagle Use Areas (IEUAs) and raptor nests and (3) bi-weekly driving surveys during the winter of 2011-2012 to search for and verify IEUAs. These additional surveys are described in more detail in Section 5.13. Seasonal and annual survey results will be reported to the MPUC and USFWS within one month of the completion of each round of surveys.

3.1.4 Bat Special Condition

Site Permit Section 13.1.2 states:

> "The Permittee shall install a minimum of two Anabat detectors on each temporary or permanent meteorological tower. Data should be collected, at a minimum, from July 15 to November 15, 2011, and May 1 to November 15, 2012. One Anabat detector on each meteorological tower shall be mounted at 5 meters above ground, and one shall be mounted as close to the rotor-swept area as possible. Additional monitoring or mitigation measures may be imposed based on results obtained from bat surveys. The Permittee shall submit the results of the 2011 monitoring by December 15, 2011 and the 2012 monitoring by December 15, 2012. Each report shall include an update on the status of the U.S. Fish and Wildlife Service potential listing of the Northern long-eared bat."

As described in Section 5.5 of this ABPP, two Anabat detectors were installed on a temporary met tower on site on July 22, 2011. Given that the Anabat permit condition only became known on June 30, 2011, it was not possible to acquire the necessary equipment from Titley Scientific and have it installed and operational by July 15, 2011. To compensate for the seven day deficit at the beginning of the monitoring period, AWA Goodhue added seven days at the end of the period. Accordingly, these Anabat units will be monitored through November 22, 2011 and again from May 1 to November 15, 2012. Survey results will be submitted by the dates specified in this special condition and will include updates on the federal listing status of the Northern Long-eared Bat.

3.1.5 Loggerhead Shrike Special Condition

Site Permit Section 13.1.3 states as follows:

> "The Permittee shall avoid placement of turbines in areas identified as highly suitable or very highly suitable loggerhead shrike habitat. Alternate turbine sites are to be considered the primary avoidance strategy. If alternate sites cannot be utilized, the Permittee shall provide the Commission and DNR with a Loggerhead Shrike Protection Plan for approval by the Commission detailing why avoidance is not possible, outlining strategies to minimize effects to Loggerhead Shrike, and providing mitigation measures for impacts. Permittee shall conduct two years of post-construction fatality monitoring to evaluate the impacts of wind turbines sited in loggerhead shrike habitat determined to be highly to very highly suitable."

The turbine layout has been modified so that all 48 proposed turbine locations and all 4 alternates are in locations that the MDNR concurs are not of concern with regard to loggerhead shrike habitat. In comments dated September 21, 2011, the MDNR indicated as follows:

> "DNR staff have reviewed AWA Goodhue efforts to relocate turbines away from state-listed threatened loggerhead shrike habitat. The DNR appreciates the project proposer's willingness to make project adjustments. The adjustments made and included in the ABPP and associated aerial photography dated August 19, 2011 address DNR concerns regarding the location of turbines in highly suitable and very highly suitable habitat."

Based upon the above-quoted MDNR concurrence, AWA Goodhue has complied with Site Permit Section 13.1.3 in the siting of turbines and a formal, separate Loggerhead Shrike Protection Plan should not be required. However, two years of post-construction fatality monitoring will still be carried out for all avian and bat species, including loggerhead shrikes. Also, as requested by the MDNR in their September 21, 2011 comments, we have reviewed the current site plan to determine which elements of project infrastructure aside from turbines would lie in highly suitable or very highly suitable loggerhead shrike habitat. The purpose of this review was to identify areas where construction is to be staged to avoid the shrike breeding period. The locations where shrike-specific construction staging applies are discussed in Section 8.4.2.

4.0 WILDLIFE AGENCY CONSULTATION AND INFORMATION SHARING

4.1 Consultation Efforts to Date

The current Project layout and this ABPP are products of a lengthy and involved agency coordination process. Consultation efforts to date are summarized in **Appendix E**.

4.2 Plan for Consultation, Information Sharing, and Reporting

AWA Goodhue will continue to work cooperatively with the USFWS and the MDNR during implementation of the ABPP, including sharing relevant, non-proprietary site data and pre- and post-construction study results. Specific reporting benchmarks and time frames are set forth in the ABPP implementation schedule provided in Section 9.0.

5.0 2011-2012 AVIAN AND BAT FIELD STUDIES

To provide context for the proposed field studies described in this ABPP, the following sections discuss surveys conducted earlier in 2011.

5.1 Bald Eagles

5.1.1 2011 Monitoring of New Eagle Nests

On May 2, 2011, Westwood received notification from interested parties of new bald eagle nests within or near the project footprint. On May 6, 2011, Westwood met with those parties in the field and confirmed these new nest sites. These additional nests are described as follows:

One new active nest was observed within the previously documented nesting territory about one mile south of the AWA Goodhue footprint on the North Fork of the Zumbro River in Section 23, Township 110, Range 16. The new nest is slightly farther from the project footprint than the previously documented nest that was active in 2010 (but found to be inactive in 2011).

One new active nest in a small woodlot in the northwest quarter of Section 30, Township 111, Range 15, about 1.25 mile west of the City of Goodhue. This woodlot was surveyed for raptor nests in 2010 and did not contain an eagle nest at that time; hence, this is a new nest that was established since 2010. The landowner was contacted and he confirmed that this nest had been built in 2011. The nest is within the project footprint and about one mile northeast of the nearest proposed turbine;

One new nest in a narrow tree line in Section 27, Township 111, Range 15, about 3/4 mile southeast of the City of Goodhue. This nest is about 2.5 miles east of the project footprint and over 3.5 miles from the nearest proposed turbine. The landowner was contacted, and he confirmed that this nest had been built in 2011. As discussed below, this nest was under construction in 2011 but was later found to be inactive (i.e. the birds building the nest subsequently abandoned it and no young were produced).

On June 1, 2011, interested parties indicated by email as many as 12 alleged nests in and around the project footprint. A second field review was conducted with those parties on June 8, 2011 to confirm the reported nests but no additional nests were observed. Confirmed and reported but unconfirmed eagle nests are depicted Exhibit 3. On May 20, 2011, Westwood initiated nest monitoring at the two new bald eagle nests using the same techniques as for earlier nests. A total of 12.5 and 13 hours of observations were made at the nests west and southeast of Goodhue, respectively. The results of this monitoring are as follows:

5.1.1.1 Nest West of Goodhue

During 12.5 hours of observation, 17 bald eagle flights were observed. Of these, 6 were short flights from the nest to a food source on ground about 20 yards from the nest (later confirmed to be a livestock carcass dump from an adjacent calving operation). The remaining flights were exercise flights, territory defenses, local flights between perches or likely trips to a natural food source to the south (e.g. the North Fork of the Zumbro River). Most of these movements were local flights within about ½ mile of the woodlot in which the nest was built and did not pass through any proposed turbine clusters. Three flights were observed where the eagle rode thermals to gain altitude and soared to the south or southeast. One of these soaring flights overflew the location of the proposed turbine cluster to the southwest but the eagle was well above the rotor swept zone during this overflight.

5.1.1.2 Nest Southeast of Goodhue

During 13 hours of observation, 11 bald eagle flights were observed. Of these, four were short flights to or from the nest to a perch site behind the farmstead immediately to the east. This perch site overlooked a cattle yard and calving operation. The remaining flights were either exercise flights or likely trips to a natural food source along the Zumbro River. All but one of these flights were directly to the east or south and none were observed to be in the direction of the project footprint. During the initial observations on May 27, 2011, the birds were observed bringing in nest material. This would not be occurring if the birds were incubating eggs or tending to hatchlings. As of June 3, 2011, the birds were not observed during 7 hours of nest observations. We contacted the landowner, who said he had not seen the eagles in a week. When asked about the eagle's interest in his livestock operation, he indicated that he composted dead livestock and then spread the remains with his manure spreader. No eagles were observed during a follow up site visit June 8, 2011.

5.1.2 2011 Monitoring of Eagle Movements

On June 9, 2011, AWA Goodhue and Westwood participated in a meeting and conference call with staff from the DOC- EFP, USFWS and MDNR. The results of the 2011 nest monitoring activities were discussed. During this call, the USFWS recommended that the locations for ongoing bald eagle monitoring be shifted from the nests to the turbine cluster locations nearest to active nests. In response to this recommendation, a total of 152 additional hours of monitoring were spent at four turbine cluster locations nearest to: (1) the Belle Creek nest; (2) the nest on the North Branch of the Zumbro River; (3) the nest west of Goodhue; and (4) a reservoir near the western edge of the project footprint (see Exhibit 3).

On July 29, 2011, the 2011 eagle monitoring data was discussed at a meeting between AWA Goodhue representatives, Westwood and staff from DOC-EFP, USFWS and MDNR. Based on the results through that date, the USFWS recommended that one monitoring location be shifted to the northwestern-most turbine cluster to determine whether eagles using the Belle Creek nest were flying through that area. Since July 29, 2011, 58 additional hours of bald eagle monitoring were performed, including 14.5 hours at this location.

Through 210 hours of eagle flight path monitoring at turbine clusters, there were no consistent flight patterns through the project area. Rather, eagles of the breeding community in the vicinity of the Project were observed in response to natural and likely artificial food sources within about half mile from proposed turbines, particularly at Clusters 2 and 3. As a function of minutes observed, this accounts for 0.08% of our total observation time (i.e. 0.0008 x total observation time), which assumes 210 observation hours or 12,600 minutes and a conservative 10-minutes of eagle movement in the RSZ and within 10 meters of a turbine location. Generally, as the summer went on and breeding territories loosened after juveniles left the nest, we observed eagles more frequently at all turbine clusters, which was expected based on eagle breeding ecology.

5.1.2.1 Turbine Cluster 1

During the 32 hours of monitoring in Cluster 1 June and July 2011, one eagle flight was observed. This observation was of an immature (2^{nd} or 3^{rd} year bird) riding thermals very high with a pair of Red-tailed Hawks (**Exhibit 4**). There were no flights below or within the RSH observed at this location. Additionally, the observed flight did not overlap the proposed turbine cluster.

5.1.2.2 Turbine Cluster 1A

During 14.5 hours of monitoring in Cluster 1A in August 2011, four eagle flights were observed that included two adults and two juveniles (i.e., young of the year) (**Exhibit 5**). A portion of one flight was within the RSH and 100-meters of a turbine as a juvenile circled to gain altitude and lasted only a few minutes. As a function of approximate eagle flight distance, about 1.2% of observed eagle flights at this cluster were both within the RSH and 100-m of a turbine. Generally, eagles were observed riding thermals and soaring very high at this location.

5.1.2.3 Turbine Cluster 2

Cluster 2 was monitored for 58.5 hours during June – August 2011. Fifteen flights were observed, all of which were adults (**Exhibit 6**). A portion of four flights was within the RSH while eagles gained altitude either to or from the reservoir. However, no observed flights at any altitude overlapped turbine clusters. Eagles were routinely observed flying to and from the Belle Creek Watershed reservoir from the north and are likely the Belle Creek nest pair. The Belle Creek Watershed reservoir is an entirely open water body with no emergent wetland fringe. The reservoir does contain fish and bald eagles have been observed capturing fish during low flights from various perches on the reservoir tree line. To date, none of the observed eagle movements associated with foraging at the reservoir were within 100 m of turbine locations to the west. The observed movements that were within the RSZ were associated with forested areas and ridges north of the Project Area between the nest and the reservoir and away from the nearest turbine locations, which are in crop fields to the east.

5.1.2.4 Turbine Cluster 3

During 54.5 hours of monitoring in June – August 2011, 29 flights were observed around Cluster 3, including 26 by adults and 3 by juveniles (**Exhibit 7**). A portion of four flights were within the RSH as eagles gained altitude; however, none of these were within 100 meters of a turbine. As a function of flight distance, these flights represented about 9.7 percent of the observed eagle flights at this cluster. Portions of three low and direct flights overlapped the 100-meter radius of turbines but were below RSH. Generally, observed flights at this cluster were low and local flights in the vicinity of a farmstead on the east side of 180th Avenue.

5.1.2.5 Cluster 4

Cluster 4 was monitored for 50.5 hours during June – August 2011. Five flights of four adults and one juvenile were recorded (**Exhibit 8**). A portion of one eagle flight was within the RSH and 100-meter buffer of turbines while gaining altitude after harassing a Red-tailed Hawk. As a function of approximate eagle flight distance, about 0.89% of observed eagle flights at this cluster were both within the RSH and 100-meters of a turbine. Generally, observed flights at this location were very high soaring flights where the adults would drift north after gaining altitude over the North Fork of the Zumbro River (and out of our monitoring map extent).

5.1.3 Proposed 2011-2012 Bald and Golden Eagle Surveys

Based on the eagle nest and flight information collected during earlier survey work, and in compliance with Special Condition 13.1.1 in the MPUC site permit, AWA Goodhue has prepared an Eagle Conservation Plan as part of this ABPP. This ECP follows the recommendations presented in the USFWS 2011 Draft ECP Guidance and expanded upon in survey recommendations provided by USFWS in a letter dated September 16, 2011. The surveys being conducted are described below:

5.1.3.1 Migration and Breeding Period Surveys

As recommended by USFWS, sixty minute point counts have been conducted 2 times per week during the fall 2011 migration period and will resume during the spring 2012 migration periods at five previously established survey locations plus a sixth location in the northeast corner of the Operational Project Area (**Exhibit 9**). In order to capture the migration periods for both bald and golden eagles, the survey periods will be from September 15 to December 15, 2011 and from February 1 to April 30, 2012. Coordination will be maintained with Hawk Ridge Environmental Center and the National Eagle Center to refine these date ranges according to actual conditions.

Point counts are being conducted in the same manner as earlier counts in 2011, except that surveyors are recording the amount of time spent by eagles along flight tracks within 800 meters of the observation point and up to 175 meters in altitude. Flight tracks are being broken out into segments observed to be below, within or above the RSZ. This will facilitate the application of an appropriate collision risk model. Flight tracks are being mapped on aerial photographs.

Point count surveys conducted to date during the fall of 2011 have been seriously compromised by an active baiting program being conducted by project opponents. The full extent of the baiting program is unknown but data from at least two of the six observation points has been compromised by baiting activity. Both livestock carcasses and relocated road killed wildlife have been used in this effort. The Minnesota Board and Animal Health (BAH) has confirmed that baiting with livestock carcasses is occurring. BAH is continuing to investigate and may initiate enforcement action. The MDNR enforcement division has also been contacted regarding the relocation of road killed deer without a possession permit.

Point count surveys will be extended through the summer 2012 breeding season (i.e. until the end of July 2012) to cover movements associated with bald eagle nests active in 2012. It is anticipated that by the 2012 breeding season, road kill clean up and artificial feeding activity on and around the Project Area will be much better controlled than as of the date of this plan. Ongoing point counts will assist in evaluating the effectiveness of food base management measures in reducing eagle movements in close proximity to turbines.

5.1.3.2 Winter Aerial Surveys

As recommended by USFWS, helicopter surveys will be conducted once per month from early November 2011 to early April 2012 to locate and document Important Eagle Use Areas (IEUAs; e.g. winter night roosts, communal foraging locations, nest territories) that might be located within or near the Project Area. The area to be surveyed will consist of the Operational Project Area plus a two-mile buffer. The March aerial survey will be expanded to serve as the spring 2012 leaf-off survey for the nests of eagles, other raptors and colony nesting waterbirds (e.g. herons, egrets and cormorants). No heron or cormorant rookeries have been identified to date within or near the Project Area; the absence of such rookeries will be re-confirmed during the aerial surveys conducted in March and April 2012.

To avoid disturbance to nesting birds, aerial survey techniques will follow the USFWS Draft Eagle Conservation Plan Guidelines (2010) and the Post-Delisting Monitoring Plan for the Bald Eagle (2009). The helicopter will fly 18 north-south transects spaced ½ mile apart to allow each of two observers to observe a ¼ mile strip on each side of the aircraft (**Exhibit 10**). The helicopter would fly at an altitude between 200 and 700 feet above ground level (AGL) and at a speed of 100 miles per hour or less. When nests or IUEAs are found, the helicopter will circle back and hover at an altitude high enough to minimize disturbance to any birds that may be present and the feature will be located with a sub-meter GPS unit deployed within the helicopter.

Data collected at each feature will include:

1. Type of feature (e.g. winter night roost, communal foraging location, nest);
2. If winter night roosts or communal foraging locations are found, the species of eagle (bald or golden), number, distribution and age classes of eagles observed;

3. For nests, occupied versus inactive, incubation and feeding activity of adults, number of eggs or eaglets; and
4. Any eagle flights observed to or from the feature.

5.1.3.3 Winter Ground Transect Surveys

As recommended by USFWS, driving surveys are being carried out to further document the presence, characteristics and use of IEUAs in and within two miles of project area two times per month from early November 2011 to early April 2012. If wintering eagles are observed to have dispersed due to ice break up or an early spring, driving surveys may be ended before the first week of April. These surveys will conducted along a pre-defined route that covers the Operational Project Area plus a two mile buffer (**Exhibit 11**). Data to be collected during driving surveys will include:

1. Areas that have open water during cold weather that could serve as foraging habitat for wintering eagles.
2. Distribution of observed natural and man-made winter food sources (e.g. road kills, livestock carcass dump sites, unburied garbage, locations where promiscuous ice fishing are allowed and water bodies that stay open allowing access to fish and/or waterfowl).
3. Any observed eagle flights, including movements to/from any winter night roost locations that may be found.

5.1.3.4 Monitor Satellite Telemetry and Winter Golden Eagle Survey Results from Minnesota Audubon & National Eagle Center

AWA Goodhue will continue to coordinate with and obtain updated data from the Minnesota Audubon and the National Eagle Center regarding golden eagles that have been fitted with satellite telemetry equipment and are being monitored. Annual golden eagle survey results will also be obtained from the same sources. Any data that is relevant the Operational Project Area will be included with reports for AWA Goodhue's eagle monitoring and surveying activities.

5.2 Loggerhead Shrikes

Loggerhead shrikes are a state-threatened bird in Minnesota, a USFWS Region 3 Species of Concern, and are known to occur in Goodhue County. As part of its wind turbine siting process, AWA Goodhue designed and conducted a comprehensive loggerhead shrike habitat assessment, coordinated with wildlife agency personnel, and conducted multiple field investigations to identify, avoid and minimize impacts to loggerhead shrike habitat with its final turbine layout. As described below, a "coarse filter" habitat assessment was initially applied to rank each quarter section within the project area as to its suitability as habitat for breeding loggerhead shrikes. The classifications used were "Unsuitable", "Slightly Suitable", "Moderately Suitable", "Highly Suitable" and "Very Highly Suitable". Individual turbine locations were then subjected to a more refined "turbine-centered" habitat model and site-specific aerial photo analysis in coordination with MDNR. In some cases, individual turbine locations were also visited in the field with MDNR staff to confirm the presence/absence of shrike habitat components and ensure adequate separation between turbines and any such components. Consistent with MPUC site permit condition 13.1.3, AWA Goodhue has not sited any turbines in areas determined to be "Highly" or "Very Highly" suitable shrike habitat, as identified through the above-described iterative habitat assessment process.

5.2.1 Agency Coordination and Field Investigation

The AWA Goodhue project team coordinated with the MDNR to refine the turbine layout and avoid and minimize potential effects on loggerhead shrikes and their habitat. The AWA Goodhue team met with the MDNR and USFWS on February 2, 2010 to discuss the loggerhead shrike habitat assessment and other avian issues. The Loggerhead Shrike Habitat Assessment (Westwood Professional Services 2009) was submitted to the MDNR, USFWS, MDOC, and MPUC on October 10, 2010.

The AWA Goodhue team met with MDNR and MDOC staff on November 17, 2010 to address agency questions and concerns related to the results of the Loggerhead Shrike Habitat Assessment. The Goodhue team provided the MDNR with two handouts at this meeting: (1) quarter-section aerial photographs showing locations of turbines proposed in habitats ranked 3-5 (Suitable, Highly Suitable and Very Highly Suitable), and (2) a summary of the spatial habitat model, turbine siting, potential effects, and compatibility of wind energy with loggerhead shrikes. Discussion at this meeting focused on turbine locations, loggerhead shrike habitat, the availability of suitable unoccupied shrike habitat in Minnesota, and MDNR recommendations to MDOC regarding potential site permit conditions relating to loggerhead shrikes.

The MDNR team found the 1"=400' scale quarter-section aerial photographs showing turbine locations very helpful and agreed that most turbines in highly suitable quarter sections avoided high-value habitat components. The MDNR's concerns were narrowed to two turbines located in grassland within quarter sections ranked highly suitable for shrikes. The meeting attendees agreed to put the shrike discussion on hold and take no action related to shrikes until after the MPUC hearing on November 23, 2010.

Biologists from the AWA Goodhue team reviewed areas of highly suitable shrike habitat and proposed turbine locations in the field with the MDNR and USFWS on June 13, 2011. The biologists first reviewed a shrike siting location from the Minnesota Natural Heritage Program database. This sighting was recorded in 1996, was situated along a fence line in a pasture, and involved a shrike observed during the breeding season, but not nesting.

The biologists then reviewed turbine locations proposed in quarter sections ranked very highly suitable for shrikes and discussed potential effects on shrikes. MDNR staff indicated concern about turbines sited in grassland within highly ranked quarter sections, but had less concern regarding turbine locations surrounded by cropland within highly ranked quarter sections.

As an example, **Exhibits 12-15** shows a turbine cluster located in a quarter-section ranked “Very Highly” suitable. Turbine 16 was located in grassland, while Turbines 17 and 18 were located in cropland. During the field visit, MDNR staff continued to express concern regarding Turbine 16, but expressed no concern regarding the locations of Turbines 17 and 18.

During the field investigation, MDNR staff were primarily concerned about displacement of shrikes that may be caused by shrikes avoiding otherwise suitable habitat due to the presence of wind turbines. The AWA Goodhue team stated that available suitable habitat is not limiting shrikes in Minnesota, that there appears to be abundant suitable habitat in the project area that is not occupied by shrikes, and that the technical wildlife literature provides no direct evidence indicating that shrikes will avoid turbines in locations with suitable grassland, nest sites, and perch sites. The potential for shrike displacement from suitable habitats is discussed in more detail under the risk assessment (section 7.3).

After the field investigation, the MDNR conservatively advocated moving two proposed turbine locations out of high quality shrike habitat. As discussed under section 8.4.1.1, consistent with its efforts to avoid loggerhead shrike impacts, AWA Goodhue subsequently eliminated both of these turbine locations from its layout.

The June 13, 2011 field review demonstrated an inherent limitation in the quarter-section coarse filter habitat model. Although the model functions well for an initial review, highly suitable quarter sections may contain as little as 50 acres of grassland that provides suitable shrike habitat, and up to 110 acres of annually-tilled cropland and woodland that is not suitable for loggerhead shrikes. Consequently, the review of individual turbine locations revealed that a more detailed turbine-centered habitat assessment was warranted.

5.2.1.1 Turbine-Centered Habitat Model

AWA Goodhue discussed the development of a turbine-centered habitat model with MDNR endangered species permit coordinator Rich Baker on August 8, 2011 and presented a working draft of this model during a meeting with MDOC and MDNR on August 18, 2011. The draft turbine-centered habitat model applies rankings based on the proportion of grassland, proportion of cropland, and available perch sites and nest sites within 40-m radius (0.5 ha, 1.25 ac) circles and 200-m radius (12.6 ha, 31 ac) circles centered on proposed turbine locations. These circles correspond to the size of the rotor diameter of project wind turbines and large loggerhead shrike breeding territories, respectively.

The draft turbine-centered model was applied to the project layout on August 18, 2011, resulting in low loggerhead shrike habitat rankings for all but one turbine. This single turbine was eliminated from the project layout on August 19, 2011.

Following AWA Goodhue's August 18, 2011 meeting with MDNR, AWA Goodhue eliminated one additional alternate location that ranked as highly suitable habitat using the turbine-centered model. In addition, at MDNR's request, AWA Goodhue shifted the location of Turbine 6 to provide additional distance between the turbine and adjacent grassland.

In addition to reviewing the draft turbine-centered habitat model, the MDNR requested detailed aerial photography showing the location of all proposed turbines. AWA Goodhue provided the requested aerial photography showing proposed turbine locations to the MDNR and MDOC on August 21, 2011. The MDNR reviewed the revised layout and in its comments dated September 21, 2011, the MDNR indicated that AWA Goodhue's turbine re-siting efforts had addressed its concerns regarding shrike breeding habitat:

> "DNR staff have reviewed AWA Goodhue efforts to relocate turbines away from state-listed threatened loggerhead shrike habitat. The DNR appreciates the project proposer's willingness to make project adjustments. The adjustments made…address DNR concerns regarding the location of turbines in highly suitable and very highly suitable habitat."

5.2.2 Inclusion of Loggerhead Shrikes in Point Count Surveys

Westwood will document all loggerhead shrikes observed during the 60-minute point counts and driving surveys conducted for eagles during 2011-2012. If loggerhead shrikes are observed during these point counts, they will be documented and reported.

5.2.3 Reporting Loggerhead Shrike Nesting Activity

If loggerhead shrikes are observed during any other surveys conducted during the breeding season, an effort will be made to locate and document the nesting territory associated with the observation. Loggerhead shrike observations that may occur incidentally during post-construction fatality monitoring will also be recorded and reported.

5.3 Trumpeter Swans

In August of 2011, the MDNR confirmed a report of trumpeter swans nesting and raising a brood of goslings in a farm pond about 1/3 mile west of the southwest corner of the project footprint in Township 110 North, Range 16 West, NW ¼ of Section 8 (see Exhibit 9). This nest site is within the cattail fringe that surrounds this pond. On October 4, 2011, the MDNR reported that a dead trumpeter swan had been found near the Project Area and that the death had been from aspergillosis, caused by a fungus common in the environment that can affect the throat and lungs. Aspergillosis can be caused by the natural environment or from piles of moldy corn that sometimes are found on agricultural lands.

The AWA Goodhue Project Area appears to encompass very little habitat potentially suitable for nesting trumpeter swans. Section 8.5 discusses typical trumpeter swan habitat and evaluates whether suitable trumpeter swan habitat characteristics exist within the site.

In conjunction with other surveys being done in the area, Westwood will visit this nest site early in the 2012 breeding season to determine whether this reservoir is used again for nesting. If so, Westwood staff will visit the site up to four times during the nesting season and spend one hour per visit to observe and document the movements of the adult birds. In addition, the eagle point count survey location south of Turbine 34 is in relatively close proximity to the confirmed nest location, and surveyors will note any flights from the nest into the project area observed from this or any other point count location. Observations will be reported to the DOC-EFP, MDNR and USFWS at the end of the observation period.

5.4 Updated 2012 Raptor Nest Survey

An aerial leaf-off nest survey for bald eagles and other raptors will be conducted in March of 2012 in conjunction with winter aerial surveys for bald eagles.

5.5 Acoustic Bat Monitoring

MPUC Site Permit condition 13.1.2 requires the installation and monitoring of two Anabat® acoustic bat detectors (Titley Scientific Ltd.) on each meteorological (met) tower installed in the project area. These detectors are to be mounted at heights of 5 and 45 meters (the latter to detect bats in the RSH) and monitored from June 15 to November 15, 2011, and from May 1 to November 15, 2012. Due to the logistics involved in ordering and shipping the Anabat bat detectors from Titley Scientific following the June 30, 2011 MPUC hearing, it was not possible to acquire and install Anabat equipment by July 15. AWA Goodhue installed bat detectors and began monitoring shortly thereafter on July 22, 2011. Bat monitoring continued until November 22, 2011.

5.5.1 Bat Detector Installation

Two Anabat bat detectors were installed on a 60-meter tall temporary met tower in the northeastern part of the project area on July 22, 2011 (**Exhibit 16**). In 2012, Anabat equipment will be installed in April to allow monitoring for the full field season. It is anticipated that the temporary met tower will be replaced with a permanent met tower during 2012 construction. Once constructed, the permanent met tower will be outfitted with Anabat acoustic monitoring systems and the temporary met tower will be removed.

The Anabat units are connected to Anabat microphones that are installed on the met towers at heights of 5 and 45 meters with cable-pulley systems. The microphones are encased in "bat hats" that are fabricated from PVC pipe and other materials to protect them from inclement weather (Arnett et al. 2006). Anabat units, batteries, and memory cards are stored approximately 4 feet above ground level inside weather-tight containers.

Acoustic monitoring is being conducted from July 22 to November 22, 2011 to cover the late summer resident period and the full fall migration period. Acoustic monitoring will be conducted from May 1 to November 15, 2012 to cover the spring migration, summer resident, and fall migration periods. Anabat units are programmed to turn on each night approximately a half-hour before sunset and turn off each morning approximately a half-hour after sunrise. The Anabat detectors are adjusted to a sensitivity level between 6 and 7 to reduce interference from other sources of ultrasonic noise such as insects and raindrops.

A technician visited the Anabat systems once approximately every two weeks during the monitoring period to change out batteries and retrieve and replace memory data cards. Batteries and memory cards were replaced weekly during the first four weeks of bat monitoring to help ensure quality control and equipment performance. The recorded data are being downloaded from the memory cards, processed with Anabat software, and uploaded to an FTP site, from which a bat ecologist retrieves and analyzes the data. The Anabat systems and related monitoring equipment were taken down and retrieved at the end of the monitoring season to protect it from winter weather.

5.5.2 Anabat Data Analysis and Report Preparation

Anabat call files are typically grouped by spring migration, summer resident, and fall migration periods, and analyzed with Analook software. Audio files are visually screened to remove files of non-bat calls so that only suitable bat calls remain. Call files are then examined visually and assigned to species or species-group categories based on comparisons to libraries of known bat reference calls.

The number of bat passes is used as an index of bat activity (Hayes 1997). A bat pass is defined as a series of echolocation calls by an individual bat, which consists of a series of more than two call notes with no pauses longer than one second between call notes (White and Gehrt 2001, Gannon et al. 2003). The number of echolocation passes is tallied to determine the number of bat passes. The total number of bat calls in a given time period and the mean number of bat passes per detector-night will be used as indices of bat activity for comparisons among detectors and to other studies. Bat calls may be grouped by high (≥35 kHz) and low (<35 kHz) frequency, which generally correspond to small bats (e.g., Myotis spp.) versus larger bats (e.g., big brown bat, silver-haired bat, and hoary bat). A written report will summarize the detected call rates by species and include related results and conclusions.

5.5.3 Bat Monitoring Report

The purpose of this study was to survey bat activity during the 2011 late summer resident and fall migratory periods within the wind development area. At the request of AWA Goodhue, Zotz Ecological Solutions provided this summary of acoustic bat data especially in reference to activity by the northern long-eared bat (*Myotis septentrionalis*). Because the northern long-eared bat overlaps in call characteristics with the little brown bat (*Myotis lucifugus*), call identification and differentiation between these species is difficult. Differentiation of calls between these species is especially problematic in open (low clutter) environments (Broders et al. 2004). The temporary meteorological tower where the bat monitoring data was collected is located in this type of open environment. In cluttered habitats (e.g., forests), however, the echolocation call of the northern long-eared bat is more easily distinguished due to its feeding specialization in these habitats.

Methods

Qualitative analysis of acoustic data was performed using the latest Anabat software for call analysis, Analook version 3.7w (Corben 2009). Call files were visually screened to remove files of non-bat calls (e.g., wind noise, insects), so that only suitable bat calls remained. Files with suitable bat calls were examined visually and identified to species based on comparison to libraries of known bat reference calls. Identification to species was possible only when clear calls were recorded and only for certain species. In the event that a call was not identifiable to species, the call was assigned to a species group category (**Table 5.1**). The presence of one species or species group within a call file was used to describe a bat pass. Thus, call analysis may result in more bat passes than call files if two or more species (or species groups) can be identified in the same call file. The occurrence and relative frequency of each species and/or species groups were described for each Anabat microphone height (5 m and 45 m).

Table 5.1. Bat Species and Species Groups used to Categorize Acoustic Data

Species/Species Group	Description
EPFULANO	Big Brown (*Eptesicus fuscus*)/Silver-haired (*Lasionycteris noctivagans*) bat group
EPLNLA	Big Brown/Silver-haired/Hoary (*Lasiurus cinereus*) bat group
LABO	Eastern Red bat (*Lasiurus borealis*)
LABOPESU	Eastern Red bat/Tri-colored bat (*Perimyotis subflavus*)
LACI	Hoary bat
LACILANO	Hoary/Silver-haired bat group
LANO	Silver-haired bat
MYLU	Little Brown bat (*Myotis lucifugus*)
MYSE	Northern Long-eared bat (*Myotis septentrionalis*)
MYOTIS	Little Brown bat/Northern Long-eared bat group
PESU	Tri-colored bat
UNKNOWN	Includes files with fragmentary calls and files with solely non-search phase calls (i.e., approach, feeding buzz, social)

Results

A total of 2,188 bat passes were recorded during July 22-November 22, 2011, with 392 bat passes detected at 45 m and 1,796 bat passes detected at 5 m. At 45m, average nightly activity resulted in 4.13 ± 0.80 bat passes/night and the hoary bat was the most commonly detected species. At 5 m, average nightly activity resulted in 22.45 ± 2.88 bat passes/night and the little brown bat was the most commonly detected species. The overall composition of bat passes classified to species or species groups is summarized in **Table 5.2** below.

Table 5.2. Bat Species Recorded during July 22-November 22, 2011

Species/Species Group	% Composition	
	5 meters	45 meters
Hoary bat	10.03	52.45
Little brown/northern long-eared bat group (MYOTIS)	25.09	3.15
Little brown bat	16.84	1.75
Big brown/silver-haired bat group (EPFULANO)	16.75	3.50
Big brown/silver-haired/hoary bat group (EPLNLA)	11.82	15.38
Eastern red bat	6.97	9.44
Hoary/silver-haired bat group (LACILANO)	1.45	8.39
Silver-haired bat	3.83	4.90
Eastern red/tri-colored bat group (LABOPESU)	2.38	1.05
Tri-colored bat	3.06	0.00
Northern long-eared bat	1.02	0.00
Big brown bat	0.77	0.00
Total	100.00	100.00

Relative proportions of species and species groups were based on the bat passes that were classified to species and species groups. Unknown bat calls accounted for 33.18% of the 2,188 bat passes detected and these unknown calls were excluded from the species composition results. Unknown bat calls included fragmentary calls and files with solely non-search phase calls (see Table 5.1). Unknown calls occur in every acoustic study of bats, but they often are not reported. Such unknown calls are typically excluded from analysis in the scientific literature because they cannot be effectively analyzed (Britzke et al. 2011, Gruver et al. 2010). However, they are included here in the interest of full discloser because they provide indication of bat activity. The analysis that follows focuses on the relative proportions of bat calls that could be classified to species or species groups.

Nightly activity was greatest during July 22 through early September 2011 at both 5 m and 45 m. Hourly bat activity was relatively different between the two heights. At 45 m, activity appeared bimodal with greatest activity earlier in the night (2100-0000 hrs or 9:00 PM-12:00 AM), and was largely attributed to the hoary bat. At 5 m, activity appeared unimodal with greatest activity in the middle of the night (2300-0100 hrs or 11:00 PM-1:00 AM), and was largely attributed to the little brown bat, possibly the northern long-eared bat, the big brown bat, and the silver-haired bat. Overall, average nightly bat activity was significantly lower at the 45 m height than the 5 m height. Bat activity at 45 m averaged 81.60% less than at 5 m.

Bat passes assigned to the big brown, northern long-eared, and tri-colored bats were only detected at 5 m, yet these species may have been detected at 45 m based on bat passes identified to species groups (i.e., EPFULANO, EPLNLA, MYOTIS, and LABOPESU). Activity by the eastern red, silver-haired, and little brown bats was significantly higher at the height of 5 m than at 45 m. Yet, bat activity identified as hoary bats did not differ significantly between 5 and 45 m.

The hoary bat, a migratory tree-roosting species, was the species most detected, followed by the little brown bat. The northern long-eared bat and tri-colored bat, both Minnesota Species of Special Concern, were detected during this study. Although no federally threatened or endangered bat species were detected, the northern long-eared bat is being considered for listing under the Endangered Species Act. As of December 13, 2011, the U.S. Fish and Wildlife Service had not yet determined whether it will be listed. Both the northern long-eared bat and tri-colored bat were detected only near ground level. It is possible that the northern long-eared bat was detected at 45 m, but overlapping call characteristics with the little brown bat made it difficult to distinguish between the two species. Nonetheless, only 3.15% (n=9) of the identified calls recorded at 45 m were assigned to the little brown/northern long-eared bat group.

Given that the bat detectors were located on a met tower in an open field and that calls were identified as little brown bats much more frequently than northern long-eared bats, it is probable that the majority of the MYOTIS group calls are also attributed to little brown bats. The northern long-eared bat typically uses forested areas for both roosting and foraging activity (Caceres and Barclay 2000), whereas the little brown bat is more likely to occur in open habitats, but does occupy a variety of habitats (Broders et al. 2004).

6.0 POST-CONSTRUCTION AVIAN AND BAT FATALITY MONITORING

6.1 Number and Selection of Turbines for Monitoring

AWA Goodhue proposes to conduct post-construction fatality monitoring at 10 turbines, which represents 21 percent of the total number of turbines. This is considered adequate coverage, as it provides monitoring of one turbine from each of the seven turbine clusters plus three additional turbines. The turbines selected for monitoring are those which appear to be in the closest proximity to woodlands and/or wetlands that might afford suitable avian and bat habitat. The locations of the turbines to be monitored for post-construction fatality are depicted in Exhibit 9.

6.2 Fatality Monitoring Protocol

Per recommendations from the MDNR, the proposed avian and bat fatality survey protocol is based on the Minnesota DNR draft protocol for Bat and Avian Fatality Monitoring at Large Wind Energy Conversion Systems (Mixon et al. 2011) for a moderate risk site. In accordance with that guidance, AWA Goodhue proposes the following protocol for monitoring post-construction fatalities:

1. Fatality monitoring will be conducted 2 times per week at 10 turbines (21 percent of the total turbines) from April 1-November 15 for a minimum of 2 years following the initiation of commercial operation. Whether additional fatality monitoring is needed will be determined in coordination with the USFWS and MDNR based on the monitoring results from the first 2 years;
2. Search transects will be spaced no more than 6 m apart within 160x160 m plots centered on turbines at a maximum speed of 1 turbine/person/hour;
3. Search areas will be assigned to visibility classes ranging from bare ground to >25% vegetative cover >1 foot tall. Vegetation control may be applied in the search plots if needed to increase visibility of carcasses;
4. Carcass removal and searcher efficiency trials will be performed in accordance with MDNR guidelines;
5. Weather conditions will be recorded at the initiation of each plot search; and
6. MDNR datasheets will be used to document searches and fatalities (**Appendix F**)

Searcher efficiency can have a major influence on fatality estimates and their accuracy. Visibility and searcher efficiency can decline substantially with increasing vegetation density. Some fatality studies in agricultural environments have involved mowing, herbicidal, or manual vegetative controls to limit vegetation height and increase carcass visibility (Jain 2005, Gruver et al. 2009). On the Project, it will be prudent to implement vegetative control by mowing 6 one-meter wide transects approximately every 2 weeks during the growing season. The mowed transects will be distributed to cover roughly 33% of the 160-m x160-m (1 ha) search plots. **Exhibit 17** provides a schematic of a 160-m x160-m search plot with mowed transects.

Visibility classes will be assigned to search areas on a seasonal basis. Carcass removal and searcher efficiency trials will be distributed temporally and spatially in proportion to the seasons and visibility classes, respectively. Carcass collection and data recording and reporting will be in general conformance with DNR protocols, except that data recording and reporting may be digitally customized and optimized. AWA Goodhue will obtain the necessary DNR salvage permit and USFWS migratory bird permit prior to commencing fatality monitoring.

6.3 Fatality Reporting

Fatality monitoring results will be reported to DOC-EFP, USFWS and MDNR using the MDNR forms and reporting guidelines contained in Appendix F and according to the schedule described in section 9.0.

7.0 RISK ASSESSMENT

7.1 Overall Avian Community

Overall, avian fatalities at the project are not expected to be a substantial source of avian mortality in comparison to other factors. The predicted annual avian mortality from wind turbines is estimated to account for less than 0.01% of the mortality caused by the top eight anthropogenic causes (Erickson et al. 2005). The proportion of avian fatality attributable to wind turbines ranked seventh, behind buildings, power lines, cats, automobiles, pesticides, and communication towers.

Post-construction monitoring of modern wind energy facilities has shown avian fatalities to be lower than observed during early avian fatality studies. Tubular steel turbines, buried electrical cables, diligent siting, and other practices have reduced avian fatality rates in the last 10 to 15 years. Regional average fatality rates at wind farms studied across the U.S. have ranged from 2.31 birds/MW/year in the Rocky Mountain Region to 3.50 birds/MW/year in the Upper Midwest (National Research Council 2007). Most birds killed are passerines and the most common passerine fatalities tend to be common species (Poulton 2010). As discussed below under Section 7.3, many avian species are not sensitive to displacement by wind turbines. Birds that have been shown to avoid wind turbines are generally open grassland species, which are adapted to habitats that do not exist at Goodhue. AWA Goodhue's siting of most turbines in agricultural fields is expected to help minimize avian fatalities.

7.2 Bald and Golden Eagles

The bald eagle is rapidly becoming a relatively common wildlife species in Minnesota and is not in danger of decline. U.S. Fish and Wildlife Service data indicates that bald eagle populations increased approximately 20-fold in the lower 48 states between 1963 and 2005[2]. In Minnesota, the bald eagle breeding population in 2005 was approximately triple that in 1990[3]. Bald eagles populations have increased so significantly over the last four decides that the species was removed from the federal list of threatened and endangered species on June 28, 2007[4]. Bald eagles have since been removed from the Minnesota Department of Natural Resources list of threatened and endangered species and re-classified as "special concern"[5]. As of 2007, the MDNR estimated that Minnesota had approximately 2,300 breeding pairs of bald eagles. Formal surveys of breeding bald eagles were discontinued after 2005[6] so the current breeding bald eagle population is unknown. However, if previously documented rate of increase has continued (i.e. about 100 percent increase every 5 years), the current breeding population should be in excess of 4,000 breeding pairs.

As described in Section 8.2.3.3, there has been one documented bald eagle fatality associated with a wind turbine in North America and four other reported but undocumented reports of fatalities in the United States. Given that the United States alone has about 43,461 MW of operating wind power facilities[7] (which equates to over 25,000 operating turbines, if the average turbine is 1.5 MW nameplate capacity), this is an extremely small amount of mortality. One of the primary causes of bald eagle mortality is vehicle collisions associated with the birds feeding on road-killed deer. In 2008, the Wisconsin DNR reported recovering about 110 sick, injured, or dead eagles and determined that "…the leading cause of death was collision with a vehicle. Most vehicle collisions occurred when eagles were scavenging car-killed deer. Other common causes of eagle mortality include lead poisoning, electrocution, eagle versus eagle territorial fights, and unspecified wing injuries."[8] In 2009, the USFWS established an Incidental Take Permit (ITP) program under the BGEPA. This program was adopted in recognition that eagle "takes" would inevitably increase with a rapidly expanding eagle population and a continuously developing landscape.

[2] http://www.fws.gov/midwest/eagle/population/chtofprs.html
[3] http://www.fws.gov/midwest/eagle/population/nos_state_tbl.html
[4] http://www.fws.gov/midwest/eagle/1999prop/index.html
[5] Species of special concern are not protected by Minnesota's Endangered Species Statute or the associated Rules.
[6] http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ABNKC10010
[7] http://www.awea.org/learnabout/industry_stats/index.cfm
[8] http://www.dnr.state.wi.us/org/land/wildlife/harvest/reports/eagleospreysurv08.pdf

The USFWS provided Westwood with a draft eagle collision risk model (CRM) in Excel spreadsheet format as a tool to assist in evaluating potential collision risks to bald and golden eagles at the site. The formulas in this spreadsheet appear to be based on the collision risk modeling method described in Appendix D of the USFWS Eagle Conservation Plan Guidance. After studying the draft USFWS model in detail, we have concluded that it would be more appropriate to apply the Band et al. (2007) collision risk model to data from the AWA Goodhue project. The primary reason for using the Band et al. (2007) model is that it has been calibrated through the development of "avoidance rates" for a number of species while the USFWS draft model has not. Avoidance rates are calculated by comparing collisions predicted by a CRM to actual collisions documented through post-operational fatality monitoring. Whitfield (2009) developed an avoidance rate for golden eagles by comparing Band et al. (2007) CRM results at four U. S. wind farms to actual injuries and fatalities documented at each. It appears that the draft USFWS model applies the Whitfield (2009) avoidance factor for golden eagles. However, because the Whitfield (2009) avoidance factor was based on et al. (2007) CRM output, it would generate incorrect answers if applied to output from a different model. Whitfield (2009) states:

> "The present study suggests that a 99.0% collision avoidance rate for the golden eagle is a precautionary estimate, under the CRM of Band et al. (2007). This rate is not transferable to other CRMs, as noted by Madders & Whitfield (2006), since other CRMs may involve different assumptions…"

To date, no one has published an avoidance rate for bald eagles, most likely because so few collisions have been documented. By using the Band et al. (2007) CRM on the AWA Goodhue project, it will allow an avoidance rate for bald eagles to be developed for the first time.

Two initial applications of the Band et al. (2007) model were run on the 2011 breeding season data collected on the AWA Goodhue project site (**Appendix G**). The first application used eagle flight observations within five 800 meter radius sample plots centered on selected observation points. The second application used eagle flight observations that occurred within 100 meters of the 18 proposed turbine locations that fell within the five 800 meter radius sample plots. Given that turbine locations are known and eagle movements in and around the project area are not random (i.e. many movements are driven by food sources and habitat features), the smaller turbine-specific sample plots should yield more accurate results than the generic 800 meter radius plots. For example, many of the eagle movements associated with foraging at the western Belle Creek Watershed District reservoir were within the 800 meter radius sample plot but never approached a proposed turbine location.

Based on the more conservative 800 meter radius sample plots, the Band et al. (2007) model yielded a result of 0.13 collisions per year, which equates to 1 collision every 7.3 years. Based on the more accurate 100 meter turbine-specific sample plots, the Band et al. (2007) model yielded a result of 0.02 collisions per year, which equates to 1 collision every 43 years. As discussed above, we believe that the latter estimate would be more accurate for the breeding season, as it incorporates actual turbine locations and habitat features. We acknowledge that the breeding season data will not be representative of the remainder of the year and that we will likely see higher predicted collision rates once we have completed the collection and analysis of fall migration data. As discussed elsewhere in this ABPP, the fall migration period data has been seriously compromised by an ongoing, organized eagle baiting program. Coordination will be undertaken with the USFWS as part of the ITP process to determine the most appropriate way to deal with this factor in fall migration season collision rate modeling.

To provide additional context for the above-described breeding season CRM results, we reviewed the magnitude of predicted collisions to the allowable take in USFWS Region 3, as set forth in Appendix C of the USFWS' *Final Environmental Assessment (FEA) on the Proposal to Permit Take under the Bald and Golden Eagle Protection Act* (USFWS 2009). Table C3 of Appendix C provides a permissible annual take threshold for Region 3 of 224.39 individual bald eagles and 28.05 bald eagle territories. Region 3 encompasses the states of Minnesota, Iowa, Missouri, Wisconsin, Illinois, Michigan, Indiana and Ohio. As of 2007, the USFWS determined that Minnesota had 1,312 of the 3,475 breeding pairs of bald eagles in Region 3 (37.76 percent). If this percentage is applied to the allowable take established for the region forth in Appendix C of the Final EA, the proportion of the allowable annual take attributable to Minnesota would be 87.73 individual eagles and 10.59 bald eagle territories.

If the collision risks predicted above using the Band et al. (2007) model to breeding season data reasonably represents future breeding season fatalities, the predicted number of collisions at the AWA Goodhue Wind Project would represent a minute proportion of the take allowable for Region 3 and Minnesota's pro rata portion of that allowable take. The more conservative prediction of 0.13 collisions per year would represent 0.06 percent (i.e. 0.0006) of the allowable annual take for Region 3 and 0.15 percent (i.e. 0.0015) of Minnesota's pro rata portion. If additional eagle flight data at the site continues to show a reasonable predicted percentage of the annual allowable take for bald eagles, the AWA Goodhue Wind Project appears to be a suitable candidate for a programmatic incidental take permit (ITP) under the BGEPA.

It should be noted that collision risk modeling based on field data collected during the 2011 fall migration season cannot fully correct for the above-described eagle baiting program. It is likely that fall migration period survey results from baited areas will overestimate the actual collision risk, as compared to the normal, unbaited condition. In analyzing collision risks based on fall 2011 migration period data, we will apply the Band et al. (2007) CRM to the full data set and to a refined data set that omits data associated with obvious baiting activity.

As previously described, Westwood will continue to refine our initial assessments of eagle collision risk by continuing to apply the Band et al. (2007) model to the results of future point count data to be collected in 2012. We anticipate that the food base management program proposed in this ABPP will reduce the collision risk below normal, unbaited circumstances. This reduction should be reflected in point count data collected and CRM output generated after the food base management program becomes operational in 2012.

Risk assessment model output will be summarized after each season's data is collected and a cumulative collision prediction will be generated for the survey period. Risk assessment results will be reported to the MPUC, USFWS and MDNR at the completion of survey period. As stated previously, we will also provide input to the USFWS regarding how the data collected might contribute to the refinement and validation of collision risk modeling. As additional data is collected, AWA Goodhue will continue to coordinate with the USFWS regarding an ITP application and the appropriate magnitude of the allowable take.

Collision modeling results will be used to identify specific turbines or turbine clusters where additional adaptive management measures may be required. Such measures may include:

1. Removal of specific transitory food sources (e.g. road kills, carcass piles) that may be causing foraging flights that place eagles at risk.
2. If eagles are drawn to specific farming operations, coordination with the landowner to pursue adjustments to the operation to reduce the attraction (e.g. clean up of trash disposal piles, better composting of dead livestock).
3. Pursuing location-specific habitat modification to reduce perch sites or remove woody cover for prey species in immediate proximity to the turbine or turbine cluster where collisions are predicted.
4. Intensified biologist observations of turbines where collisions are predicted to obtain visual observations of eagle movements to gauge the degree to which avoidance behavior is occurring.
5. The use of non-moving pylons to simulate the outer edge of a turbine cluster. Such pylons would need to be designed not to serve as perch sites.
6. If the foregoing measures do not adequately resolve a collision risk predicted by modeling, temporary curtailment of the nearest turbine in the nearest cluster to the problematic movement pattern would be undertaken. To avoid diminishing the barrier effect, this turbine would be slowed rather than shut down.
7. Based on continued biologist observations, such curtailment would cease when the problematic movements have been resolved.
8. Stepwise expansion of curtailment would only be undertaken if continued risky flight behavior is observed to be continuing even after all other measures, including partial curtailment, have been implemented.

Since golden eagles winter but do not breed in Minnesota, the breeding season eagle monitoring data does not include any golden eagle observations. During 72 hours of point counts in October and November 2011, two golden eagles were observed. One golden eagle was soaring, exhibiting normal migratory behavior. The other was attracted to an active baiting location. These movements, along with any others observed in December

2011, will be analyzed in the same fashion as bald eagles to generate a collision risk prediction.

The collision risk to golden eagles is anticipated to be lower than for bald eagles for a number of reasons. First, there are far fewer golden eagles using the area. Based on golden eagle winter surveys, a population of about 60 birds is known to winter in southeastern Minnesota and southwestern Wisconsin[1] while, as of 2007, Minnesota had about 2,300 breeding pairs of bald eagles[2]. Second, golden eagles winter in Minnesota and do not breed here. Green and Janssen (1975), indicate that, at the most, golden eagles spend up to 7 of 12 months in Minnesota (i.e. mid-September to mid-April). This is corroborated by data from the two golden eagles being tracked by satellite telemetry by Minnesota Audubon and the National Eagle Center. Third, wintering golden eagles appear to spend much of their time in goat prairies and timbered rather than on agricultural land. In contrast, bald eagles breed in Minnesota and are typically present from mid-February through late December, with some birds staying year round to winter in open portions of the Mississippi River. As demonstrated by the nest observations and point count data collected to date for the AWA Goodhue project, breeding eagles will use agricultural land if food resources and nest sites are available. As compared to bald eagles, the relative collision risk to golden eagles should be lower because golden eagles: (1) are less common; (2) do not breed in Minnesota; (3) are present in the state for about 3.5 to 4 fewer months each year than bald eagles; and (4) focus their wintering activities in habitat types that are limited in the Project Area.

However, again, the ultimate collision risk to golden eagles will estimated based on field data and ongoing modeling results. If adaptive management measures are found necessary to address problematic gold eagle movements, they would be the same measures used for bald eagles.

7.3 Loggerhead Shrikes

Based on the shrike habitat avoidance strategies employed by AWA Goodhue in designing its turbine layout, and a review of available loggerhead shrike literature, the potential for loggerhead shrike collisions with wind turbines on this project is expected to be low.

Several facets of loggerhead shrike ecology and behavior suggest that this species is less vulnerable to effects from wind energy development than other avian species such as prairie chickens that inhabit open landscapes with uninterrupted horizons and few structures.

[1] http://www.dnr.state.mn.us/eco/nongame/projects/golden_eagle_tracking.html
[2] http://www.dnr.state.mn.us/birds/baldeagle.html

Information documenting the potential compatibility of wind energy with loggerhead shrikes and their habitat was presented at national and regional wildlife conferences (Bouta et al. 2010, Bouta et al. 2010a). Factors that suggest wind energy may not have a substantial effect on loggerhead shrikes include:

1. Loggerhead shrikes nest and forage in proximity to roads, power lines, fence lines, and farmsteads. The association of shrikes with roads and structures suggests that they would be less likely than many avian species to avoid habitats due to the presence of wind turbines.
2. Loggerhead shrikes nest and often fly much closer to the ground than wind turbine blades. Shrikes typically nest 1.2-6m above the ground (INHS 2010, Lee 2001). Keinath and Schneider (2005) indicated most foraging flights are within 10m of elevated perches, which suggests that most local flights of shrikes are at 16m or below. Conversely, the rotor-swept height of wind turbines at Goodhue Wind Project will extend from 38.8 to 121.3m.
3. Loggerhead shrikes have small breeding territories. Such localized habitat use would tend to reduce the probability of collisions with wind turbine blades, particularly when most turbines are sited in cropland. The largest territories are often about 12.6 ha or 31 acres (Kridelbaugh 1982, Porter et al. 1975). Dechant et al. (2002) indicated territories usually cover about 6-9 ha and can range from 2.7 to 25 ha in the U.S. and Canada.
4. Loggerhead shrikes have relatively low population densities and suitable habitat is not considered a limiting factor for shrikes in Minnesota, suggesting that shrikes will have adequate suitable habitat even if wind turbines displace shrikes from some suitable habitat. Brooks and Temple (1990) found substantial suitable unoccupied shrike habitat in Minnesota. Roadside surveys of shrikes in Minnesota and Iowa have found 0.11-0.15 pair/km (Brooks and Temple 1990, DeGeus 1990). A reasonable maximum shrike population for the project area, based on twice the density of 0.15 pair/km, would be 1 pair for every 330 ha of quarter-section habitat ranked 3-5, or 12.6 pairs for the project area. Alternatively, a reasonable habitat-based population potential for the project area would be 1 territory for each quarter section ranked 3 and 2 territories for each quarter section ranked 4-5, resulting in a total of 93 potential shrike territories. This suggests that the project area could include 80.4 suitable unoccupied shrike territories.

As indicated above, loggerhead shrikes may be less likely to be displaced from suitable habitats on wind projects because shrikes use habitats associated with fences, roads, power lines, and buildings. The AWA Goodhue team found no literature or documentation supporting the assertion that shrikes will avoid wind turbines, resulting in displacement of shrikes from suitable habitats. Although some grassland birds avoid wind turbines, many do not. Shaffer and Johnson (2008) found that one of five species of grassland birds avoided wind turbines in North and South Dakota. Although grasshopper sparrows avoided wind turbines, western meadowlarks, chestnut-collared longspur, and killdeer did not. Results for clay-colored sparrows were ambiguous. Research at wind projects on the Buffalo Ridge in Minnesota found small-scale displacement of about 80-100m (Leddy et al. 1999, Johnson et al. 2000).

The low flights of loggerhead shrikes may reduce the potential for shrike fatalities due to collisions with wind turbine blades. A recent avian fatality study in Oregon recorded an incidental loggerhead shrike observation, but detected no loggerhead shrike fatalities (Enk et al. 2010). A conversation with a biologist from Western Ecosystems Technology, Inc. indicated he did not recall any loggerhead shrike fatalities during post-construction fatality monitoring studies (Thompson 2011).

In a letter dated November 15, 2010, the USFWS suggested that fragmentation of grassland habitats would have the greatest effect on loggerhead shrikes. However, grasslands in the project area are already relatively fragmented. Furthermore, the effects of small grassland patch size on loggerhead shrikes is not well understood (Pruitt 2000). Cultivated cropland accounts for approximately 60% of the project area. Grasslands, pastures, and hay fields cover up to half of a square mile in certain areas and account for about 30% of the land cover in the project area.

AWA Goodhue has avoided and minimized turbine siting in grasslands and near important nest and perch sites such as scattered solitary trees, tree rows, and eastern red cedars. Instead, AWA Goodhue sited its turbines in agricultural row-crop fields wherever practicable. These practices, combined with the low flights, small territories, and low population densities of loggerhead shrikes, support AWA Goodhue's expectation that the potential for loggerhead shrike collisions with wind turbines on this project is low.

7.4 Trumpeter Swans

The recently discovered trumpeter swan nest location is within an impounded farm pond about 1.8 miles southwest of the nearest proposed wind turbine. The pond involved is about 2.8 miles northwest of the Zumbro River and has about 1.8 acre of open water and a fringe of emergent vegetation. The pond lies at the confluence of several grassy drainage ways and is about 0.35 mile from the nearest road. The following discussion summarizes the habitat preferences of trumpeter swans, the availability of suitable habitat within and near the Project Area and the potential risk to swans of turbine collisions.

7.4.1 Trumpeter Swan Habitat Preferences

Trumpeter swans nest in clear, quiet, ponded water bodies (e.g., ponds, lakes, marshes, sloughs) with relatively static levels, no obvious currents or constant wave action, and shallow margins that facilitate digging and foraging for the roots and tubers of aquatic plants (Travsky and Beauvais, 2004). In Montana, trumpeter swans were observed to nest in extensive beds of marsh vegetation such as sedges, bulrushes, cattails and Juncus (Belrose, 1978). In Alaska, sedges (Carex spp.) and horsetails (Equisetum spp.) dominate nesting marshes. Isolation from humans has been cited as an important factor in nest site selection (Hansen et al. 1971). Trumpeter swans avoid acidic, stagnant, or eutrophic waters (Mitchell 1994). In North Dakota, foraging trumpeter swans strongly preferred wetlands with sago pondweed (Earnst 1994).

Open flight lanes of at least 100 meters are needed for takeoff and landing, making small water bodies and forested wetlands unsuitable for nesting habitat (Travsky and Beauvais, 2004). Nest territory sizes range from 6 to 150 acres (Hansen et al. 1971). Trumpeter swans build their nests on top of emergent vegetation or small islands, usually in water less than 1 meter deep. Muskrat (Ondatra zibethicus) and beaver (Castor canadensis) lodges are often used as nest substrate (Banko 1960; Alaska Department of Fish and Game 1986; Henderson 1981; Earnst 1994). Non-breeding birds (typically less than 4 years old) usually gather in small flocks and remain together throughout the summer on water bodies not occupied by breeding pairs.

The AWA Goodhue Project Area appears to encompass very little habitat potentially suitable for nesting trumpeter swans. The Project Area does encompass a number of small impounded farm ponds but most appear unsuitable for trumpeter swan nesting because they are too small for cygnets to take flight and/or lack emergent vegetation. These ponds differ from the pond on which the new nest is located. The pond with the nest is slightly larger, has a fringe of emergent aquatic vegetation and has sufficient open water (i.e. 1.8 acre) for swans to take flight. The Project Area also encompasses two larger reservoirs that have sufficient size and open water to support use by breeding swans but have minimal emergent vegetation for potential nest sites. There is another reservoir and a farm pond ¼ to ½ mile west of the northwest corner of the Project Area that could provide suitable nesting habitat for swans. However, these water bodies are not located between any proposed turbine locations and other suitable swan habitat. The remaining wetlands in and around the Project Area are virtually all wet meadows or scrub shrub wetlands located along ditches or drainage ways. These wetland types lack both open water and aquatic emergent vegetation that would be suitable for nesting for foraging.

Muskrat houses and beaver lodges that might provide nest sites are similarly scarce. Due to the paucity of flooded emergent vegetation from which to build houses, muskrats in the Project Area typically utilize burrows in the banks of water bodies. Beaver lodges are built from peeled sticks and mud. No beaver lodges have been observed in open water within the Project Area but lodges likely exist along and within the banks of the larger reservoirs. It is possible that beaver bank lodges could be used as swan nest sites but, due to their exposure to predators, would be less suitable than beaver lodges located in open water away from shore.

During migration trumpeter swans stopover habitat consists of freshwater marshes, ponds, lakes, rivers, and brackish estuaries (Gale et al. 1987, Lockman et al. 1987, Bailey et al. 1990). They travel in family groups, and high-quality resting and feeding sites are especially critical to young birds which cannot travel as far as adults. Stopover use is limited by ice, forage availability, and disturbances. It is possible that migrating trumpeter swans could utilize the reservoirs and larger farm ponds as migration stopover habitat but such use has not been documented in the Project Area to date. If trumpeter swans are observed moving through the Project Area during migration period field surveys, we will document any observed flight paths and attempt to determine whether the swans utilize water bodies or cropland in the area.

Good winter habitat is characterized by open water bordered by level and open terrain, such as unobstructed snowfields or meadows, which does not impair the vision or mobility of resting swans (Travsky and Beauvais 2004). Level terrain is especially important next to smaller water bodies because trumpeter swans need long, open air lanes for takeoff and landings. During the mild weather of early winter swans may be widely dispersed, feeding in various water bodies, wetlands, and flooded agricultural fields. Potential wintering habitat within and near the Project Area appears to be negligible due to the lack of open water and exposed crop residue during winter.

7.4.2 Collision Risk to Trumpeter Swans

The risk of a trumpeter swan collision with a wind turbine appears low. The recently documented nest site is 1.8 miles from the nearest turbine and there are no open water bodies on the intervening land. No suitable trumpeter swan nesting habitat is apparent between the nest site and any of the turbines within the Project Area. It is possible that swans may fly through the Project Area during migration periods. However, the only specific landscape features that appear to afford potential stopover habitat are the reservoirs in and adjacent to the northwestern corner of the Project Area. Harvested crop fields may also be used for foraging during migration periods but there is no way to predict which fields would be most likely to be used. The crop planted and harvest dates vary from year to year and such fields are the predominant landscape feature in an around the Project Area. Which crop fields might receive use by swans (if any) would depend on conditions on the specific dates that swans might move through the area.

Assuming the swan nest is active in 2012, the potential collision risk to breeding swans will be re-assessed after nesting season observations have been completed. In addition, any observed movements and habitat use of swans during fall, winter and spring survey periods will be documented and included in the re-assessment of collision risk.

7.5 Bats

AWA Goodhue has minimized the potential for effects on bats by siting wind turbines away from woodlands wherever practicable. The primary bat species of concern identified by the USFWS during a telephone conference on June 9, 2011 is the northern long-eared bat. On January 21, 2010, the Center for Biological Diversity submitted a petition to the U.S. Secretary of the Interior to list the eastern small-footed bat (*Myotis leibii*) and northern long-eared bat (*Myotis septentrionalis*) as threatened or endangered under the Endangered Species Act (Center for Biological Diversity 2010). The petition identified threats to these species consisting of white-nose syndrome; agricultural and residential development; logging; oil, gas, and mineral development; wind energy development; and mine closures.

7.5.1 White-Nose Syndrome

White-nose syndrome has no direct relationship to wind power, but the fatal effects of this disease on bats has alarmed biologists and exacerbated concerns regarding potential effects of wind energy on bat populations. White-nose syndrome is a fungus that grows on the muzzles and wings of affected bats while they hibernate in caves. It was first discovered in New York State during the winter of 2006-2007. In five years it has affected nine species of bats, killed more than a million bats of six species, spread into more than 17 states, and moved as far west as Indiana, Missouri, and Oklahoma (Bat Conservation International 2011a, 2011b). The potential for white-nose syndrome to reach Minnesota may be limited because bat hibernacula are more widely dispersed in the Upper Midwest than they are to the south and southeast. Species with potential to occur in the project area and affected by white-nose syndrome in include the big brown bat, tri-colored bat, little brown bat, and northern long-eared bat. Wildlife mortality factors such as white-nose syndrome and collisions with wind turbines can be either compensatory or cumulative. Because bats have relatively few offspring and long lives, many biologists suspect that bat mortality factors are likely to be cumulative or additive rather than compensatory.

7.5.2 Risk of Turbine-Related Bat Fatality

Although some bat fatality is expected to result from collisions with turbines at the project, review of pertinent bat fatality monitoring studies does not allow prediction of the precise extent of bat fatality anticipated. Baerwald et al. (2008) suggested that more bat fatality is caused by barotrauma, a result of air pressure changes around turbine blades, than collision with turbines.

A compilation of bat fatalities at wind projects across North America (Arnett et al. 2008) indicated that bat fatalities were lowest at wind projects in the Rocky Mountains and Pacific Northwest regions, and highest in the eastern United States. In the eastern region where turbines have been placed on forested ridges, fatalities have averaged 37.0 bats/turbine/year and 37.1 bats/MW/year. Data from Arnett et al. (2008) indicates that fatalities in the Midwest have averaged 3.3 bats/turbine/year and 4.2 bats/MW/year.

The perceived fatality rate of bats at wind farms has increased as more studies are published. Prior to 2007, the overall average fatality rate for U.S. wind projects was estimated at 3.4 bats/turbine/year, and 4.6 bats/MW/year (Johnson 2004). Early studies indicate most wind farms in grassland and agricultural landscapes tended to have lower fatality, ranging from 0.74 to 2.32 bats/turbine/year (Erickson et al. 2002, Johnson 2004).

Recent studies have shown that bat fatality rates cannot be reliably predicted based on project area vegetation and topography. Relatively high fatality rates have been documented in agricultural areas at wind projects in Iowa (8.59 bats per MW per year, Jain 2005), Wisconsin (24.57 bats/MW/year, Gruver et al. 2009), and Alberta (10.27 bats/MW/year, Brown and Hamilton 2006). In southern Alberta, two wind projects located near one another and with similar vegetation and topography had dramatically different bat fatality rates (Arnett et al. 2008).

The annual peak of bat fatalities at wind projects is correlated with the fall migration period. Bat fatality at wind farms has been associated primarily with dispersing and migrating bats, and has typically involved solitary, tree-roosting species such as Silver-haired, Hoary and Eastern Red Bats (Erickson et al. 2002, Johnson 2004). As indicated in section 5.6.3, all three of these species were detected in the project area during the initial month on acoustic monitoring. One national overview indicates that the Hoary Bat and Eastern Red Bat together account for 64.4% of the bat fatalities at wind projects (National Research Council 2007). Conversely, the other four species of bats detected in the project area are susceptible to white-nose syndrome.

8.0 IMPACT AVOIDANCE AND MINIMIZATION

8.1 Overall Avian Community

8.1.1 Pre-Construction

Pre-construction efforts to avoid and minimize avian and bat impacts have focused on siting turbines on cropland to minimize impacts to forest stands, grasslands and wetlands that provide suitable habitat for sensitive species birds and bats. Turbines have been sited to maximize distances to high quality habitats and likely flight corridors. These avoidance and minimization efforts have been informed by a series of past and ongoing pre-construction avian and bat studies and surveys described in sections 3.1.1 and 5.0 of this ABPP.

8.1.2 Construction

8.1.2.1 Minimize Construction Disturbance

Construction practices to be followed by the contractor will be documented in a manual which will be presented during construction phase environmental training (see Section 9.1.2). AWA Goodhue will minimize the area of construction disturbance to the extent practicable. The majority of access road, turbine pad, and electrical collection line construction will occur within cultivated agricultural fields. The project design minimizes habitat fragmentation and habitat disturbance by virtue of its location in a landscape dominated by corn and soybean fields. Temporary construction areas that occur in areas of natural vegetation, such as underground electrical cable routes and construction crane paths, will be restored to pre-construction contours and grassland vegetation.

The construction contractor will implement practices to maintain a safe and orderly construction site during project construction. The potential for wildfire will be minimized by properly storing petroleum chemicals and clearing combustible vegetative materials from construction zones where appropriate. Wildfire is a potential threat that can affect bird and bat habitat. The accumulation of garbage and related food waste will be limited by use of proper solid waste disposal activities so that garbage does not attract birds and bats. The introduction and spread of invasive plant species will be limited by emphasizing native seed mixes, avoiding unnecessary soil disturbance, and stabilizing disturbed soils with approved seed mixes or other erosion control measures as soon as appropriate.

8.1.2.2 Minimize Vegetation Removal

Project construction will minimize clearing of perennial vegetation and disturbance of potential avian nesting cover. Substantial nesting cover impacts are not anticipated because the project layout avoids most grasslands. To avoid and minimize potential effects on grassland nesting birds, areas with planned grassland disturbance will be mowed or tilled during the late fall or early spring (outside of the nesting season) so that temporary disturbance areas do not provide attractive nesting cover.

8.1.2.3 Minimize Wetland Impacts

The Project has been designed to minimize impacts to wetlands. Permanent wetland impacts were quantified at 0.225 acre. Access road alignments, collector cable routes and crane paths were refined to avoid wetland impacts wherever possible.

8.1.3 Post-Construction

8.1.3.1 Minimize Turbine and Facility Lighting

AWA Goodhue will minimize operational turbine lighting to the extent practicable in an effort to avoid attracting birds and bats to turbines. Lights can attract and confuse migrating birds (Gehring et al. 2009, Manville 2005, 2009) and bats sometimes feed on concentrations of insects at lights (Fenton 1997). The USFWS recommends strobed, strobe-like or blinking incandescent lights, preferably with all lights illuminating simultaneously, to avoid disorienting or attracting birds and bats (USFWS 2010a). The USFWS states that only minimum intensity, maximum "off-phased" duel strobes are preferred. No steady burning lights, such as L-810 steady-burning obstruction lights, will be used. The USFWS recommends use of medium intensity flashing white lights (L-685) on a previous wind project and the Federal Aviation Administration (FAA) lists these lights as an option for wind turbines. However, AWA Goodhue does not propose to utilize such lights because they are substantially brighter than red lights and more noticeable to humans. The lighting of specific turbines at the project will be in accordance with FAA standards for cluster turbine configurations (FAA 2007), which recommend:

1. synchronized flashing red lights (L864);
2. perimeter lighting that defines the periphery of the project with gaps of no more than 0.5 mile (0.8 km) between lights;
3. lighting gaps of no more than 1 horizontal mile (1.6 km) or 100 vertical feet (30.5 m) of terrain across the cluster; and
4. lighting of isolated turbines that are distant from cluster groups.

The Goodhue project lighting plan is under review by the FAA and is consistent with several of the USFWS recommendations. The met towers were approved for a dual lighting system that consists of red lights for nighttime and medium intensity flashing red lights for daytime and twilight. This lighting plan will remain the same when project layout is finalized and alternate turbines are eliminated.

Lighting of operations, maintenance, and substations facilities will be at a minimum level for safety and security purposes. Use of motion or infrared light sensors and switches will be considered to enable lights to be kept off when they are not required. Lights on the maintenance facility may be shielded to minimize skyward illumination.

8.1.3.2 Follow APLIC Guidelines for Transmission Lines

The Avian Power Line Interaction Committee (APLIC) has developed practices for addressing electrocution risk factors and other interactions between birds and power lines (APLIC 2006). AWA Goodhue will ensure that the transmission lines connecting its project to the grid are designed in a fashion consistent with APLIC guidelines. Transmission line engineers are generally familiar with the design specifications and guidelines developed to reduce the potential for avian electrocutions. Consequently, modern transmission structure designs are generally consistent with APLIC recommendations on dimensions and configurations that reduce the risk of bird fatality.

8.2 Bald Eagles

8.2.1 Pre-Construction

8.2.1.1 Turbine Siting

To the degree possible, turbines have been sited in open agricultural fields that have unobstructed views and are away from natural food sources, such as riparian corridors and streams. The number of turbines has also been reduced by 8 percent from 52 to 48. All turbines have been sited at least one mile from the nearest bald eagle nest. Neither the current USFWS ECP guidelines nor the 2003 Service Interim Guidance for Avoiding and Minimizing Impacts from Wind Turbines contain any recommendation for a spatial buffer distance from bald eagle nests.

8.2.1.2 Continued Bald Eagle Monitoring/Risk Modeling

Point count surveys for bald and golden eagles will be continued, and USFWS risk assessment modeling results will be updated throughout the pre-operational phase of the Project.

8.2.1.3 Initiation of Food Base Management

The January 2011 Draft Eagle Conservation Plan Guidance recommends a number of management practices intended to manage the availability of both artificial and natural eagle food sources within the footprints of wind power projects. AWA Goodhue will pursue the following USFWS recommended food base management measures in conjunction with O & M activities on the Project:

1. If rodents and rabbits are attracted to project facilities, the activities that may be attracting them will be identified and eliminated.
2. Vegetation or landscape management that might indirectly result in raptors being attracted to turbine locations (e.g. seeding forbs or maintaining rock piles that attract rabbits and rodents) will be avoided.
3. Stored parts and equipment, which may be utilized by small mammals for cover, will be kept away from wind turbines.
4. If fossorial mammals burrow near tower footprints, where feasible on a case-by-case basis, burrows will be filled and the surrounding pad covered with gravel at least 2 inches deep and out to a perimeter of at least 5 feet.
5. Carcasses that have the potential to attract raptors to the Project Area and, in particular, turbine locations will be immediately removed.

6. Responsible livestock husbandry will be encouraged among both participating landowners and neighbors (e.g. removing and properly disposing of livestock carcasses, fencing out livestock).
7. Artificial and/or natural habitats near turbine locations that attract prey species may be undertaken if eagles exhibit risky flight behavior after the forgoing measures are in place.
8. Prey-base enhancements and/or land acquisition and management to draw eagles out of a project footprint may be undertaken, if eagles exhibit risky flight behavior after the foregoing measures are in place.

Both of the two new bald eagle nests identified in 2011 were directly associated with artificial feeding activities involving the disposal of livestock carcasses. Both new nesting locations are unusual and appear sub-optimal due to their minimal forest cover, the predominance of surrounding cropland and their substantial distances to perennial water (and hence, natural food) sources.

Regardless of whether eagles would have nested in these locations naturally, artificial feeding activity encourages bald eagles to forage and nest in locations that might otherwise be sub-optimal or unsuitable eagle habitat. It is inappropriate to encourage bald eagles to become dependent on an artificial food source that might be discontinued at a critical point in their life cycle. As stated above, the USFWS Draft ECP Guidance recommends against the improper disposal of livestock carcasses when it recommends "…responsible livestock husbandry (e.g. removing carcasses, fencing out livestock)… if grazing occurs around turbines."

Exposed surface disposal of livestock carcasses is also illegal in Minnesota under Minn. Stat. § 35.82, which provides that livestock carcasses must either be trucked to a rendering facility or buried out of reach of scavengers. The Board of Animal Health (BAH) is responsible for enforcing this statute. It is also an acceptable practice to fully compost livestock carcasses using a process developed and approved by the BAH. Properly composted livestock carcasses are so decomposed that they do not represent a potential food source for scavengers.

Road kills also represent a food source for bald eagles, and there is evidence that some road kills have been disposed of in one or more of the locations used for livestock carcass disposal. Eagles feed opportunistically on road kills anywhere they occur, in turn exposing the birds to the risk of being struck by vehicles. In 2008, 2009 and 2010, the Wisconsin DNR analyzed the cases of injury or mortality for 110, 150 and 120 sick, injured, or dead eagles (Wisconsin Department of Natural Resources 2008, 2009 and 2010). In each of these years, the leading cause of death was collision with a vehicle. Most vehicle collisions were reported to have occurred when eagles were scavenging car-killed deer.

The 2011 USFWS Draft Eagle Conservation Plan Guidance also recognizes vehicle collisions as a source of fatalities and recommends immediate removal of "…carcasses (other than those applicable to post-construction fatality monitoring; see below) that have the potential to attract raptors from roadways and from areas where eagles could collide with wind turbines. AWA Goodhue will undertake a multi-step process to address problems with artificial feeding of bald eagles and risks posed by eagles feeding on road kills:

1. AWA Goodhue will work directly with landowners who are currently known or thought to be improperly disposing of livestock carcasses, in an effort to gain voluntary compliance with Minn. Stat. § 35.82. If compliance cannot be obtained through informal coordination, the BAH will be contacted and asked to conduct necessary inspections and, if appropriate, subsequent enforcement action.
2. AWA Goodhue will work with the BAH, Goodhue County Agricultural Extension Service and Goodhue County law enforcement to provide educational resources to landowners regarding proper livestock carcass disposal techniques.
3. AWA Goodhue will fund the establishment of an appropriately sited and managed central road kill disposal location that will not attract bald eagles to the project footprint.
4. AWA Goodhue O & M staff will work with state, county and township road and law enforcement authorities to encourage and facilitate rapid pick up and proper disposal of road kills. AWA Goodhue O & M staff having valid MDNR possession permits may also directly engage in the removal and disposal of road kills within the Project Area.

8.2.2 Construction

8.2.2.1 Continued Bald Eagle Monitoring/Risk Modeling

Point count surveys for bald and golden eagles will be continued, and USFWS risk assessment modeling results will be updated throughout the construction phase of the Project.

8.2.2.2 Construction Phasing to Minimize Disturbance

All of the currently known active bald eagle nests in and around the Project Area are in excess of one mile from the nearest turbine. Accordingly, no special construction phasing measures appear to be required to avoid construction-related disturbance to eagles during the nesting period.

8.2.2.3 Continued Food Base Management

The construction management staff for the project will be trained to recognize likely signs of artificial feeding activity of eagles (e.g. concentrated eagle movements around farmsteads or locations lacking perennial water, defense of such locations against turkey vultures, etc.) and report such observations to AWA Goodhue. Where such activity is observed or suspected, the same resolution process described in Section 8.2.1.2 will be undertaken. Construction workers and logistics contractor drivers will also be provided instructions for immediately reporting road kills to construction management staff, who will then report them to AWA Goodhue. Road kills will either be removed by AWA Goodhue staff or will be reported to the appropriate road authority with a request for rapid pick up and proper disposal at the central disposal facility described above.

8.2.2.4 Road Kill Minimization in Construction Traffic Plan

AWA Goodhue recently engaged in a study of road structure suitability to determine which county and township roads are best suited to handle heavy construction traffic. AWA Goodhue is now in the process of working with Goodhue County and the townships to develop a plan for construction traffic routing. AWA Goodhue will include road kill minimization as a factor in this traffic routing plan. The construction traffic routing plan will include conservative speed limits for all construction traffic, as well as a road kill reporting process. All construction staff and drivers of vehicles hauling equipment and turbine parts will all be provided instructions regarding the rapid reporting of road kills. Prior to construction, on-site staff and the wildlife consultant for the project will obtain the necessary possession permits from MDNR to facilitate the rapid removal and disposition of road kills. Road kill reporting instructions will provide contact information for these individuals. A central road kill burial site (to be identified in the construction traffic plan) will be established either within the Project Area or at a nearby landfill.

The construction traffic plan will be submitted to the USFWS and MDNR for review prior to issuance to construction staff, the construction contractor and the logistics contractor.

8.2.3 Post-Construction

8.2.3.1 Continued Bald Eagle Monitoring/Risk Modeling

Point count surveys for bald and golden eagles will be continued, and USFWS risk assessment modeling results will be updated for two years after the Project becomes commercially operational.

8.2.3.2 Continued Food Base Management

After construction is complete, O & M staff will continue monitoring the project area for likely signs of artificial feeding activity of eagles and will pursue the same resolution process described in Section 8.2.12. AWA Goodhue will continue to fund the central road kill disposal location for the life of the project and O & M staff will continue to report road kills to the appropriate road authority with a request for rapid pick up and proper disposal at the central disposal facility described above. Where feasible and appropriate, O & M staff may pick up and dispose of road kills in the course of their duties to assist road authorities.

8.2.3.3 Curtailment

Curtailment of wind turbine operation by idling or braking turbines to prevent blades from spinning has been suggested as a possible mitigation measure to minimize or avoid impacts to eagles. For the reasons set forth below, curtailment is considered a last resort measure for reducing turbine collision risks for bald eagles.

Curtailment as a mitigation tool is typically applied to sites where large-scale bird activity has been previously identified. A literature and internet search found no instances where curtailment was targeted specifically towards bald eagles or any other large avian species in the United States. Examples of sites in the United States where curtailment is being used include Penascal and Gulf Wind I Wind Farms, both of which are in the gulf coast in Texas. These locations have been identified as having high risk of avian mortality due to their proximity to major avian migration corridors or landscape features that act to concentrate large numbers of birds during certain weather events or periods of broad-front migration. These locations are at the south end of the central flyway and see flocks of thousands of migrating birds. These large flocks are particularly at risk when migration flights occur at night or during periods when poor weather limits visibility. The AWA Goodhue project area does not experience concentrated bird migration movements that approach the magnitude occurring at these coastal sites.

The USFWS Draft Eagle Conservation Plan (USFWS 2011, page 7) states that significant numbers of bald eagles have not been documented at U.S. wind projects. An internet search revealed only one incident of bald eagle mortality at a wind project in North America – at the Erie Shores facility in Ontario, Canada. Turbines in this facility are sited in strings rather than clusters and are oriented parallel to and within 0.25 mile of the Lake Erie shoreline – a landscape feature that attracts foraging and nesting eagles and funnels their movements during migration periods. This situation starkly contrasts with turbines sited in clusters on an agricultural landscape.

More recently, USFWS staff members have suggested as many as five bald eagle fatalities associated with North American wind farms. Documentation regarding these reported fatalities was requested from the USFWS to facilitate comparison with the circumstances at the AWA Goodhue project site. The information requested included: (a) which wind projects were involved; (b) at what time of year did the alleged fatality occur; (c) how close was the collision site to the nearest eagle nest or other important eagle use area; and (d) contact information for the developers of these wind farms or their consultants. The USFWS indicated that it was unable to supply the requested documentation. Accordingly, other than the Erie Shores fatality, these reports must still be considered anecdotal and unverified. Even if the correct number of documented bald eagle fatalities is five, this is still an extremely low number given that more than 45,000 MW of wind power is currently operational in North America. It is possible that the extremely low number of bald eagle fatalities is partially a result of avoidance behavior, described in more detail below.

An important factor that needs to be considered in any decision to curtail turbines is the fact that some bird species, including bald eagles, appear to actively avoid moving turbines. This "barrier effect" has been documented in a number of avian studies around the world (particularly off-shore wind developments) and is a phenomenon acknowledged by the USFWS.[1] Bald eagles displayed avoidance behavior after the construction and operation of a 3-turbine wind facility in Pillar, Alaska (Kodiak Island), where eagles discontinued use of previously utilized areas of the mountain ridge in order to avoid crossing the ridge among the turbines (Sharp et al. 2010). Presumably, the barrier effect observed around a cluster of turbines would be at least as great as for three turbines along a ridge. If turbines are shut down, then it is questionable whether the barrier effect will fade and eagles would start moving through a turbine cluster they might otherwise avoid. If curtailment is applied to address a specific movement pattern in a given location, it may be most prudent to curtail only the turbine nearest the movement rather than the entire cluster. This would have a similar effect to pylons, which are discussed on page 66 of the USFWS Draft Eagle Conservation Plan Guidance[2], while maintaining motion to preserve the barrier effect. Pylons could be used prior to undertaking partial curtailment, in an effort to create the perception of a different turbine cluster boundary and encourage avoidance behavior. However, the pylons would need to be designed so as not serve as perches.

For the AWA Goodhue Wind Project it is expected that foraging activities would represent the largest risk for bald eagles and other raptor species. Food

[1]http://www.fws.gov/windenergy/docs/Barrier_Effect.pdf
[2]The USFWS recommend that developers "[c]onsider using pylons at the ends of turbine rows, place pylons in ridge dips or leave dips undeveloped."

base management that would remove incentives for eagles to approach or enter turbine clusters seems to represent the best day-to-day option for collision prevention. Some food sources are landscape features that cannot be moved while others are temporary and highly transitory. With food sources that are immobile, flight patterns are likely to be relatively consistent and siting turbines away from known movement corridors is the probably the most effective impact avoidance approach. Using the locations of nests and fixed food sources known data collected on nest locations AWA Goodhue has done this to the extent practicable based on applicable turbine setbacks, locations of known nests and fixed food sources (e.g. the Belle Creek Watershed District Reservoir) and eagle movement data collected during the breeding season.

With transitory food sources, neither turbine siting nor curtailment offers a practical approach to preventing collisions. Artificial baiting of eagles in the Project Area (which has been documented in multiple locations and is ongoing) and the unpredictable timing and distribution of road kills make it impossible to predict which turbines would most put eagles at risk on any given day. Because they are opportunistic feeders, eagle flight patterns will change every time a food source is introduced or removed. Focusing on the removal of these food sources would be more effective in preventing collisions than curtailing specific turbines that may or may not represent a risk. Because flights related to transitory food sources are unpredictable, curtailment is not a valid mitigation measure to address them. Effective use of a curtailment program to address these flights would require real-time knowledge of an individual bird or flock's location, flight height, flight speed, flight direction, and a systematic approach to determine potential for collision with an operational wind turbine.

Avian radar systems are being used at the Penescal and Gulf Wind I Wind Farms (mentioned above) to curtail turbines when a large number of birds are identified during broad-front migratory events occurring and weather conditions impair visibility or concentrate avian activities in high risk areas. While radar systems have been effective in these types of applications, the technology does not allow for the identification of a target species and is not an effective mitigation tool for large raptors, including eagles. Other large avian species, such as turkey vultures, can and do occur in areas with bald eagles, and current radar system technology cannot accurately differentiate the reflective signatures produced by these species. Radar could not be practicably used to inform curtailment decisions in response to eagle movements.

As described in Section 7.2, AWA Goodhue proposes to use curtailment as a last resort measure in specific instances when a collision risk identified through modeling or field observations cannot otherwise be satisfactorily resolved. Curtailment would be pursued if: (1) field survey and/or collision modeling results indicate a collision risk problem that would cause AWA Goodhue to potentially exceed a take threshold set forth in an ITP and (2) all other measures listed in Section 7.2 fail to reduce the predicted collision risk below that threshold. After all other measures have failed to resolve a turbine-specific collision risk, temporary curtailment of the nearest turbine in the nearest cluster to the problematic movement pattern would be undertaken. To avoid diminishing the barrier effect, this turbine would be preferably slowed rather than totally shut down. Based on continued biologist observations, such curtailment would cease when the problematic movements have been resolved. Stepwise expansion of curtailment would only be undertaken if ongoing surveys or collision risk modeling continues to indicate a collision risk that would cause an ITP threshold to be exceeded. Ongoing coordination will be maintained with the USFWS regarding updated survey and modeling results and measures being taken to avoid exceeding a take threshold.

8.3 Golden Eagles

The impact avoidance, minimization and adaptive management measures applicable to bald eagles will apply to golden eagles as well. These are described in Sections 7.2 and 8.2.3. Through ongoing pre-operational point counts, we will develop a better picture of the collision risk to golden eagles. Westwood will also maintain ongoing coordination with Minnesota Audubon and the National Eagle Center to obtain and analyze the satellite telemetry data being collected of radio-tagged golden eagles. If any radio-tagged golden eagles utilize the project footprint, information will be assessed and included in the monthly monitoring reports. Like bald eagles, golden eagles will scavenge livestock carcasses and road kills. Accordingly, the prey-base management measures described for bald eagles would apply equally to golden eagles. These measures are intended to foster reliance on natural food sources, which in turn would be associated with higher quality habitats away from proposed turbine locations.

8.4 Loggerhead Shrikes

8.4.1 Pre-Construction

Throughout the site permit process, AWA Goodhue revised its turbine layout a number of times to reduce potential environmental and human impacts associated with the project. In addition to moving individual turbine locations to avoid and minimize impacts, AWA Goodhue also reduced the overall number of proposed turbine locations from 52 to 48 by switching from the GE 1.5 MW turbine model to the GE 1.6 MW turbine.

AWA Goodhue's primary strategy for protecting loggerhead shrikes was to avoid highly and very highly suitable shrike habitat through its micro-siting process. Given the connected nature of wind energy infrastructure (turbine arrays, access roads, cable routes, crane paths), some minor effects on potential shrike habitats are expected. Implementation of mitigation measures is expected to aid in minimizing potential effects on shrikes.

8.4.1.1 Turbine Layout Revisions to Minimize Effects

A proactive approach to siting turbines and related improvements increased the compatibility of the project with loggerhead shrike habitat. AWA Goodhue adjusted turbine locations to avoid highly suitable and very highly suitable loggerhead shrike habitat. Between October 21, 2010 and June 30, 2011, proposed turbine locations were revised several times, and a number of turbines were moved out of suitable habitats into habitats ranked unsuitable to minimally suitable. Turbines proposed in higher quality habitats (ranks 3-5) were shifted within those areas to avoid habitat features that contribute to high suitability rankings. Avoidance of suitable shrike habitat was balanced against multiple constraints that affected acceptable turbine siting locations, including landowner acceptance, property boundary setbacks, residence setbacks, wind resources, raptor nest setbacks, wetlands, cultural resources, construction feasibility, site access, telecommunications signals, radar, and aircraft flight navigation. However, even given these other constraints, only three turbine locations are in highly or very highly suitable habitat based on the coarse filter habitat model. Closer review using a turbine-centered habitat model indicates that all three of these turbines are sited in cropland. None of the turbines meet the criteria of the turbine-centered model for highly suitable shrike habitat, which include:

1. area within a 40-meter radius is dominated by grassland,
2. area within a 200-meter radius is over 40% grassland, and
3. perches exist on over 40% of the area within a 200-meter radius.

The following is a summary of recent additional layout changes designed to avoid quality shrike habitat.

After the June 13, 2011 field investigation, the following turbines were eliminated or moved to minimize potential effects on loggerhead shrikes: Turbine 16 was eliminated from the layout because it was located in grassland within a quarter section ranked very highly suitable for loggerhead shrikes. Turbine 28 was renamed Alt-28 and moved 1,025 feet south-southeast to a location of disturbed land along a field road because it was located in grassland within a quarter section ranked very highly suitable for loggerhead shrikes.

After meeting with the MDNR and MDOC on August 18, 2011, the following turbine location adjustments were made to minimize potential effects on loggerhead shrikes:

1. Turbine Alt-28 was eliminated because it was located in an area of grazed grassland within a quarter section ranked very highly suitable for loggerhead shrikes.
2. Turbine 6 was moved 735 feet south-southeast, increasing the distance from a 15-acre grassland within an unsuitable ranked quarter section from 60 feet to 340 feet.

8.4.2 Construction

Turbines have all been sited in locations that do not provide highly or very highly suitable shrike habitat. Accordingly, construction activities associated with turbines are expected to have little to no effect on shrikes. As access roads and collector cable routes have also been designed to avoid and minimize effects on highly suitable shrike habitats. If any access roads or collector cables routes coincide with shrike breeding locations that may be noted during avian surveys, routes will be modified or construction timing staged to avoid or minimize disturbance to the birds during nesting.

If construction activities will occur between April and July within 200 meters of habitat considered “Highly Suitable” or “Very Highly Suitable” by the MDNR, pre-construction loggerhead shrike surveys will be conducted in those areas to determine whether breeding shrikes are present. Based on a review of the turbine layout and shrike habitat rankings, only turbines 17 and 18 lie within areas ranked “Highly Suitable” or “Very Highly Suitable” for shrikes and appear to be within 200 meters of the habitat that generated these rankings. Turbines 25, 26 and A52 lie within areas ranked “Highly Suitable” or “Very Highly Suitable” for shrikes but appear to be more than 200 meters of the habitat that generated these rankings.

Construction activities will be staged to avoid causing a potential disturbance-related “take” of loggerhead shrikes. Coordination will be undertaken with the MDNR to review the final plans for the project, confirm the boundaries of potentially sensitive shrike breeding habitat near the turbines mentioned above and will obtain concurrence on site specific activities and time periods that must be avoided if breeding shrikes are observed. The results of this coordination will be reported at the Preconstruction Meeting to ensure contractor awareness of the sensitive areas. If possible, construction activity in such areas will be staged to avoid the April-July period entirely. If construction in such areas is proposed during this time period, such construction will not be commenced until it has been confirmed that breeding shrikes are not present.

8.4.3 Post-Construction

AWA Goodhue avoided effects on loggerhead shrikes through siting turbines almost exclusively in crop fields and away from highly suitable shrike habitat. The turbine layout has been modified multiple times in response to MDNR input and the MDNR has formally concurred that all turbines are sited in a manner that avoids highly and very highly suitable shrike habitat. Accordingly, the implementation of additional mitigation measures will be balanced with other ecological mitigation measures discussed in this plan.

AWA Goodhue is considering several mitigation measures to help fill knowledge gaps regarding shrike ecology and maintain and enhance loggerhead shrike habitats. Various sources contributed to the development of the practices listed below, including but not limited to Dechant et al. (2002), Pruitt (2000), and WDNR (2011). Implementation of the following additional mitigation measures will depend upon construction timing, wildlife agency assistance, and landowner relations:

1. Keep fence lines intact to the extent practicable.
2. Record any loggerhead shrikes observed during point counts conducted for continued monitoring of bald eagle activity in the project area.
3. Report observed loggerhead shrikes and/or shrike nesting activity, if any, to the MDNR Natural Heritage Program.
4. Record locations of incidental loggerhead shrike observations in relation to turbine locations during post-construction avian fatality monitoring.
5. Consider implementing a program of periodic behavioral observations to assess the risk to any breeding shrikes that may be detected in the vicinity of wind turbines.
6. Educate landowners on measures that enhance loggerhead shrike habitat, including: periodic burning or mowing of ungrazed grasslands to discourage succession to woodland and maintain open grassland with scattered small trees and shrubs; rest-rotation grazing to provide preferred habitat by shortening tall grasslands; tree and shrub nest site and perch site protection from grazing and rubbing by livestock; use of fencing or other methods to protect old shelterbelts and nest trees from cattle; planting or protecting low shrubs and trees along fences and in otherwise open pastures and fields; maintaining and diversifying shelterbelts adjacent to grassland by incorporating thorny trees and shrubs; and avoiding creation of continuous linear strips of woody vegetation.

8.5 Trumpeter Swans

Trumpeter swans were considered extirpated in Minnesota as of the mid-1800s due to overhunting. Through recovery efforts, Minnesota now supports 2,400 free-flying trumpeter swans. However, continued threats to the trumpeter swan population in Minnesota include loss or degradation of wetland habitat, lead poisoning, power line collisions, and illegal shooting. Lead poisoning is the primary man-induced cause of trumpeter swan mortality. It is estimated that lead poisoning from ingestion of lead shot and fish sinkers is responsible for more than half of the mortality of Midwestern trumpeter swans (Gillette and Shea 1995). Powerline collisions are a less prevalent, but still important, source of trumpeter swan mortality. Of 75 trumpeter swan deaths recorded from 1958 to 1973, 19% of the fatalities were due to powerline collisions (Weaver and St. Ores 1974).

At this time, the potential for construction disturbance or turbine collision risk to trumpeter swans from the AWA Goodhue Wind Project is considered low, given that; (1) only one breeding pair has been documented in the general area; (2) the nest site is outside the Project Area and is 1.8 miles from the nearest turbine; and (3) no proposed turbine locations lie between the nest site and other potentially suitable aquatic foraging habitat.

The MDNR species profile for trumpeter swans describes their nesting habitat as follows:

> "During the breeding season, trumpeter swans select small ponds and lakes or bays on larger water bodies with extensive beds of cattails, bulrush, sedges, and/or horsetail. Ideal habitat includes about 100 m (328 ft.) of open water for take-off, stable levels of unpolluted, fresh water, emergent vegetation, low levels of human disturbance, and the presence of muskrat (*Ondatra zibethicus*) houses and American beaver (*Castor canadensis*) lodges for use as nesting platforms."
>
> http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=ABNJB02030

No suitable trumpeter swan nesting habitat, as described by the MDNR, has been observed within the AWA Goodhue Project Area. Potential breeding season foraging habitat for trumpeter swans is likewise extremely limited within the Project Area. The only water body observed within the project area that might offer swans a foraging opportunity is the reservoir in the northwest part of the Project Area. However, this water body lacks emergent vegetation and does not appear to offer any suitable nesting opportunities for trumpeter swans. Trumpeter swans do forage in crop fields during the migration periods. Row crops are the predominant land cover in and around the Project Area and crops change from year-to-year. Accordingly, while it is possible that the swans utilizing the recently documented nest site could utilize the Project Area for foraging, it is not possible to predict what areas they might use or during what time periods. If crops fields within the Project Area are used for fall foraging, it is likely that such use would be transitory and short-term.

Given the above factors, it appears unlikely that any specific impact avoidance, minimization or adaptive management measures specific to swans will be necessary. However, this conclusion will be re-visited during the spring and fall of 2012 after more data has been collected on the movements of nesting and migrating swans (assuming they return to nest in the same area). If that data suggests that impact avoidance, minimization or adaptive management measures might be warranted, such measures will be explored in coordination with MDNR. Specific examples of impact avoidance, minimization or adaptive management measures that might be explored under such circumstances are:

1. If the nest is active in 2012, route construction traffic away from roads nearest the nest location;
2. If the nest is active in 2012, stage construction activity in the southwest corner of the Project Area to avoid the trumpeter swan nesting period;

3. Install bird diverters on the interconnection transmission line at the north end of the Project Area. While this will not traverse any potentially suitable aquatic habitat, foraging or migrating swans could potentially pass through this area en route to the Mississippi River;
4. While existing electric distribution lines in the immediate area of the nesting pair are unrelated to the AWA Goodhue Wind Project, additional bird diverters could be installed on lines in that area to minimize the potential for collisions;
5. With the permission of the landowner, signs could be posted around the known nesting location to alert humans that swans might be present and must not be disturbed or shot; and
6. If trumpeter swans are observed foraging in crop fields near turbines during the migration periods, temporary activities could be employed to divert the birds to crop fields farther from turbines.

Again, whether any of the above adaptive management measures might be necessary will be determined based on 2012 field survey data and coordination with MDNR and USFWS. Any decision to undertake such measures will be communicated to the MPUC prior to being undertaken. Also, if temporary activities are needed to divert swans from crop fields near turbines, USFWS will be contacted in advance to obtain any necessary depredation permit. For the reasons set forth in Section 8.2.2.3 with regard to bald eagles, curtailment is not considered a practicable adaptive management with regard to trumpeter swans.

8.6 Raptor Nests

8.6.1 Pre-Construction

Throughout the design of the Project, efforts have been made to site turbines 0.25 mile or more from active raptor nests. With the current turbine layout, all proposed turbine locations are more than 0.25 mile of raptor nests. The raptor nest nearest to a turbine is 0.37 mile away. During the March 2012 aerial raptor nest survey, we will determine if any new nests have been built closer than 0.25 mile from a turbine. If any such nests are found, Westwood will coordinate with USFWS and MDNR to discuss whether the birds using the nest appear to be at risk and, if so, the best management approach. If the habitat between the nest and the turbine consists entirely of cropland, no management may be necessary. If suitable habitat exists around the turbine such that foraging raptors may be attracted to it, AWA Goodhue may pursue habitat modification to minimize its attractiveness to prey species. As a last resort, removal of such nests at a time when they are inactive may encourage any returning raptors to build in locations farther from the turbine.

8.6.2 Construction

No construction-related impact avoidance or minimization measures are proposed for turbines more than 0.25 mile from the nearest raptor nest. For the three turbines that lie within 0.25 mile of possible raptor nests, if nests are left in place, construction will be staged and conducted in a manner that will minimize disturbance to raptors during the nesting period. Potential examples of such measures would include:

1. Monitor the activity status of each nest to determine whether any impact minimization measures are necessary and, if so, for how long;
2. Stage construction activity within 0.25 mile of active nests so as to avoid the period when the nest is active; and
3. Route construction traffic away from roads nearest the nest location to the maximum degree possible during the active nesting period.

8.6.3 Post-Construction

After construction is complete, O & M personnel will monitor the area around each turbine and document any observed raptor nesting activity. If new nests are observed, they will be visited to confirm whether they are raptor nests and GPS located to determine whether they are within 0.25 mile of a turbine. If so, the presence and location of the nest will be included in the next post-construction fatality monitoring report submitted to the agencies. If any post-construction raptor fatality occurs that appears attributable to a nearby nest, coordination will be undertaken with the USFWS and MDNR to determine whether the nest should be removed during a period when it is inactive.

8.7 Bats

8.7.1 Pre-Construction

AWA Goodhue designed the project to avoid and minimize effects on bats and bat habitats to the extent practicable. Turbine siting avoids woodland habitats preferred by many bat species by up to 2,500 feet and an average of 777 feet. Land cover mapping indicates the project area is only about 4% forested. Although turbine siting avoids woodlands, the woodlands that do exist in relative proximity to proposed turbines consist mostly of small woodlots, tree lines, and farmstead shelterbelts that are not large enough to appear as forest land on land cover mapping.

8.7.2 Construction

Project construction will avoid and minimize disturbance of preferred bat habitats and roost sites such as woodlands, water bodies, wetlands, caves, and rock formations. Because turbines are sited in open areas and primarily in cropland, woodlands will be disturbed only where necessary for construction of access roads and electrical collection cables.

8.7.3 Post-Construction

AWA Goodhue has implemented turbine siting and construction practices that will continue to help avoid and minimize effects on bats after construction. Post-construction monitoring of bat fatalities will help expand understanding concerning the variability of bat fatalities at wind projects and assess the potential need for post-construction impact minimization practices.

8.7.4 Potential Federal Listing of Northern Long-eared Bat

Westwood will contact the Twin Cities Field Office of the USFWS on a monthly basis to obtain updates on the federal listing status of the Northern Long-eared Bat. The Federal Register and USFWS Region 3 web-site will also be monitored regularly for updates. If this species is listed under the Endangered Species Act (ESA), we anticipate that it would occur after all required permits in place and the project is either under construction or built and operational. If listing occurs, AWA Goodhue would undertake informal coordination with the USFWS to discuss the perceived risk of a "take" of this species and whether a Habitat Conservation Plan and ESA Incidental Take Permit (ITP) are warranted. Because the AWA Goodhue project would not involve a federal action, we do not see any basis for Section 7 consultation under the Endangered Species Act.

If the Northern Long-eared Bat becomes federally listed, additional surveys would be needed to determine which portions of the project area are being used by this species. Potential adaptive management strategies will be developed on a turbine-by-turbine basis. Surveys would likely include mist netting and additional Anabat monitoring. Potential adaptive management strategies would be developed through coordination with the USFWS and could include: (1) enhancement and/or preservation of roosting and foraging habitat in parts of the project site away from turbines; (2) identification and preservation of potential hibernacula in the area; and (3) turbine-specific operational measures, such as increasing turbine cut-in speed in higher risk locations (i.e. where surveys indicate bats are present and foraging in the RSZ) during higher risk conditions (i.e. during night time hours, temperatures above 50 degrees, high humidity and low wind). If operational mitigation measures are found necessary, they would be subject to periodic adjustment based on fatality monitoring results and coordination with the USFWS.

9.0 ABPP IMPLEMENTATION

9.1 Training

AWA Goodhue believes that employee and contractor training is an important aspect of implementing the ABPP for the Project. Consequently, AWA Goodhue staff involved in the daily implementation, planning and engineering process for the project will be trained in the specific requirements of the ABPP and in avian and bat issues that are of concern on the AWA Goodhue Project site. Some staff members, particularly those implementing the ABPP, may receive external training courses on avian and bat identification, protection planning and practices to reduce collision fatality or risk of electrocutions. AWA Goodhue ABPP training will include the following components:

9.1.1 Development Stage Environmental Training

Wind project development team members who have been involved in the design and permitting of the AWA Goodhue Wind Project have received informal training in the avian and bat issues associated with the Project Area. Certain issues have arisen or evolved during the development and permitting process, making such training an ongoing, iterative process. Throughout the design and permitting processes, there has been ongoing coordination among the developer, construction contractor, project team design engineers and environmental professionals and wildlife agency staff members to ensure that avian and bat issues described in this ABPP have been properly addressed in the design of and construction planning for the project. However, because the preparation of this ABPP is occurring near the conclusion of the project design and permitting processes, no formal development stage ABPP training courses have occurred or are being proposed.

9.1.2 Construction Stage Environmental Training

All construction staff will receive training on the environmental constraints and issues specific to the site, including sensitive habitats to be avoided (such as buffers around raptor nests or habitat of sensitive species) and how they are marked in the field, practices to minimize impacts to wildlife (such as project-specific speed limits), and procedures for handling injured or dead birds and other wildlife. Materials to support this training will include maps showing sensitive areas to be avoided. As they are most familiar with the avian and bat issues associated with the Project Area, construction stage training will be provided by the wildlife biologists responsible for pre-operational surveys and studies and who prepared this ABPP. Training materials will be provided to USFWS and MDNR biologists for advance review and agency biologists will be invited to attend and participate in the construction stage training session(s).

9.1.3 Operations Stage Environmental Training

Training in the key components of this ABPP will be part of the training provided to each new operations staff within 90 days of hire. In addition, all operations contractor staff who operate the AWA Goodhue Wind Project and remote operations staff will be trained as well. This training will include a general orientation to state and federal wildlife laws and procedures for handling and reporting dead or injured birds. Training in bird and bat identification will be provided, with emphasis on state and federally listed species. Materials to support this training will include a flowchart showing how dead or injured birds and bats should be handled, as well as project-specific posters showing species that are of particular conservation concern or that have special status that may be present at the site. Again, operations stage training will be provided by the wildlife biologists who provided construction stage training. Again, training materials will be provided to USFWS and MDNR biologists for advance review and agency biologists will be invited to attend and participate in the operations stage training session(s).

It should be noted that all formal surveys, fatality monitoring and report preparation activities will be performed by trained biologists and not O & M staff. The purpose of operations stage environmental training is to facilitate proper documentation and reporting of O & M staff observations during the day-to-day operation of the wind farm. A Special Miscellaneous Permit will be obtained from the USFWS for any staff member who will be handling the carcasses of migratory birds.

9.1.4 External Training:

Operations and Maintenance (O & M) staff may receive future training on avian protection planning and practices or specific wildlife management techniques. Such training is offered by the Avian Power Line Interaction Committee (www.aplic.org) and occasionally by state and federal wildlife agencies. Refresher courses on bird and bat identification may also be warranted for O & M staff to ensure accurate characterization and reporting of fatality incidents.

9.2 Quality Control and Adaptive Management

9.2.1 Quality Control

Compliance with this project-specific ABPP will be reviewed and audited by AWA Goodhue on an annual basis. Audit information will be supplied to DOC-EFP and the MPUC for review and will be e-filed to the docket for the project. Any noted deficiencies and recommendations will be addressed through corrective action plans, which will be implemented on a schedule that matches the urgency of the deficiency. A corrective action plan may be recommended by AWA Goodhue based on audit results but the decision whether such a plan is required would be made by the MPUC with DOC-EFP input. A corrective action plan would set forth: (1) the specific actions needed to correct the identified deficiency; (2) a schedule for completing those actions; (3) the parties who would be responsible for implementing those actions; and (4) the process for confirming that the corrective action has adequately addressed the deficiency. If a corrective action plan becomes necessary, it would sent to DOC-EFP and the MPUC for review and, after approval, progress would be reported on a quarterly basis and progress reports would be e-filed to the project docket.

Annual audits will be carried out to ensure that: (1) ABPP compliance is satisfactory; (2) O & M staff members have adequate training and training materials; (3) that avian and bat fatality incidents are being properly documented and reported. AWA Goodhue will continually seek to improve plan performance, study protocols, and mitigation approaches to reduce future wind-related wildlife risks and update the ABPP to the extent necessary.

9.2.2 Adaptive Management

Adaptive management:

> "… involves exploring alternative ways to meet management objectives, predicting the outcomes of alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management actions. Adaptive management focuses on learning and adapting, through partnerships of managers, scientists, and other stake-holders who learn together how to create and maintain sustainable resource systems." (USDOI, 2009)

Adaptive management strategies that would be pursued by AWA Goodhue have been described throughout this ABPP. Specific adaptive management strategies for the species discussed in this plan are discussed in the sections applicable to each species. If adaptive management is found necessary (e.g. collision risk modeling predicts more eagle fatalities than allowed under an ITP), specific measures to be undertaken will be developed in coordination with DOC-EFP, USFWS and MDNR and will only be implemented with agency concurrence. Also, as the process of documenting and reporting on monitoring and fatality results proceeds, AWA Goodhue will continually look for ways to streamline and improve the process. If the USFWS and/or MDNR develop electronic procedures for fatality reporting, AWA Goodhue will work with the agencies to adopt and implement the new reporting procedures.

9.2.3 Avian and Bat Reporting to MPUC, DOC-EFP, USFWS and MDNR

9.2.3.1 Eagles

The results of spring, summer, fall, and winter eagle point count surveys will be reported quarterly within one month after the end of each season for two years. The activity status of each bald eagle nest identified in or within two miles of the Project Area will be reported in the spring report for two years.

9.2.3.2 Bats

Anabat data collection will occur on one temporary met tower from July 22 to November 22, 2011 and on one or two permanent met towers from May 1 to November 15, 2012. The results of the 2011 and 2012 Anabat monitoring and federal listing status of Northern Long-eared Bat must be submitted to MPUC by December 15, 2011 and 2012, respectively.

9.2.3.3 Loggerhead Shrike

Because all turbines have been sited in locations that do not constitute highly or very highly suitable loggerhead shrike habitat, no Loggerhead Shrike Protection Plan is required. If any loggerhead shrike fatalities are found during post-construction fatality surveys or during the course of O & M activities, it will be reported to the MPUC, USFWS and MDNR within 24 hours of discovery (as required by the Site Permit).

9.2.3.4 Trumpeter Swans

If any trumpeter swans fatalities are found during post-construction fatality surveys or during the course of O & M activities, it will be reported to the DOC-EFP, MPUC, USFWS and MDNR within 24 hours of discovery (as required by the Site Permit).

9.2.3.5 Informal Avian and Bat Injury Fatality Reporting

Observations of avian and bat injuries or fatalities in the normal course of O & M activities are to be reported through the informal avian and bat injury and fatality reporting procedure using the Wildlife Incident Reporting Form, which includes turbine number, date fatality or injury was discovered, species of bird or bat involved and other relevant information (**Appendix H**). All informal reports will be emailed to DOC-EFP, MPUC, USFWS and MDNR, with electronic and paper copies kept on file by the site manager and the project wildlife consultant. Individual wildlife incident reports will not be e-filed to the project docket. Such observations are separate and distinct from those collected during formal avian and bat fatality surveys. In order to ensure accurate and timely reporting of wildlife fatalities, all informal reporting will be done within 24 hours through the project wildlife consultant and AWA Goodhue Site Manager. O & M staff will thus be relieved of the responsibility of definitively confirming the species of bird or bat killed and the appropriate reporting time frame under the MPUC Site Permit.

There are three types of proposed reporting for avian and bat fatality: (1) 24-hour reporting of certain fatality events; (2) quarterly reporting of avian and bat fatalities observed during day-to-day O & M activities on site; and (3) reporting of fatality survey results over the first two years of operation. These reporting requirements are described in more detail as follows:

24-Hour Reporting

If any of the following occur during the course of site activities during facility operations, the occurrence will be reported to the MPUC, USFWS and MDNR within 24 hours of discovery:

1. Five or more dead or injured non-protected avian or bat species within a reporting period (i.e. within a quarter);
2. One or more dead or injured migratory avian or bat species (including any species of eagle);
3. One or more dead or injured state threatened, endangered or special concern species; or
4. One or more dead or injured federally listed species.

"Non-protected" avian species have been assumed to include non-native species such as European starlings and house sparrows and non-migratory species that are not otherwise protected as threatened or endangered (e.g. non-migratory game birds). All native migratory bird species will be treated as "protected".

Quarterly Fatality Reporting

Avian and bat fatalities observed by the AWA Goodhue Site Manager or O & M staff in the course of their duties on the wind farm must be reported on a quarterly basis. Again, these reports are separate from reporting of the results of more intensive fatality surveys described below. Quarterly reports on day-to-day avian and bat fatality observations are due on January 15, April 25, July 15 and October 15 of every year for the life of the Site Permit. Reports are to include species of dead or injured bird or bat species found, location of find by turbine number, date of find, potential cause of fatality and any steps taken to avoid future occurrence. Quarterly reports will reported to the DOC-EFP, MPUC, USFWS and MDNR by email and will be e-filed to the project docket.

9.2.3.6 Formal Fatality Survey Result Reporting

As described previously in this ABPP, fatality surveys will be conducted two times per week at 10 turbines for the first two years of project operation. The results of these surveys will be reported quarterly on January 15, April 25, July 15 and October 15 for the first two years of facility operation. An annual report will be also be submitted with the January 15th quarterly summary and will use the format provided in the MDNR Fatality Report Guidelines (Appendix F of Mixon et al, 2011).

9.3 Key Resources

AWA Goodhue will develop a list containing names, contact information and responsibilities of key development team members and agency staff to facilitate communication and reporting throughout the life of the ABPP. This list will be distributed at least 10 days prior to at the pre-construction meeting.

10.0 PROJECT DECOMMISSIONING

Prior to commercial operation, AWA Goodhue will submit a Decommissioning Plan to the MPUC that documents the manner in which AWA Goodhue anticipates decommissioning the project in accordance with Minn. Rules Part 7854.0500, subp.13. AWA Goodhue will ensure that it carries out its obligations to properly decommission the project at the appropriate time.

Upon expiration of the Site Permit or termination of project operation, whichever occurs earlier, AWA Goodhue will dismantle and remove from the site towers, turbine generators, transformers, overhead and underground cables, foundations, buildings and ancillary equipment to a depth of 4 feet. Access roads will be removed unless written approval is given by the affected landowner requesting that one or more roads, or portions thereof, be retained. Any agreement for removal to a lesser depth, or for no removal, will be recorded with the county and will show the locations of all foundations. In accordance with the Site Permit, the site will be restored within 18 months after expiration. The project will be considered a discontinued use after 1 year without energy production unless a plan is developed and submitted to the MPUC outlining the steps and schedule for returning the project to service.

AWA Goodhue will restore and reclaim the site to its pre-project topography and topsoil quality using BMPs consistent with those outlined by the Wind Turbine Guidelines Advisory Committee (WTGAC 2010). The goal of decommissioning will be to restore natural hydrology and plant communities to the greatest extent practical while minimizing new site disturbance and removal of native vegetation.

Some of the decommissioning BMPs that will be employed on the project to the extent practicable with the intent of meeting this goal include:

1. restore topsoil to assist in establishing and maintaining preconstruction native plant communities to the extent possible;
2. vegetate exposed soils, that are not agricultural land, with native plants appropriate for the soil conditions and adjacent habitat using local seed sources;
3. restore surface water flows to pre-disturbance conditions, including removal of stream crossings, roads, and pads, consistent with storm water management objectives and requirements;
4. install erosion control measures, following decommissioning, within disturbance areas with potential for erosion, consistent with storm water management requirements; and
5. remove fencing installed for the project unless pertinent to existing landowner operations.

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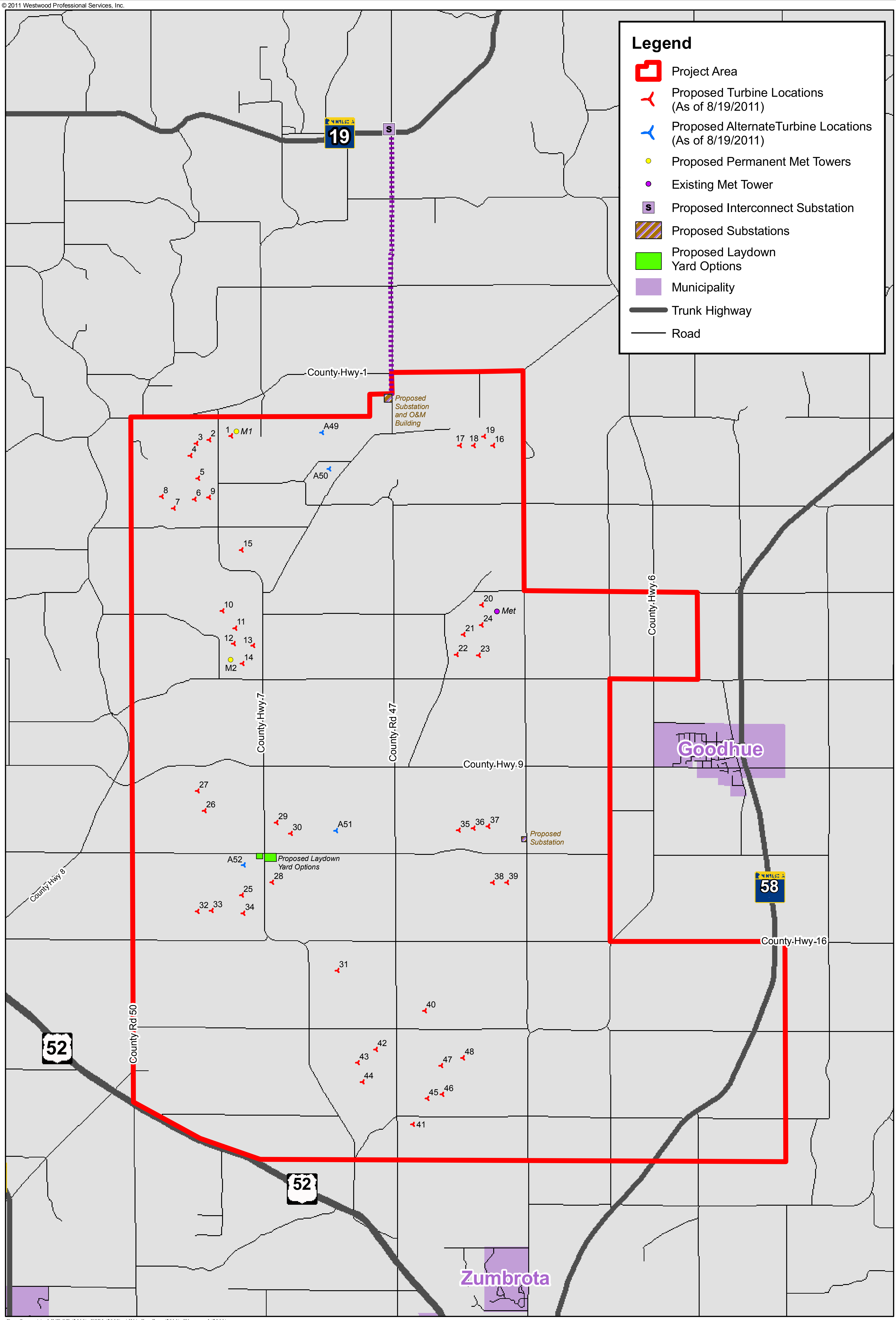

Data Source(s): MNDOT (2010); ESRI (2009); AWA Goodhue (2011); Westwood (2011).

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AWA Goodhue, LLC

Goodhue County, Minnesota

MPUC Approved Project Area and Proposed Facilities

Exhibit 1

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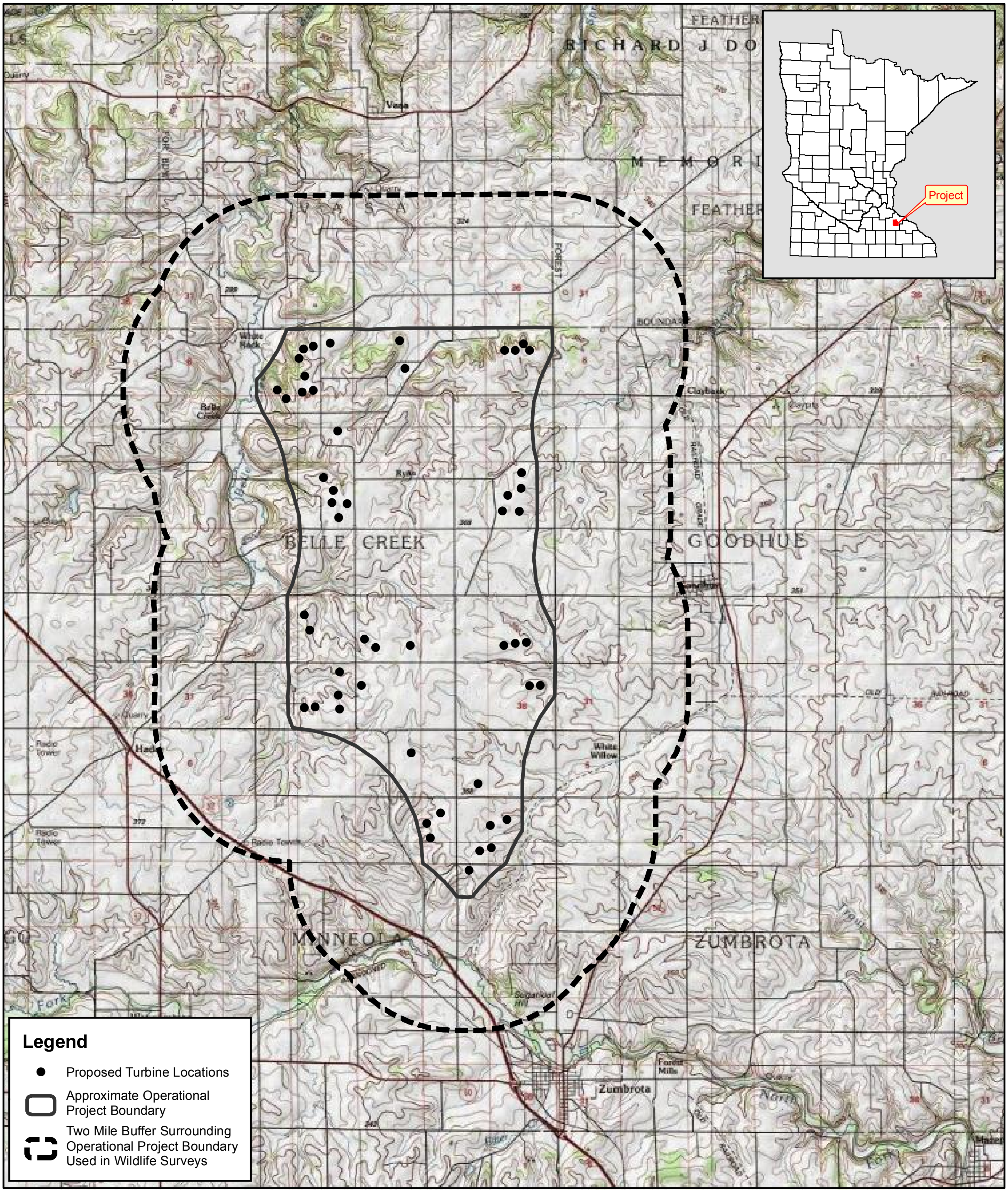

Data Source(s): USGS (2011), Westwood (2011), MN DNR (2008)

AWA Goodhue, LLC

Goodhue County, Minnesota

Approximate Operational Project Boundary

EXHIBIT 2

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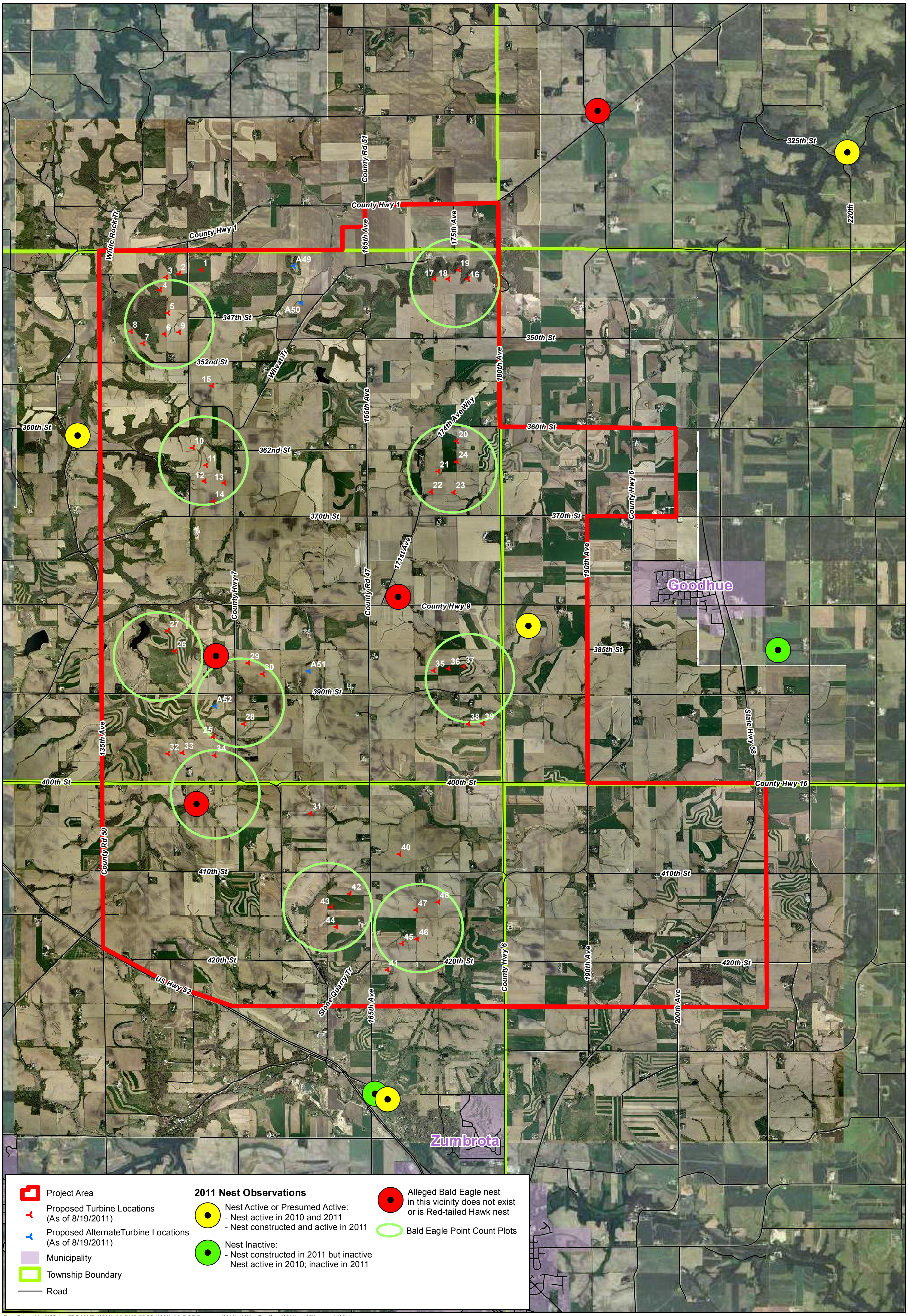

Data Source(s): USDA AFPO NAIP (2009), MnDNR PLSS (1980), MnDOT Basemap (2010), AWA Goodhue (2011) and Westwood (2011).

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Goodhue County, Minnesota

Bald Eagle Nests and Monitoring Clusters

Exhibit 3

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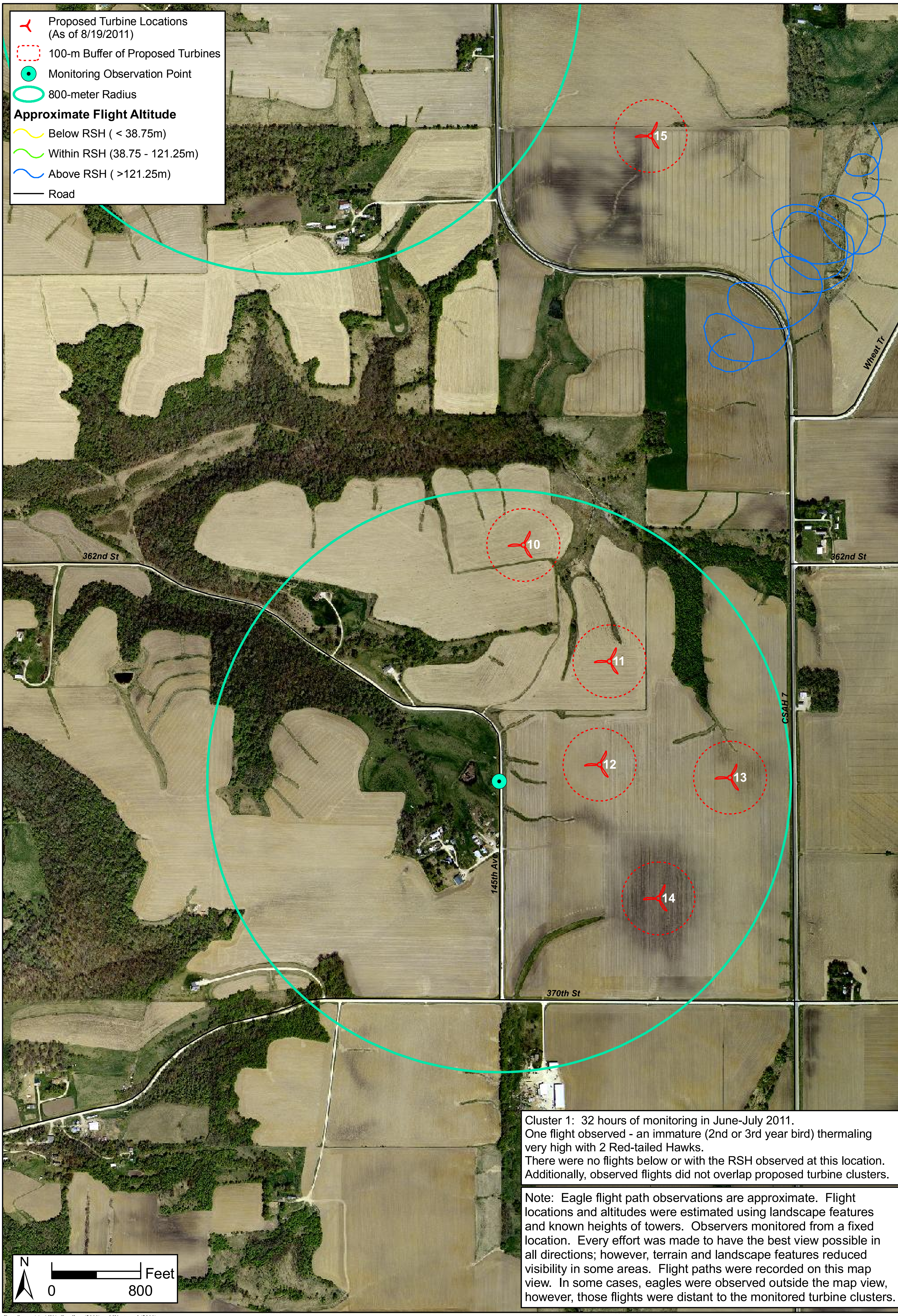

Cluster 1: 32 hours of monitoring in June-July 2011.
One flight observed - an immature (2nd or 3rd year bird) thermaling very high with 2 Red-tailed Hawks.
There were no flights below or with the RSH observed at this location.
Additionally, observed flights did not overlap proposed turbine clusters.

Note: Eagle flight path observations are approximate. Flight locations and altitudes were estimated using landscape features and known heights of towers. Observers monitored from a fixed location. Every effort was made to have the best view possible in all directions; however, terrain and landscape features reduced visibility in some areas. Flight paths were recorded on this map view. In some cases, eagles were observed outside the map view, however, those flights were distant to the monitored turbine clusters.

Data Source(s): AWA Goodhue (2011) and Westwood (2011).

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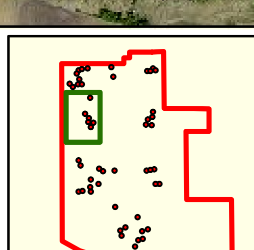

AWA Goodhue, LLC

Goodhue County, Minnesota

2011 Breeding Season Bald Eagle Monitoring
Results - Turbine Cluster 1

EXHIBIT 4

Map Document: (P:/20081147/gis/2011Eagles/June-July Monitoring/Results/Loc1a-Turbs2-8.mxd)
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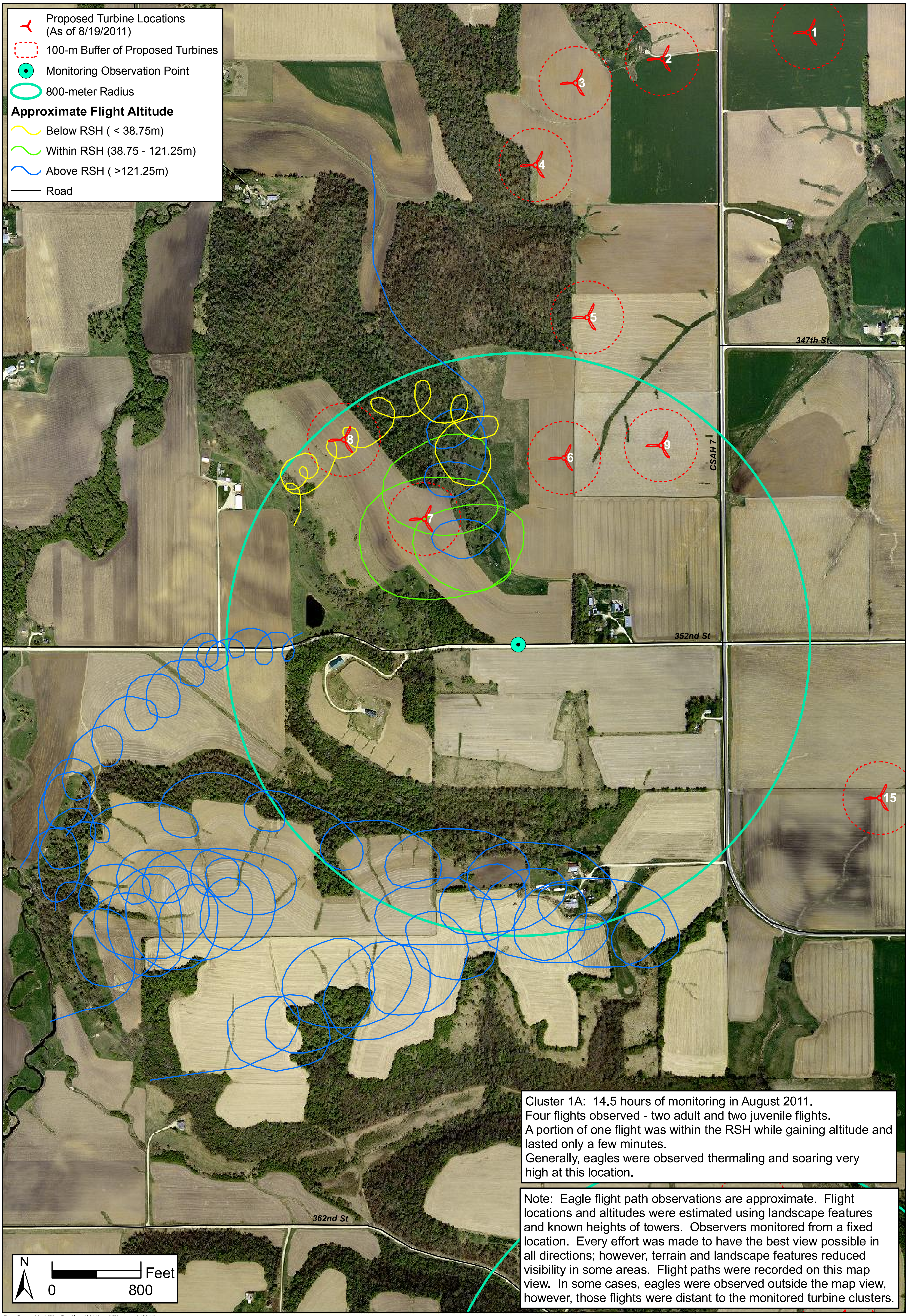

Cluster 1A: 14.5 hours of monitoring in August 2011.
Four flights observed - two adult and two juvenile flights.
A portion of one flight was within the RSH while gaining altitude and lasted only a few minutes.
Generally, eagles were observed thermaling and soaring very high at this location.

Note: Eagle flight path observations are approximate. Flight locations and altitudes were estimated using landscape features and known heights of towers. Observers monitored from a fixed location. Every effort was made to have the best view possible in all directions; however, terrain and landscape features reduced visibility in some areas. Flight paths were recorded on this map view. In some cases, eagles were observed outside the map view, however, those flights were distant to the monitored turbine clusters.

Data Source(s): AWA Goodhue (2011) and Westwood (2011).

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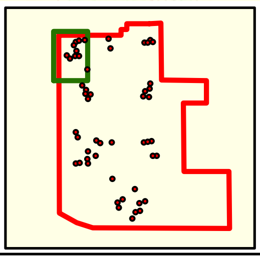

AWA Goodhue, LLC

Goodhue County, Minnesota

2011 Breeding Season Bald Eagle Monitoring
Results - Turbine Cluster 1A

EXHIBIT 5

Map Document: (P:/20081147/gis/2011Eagles/June-July Monitoring/Results/Loc2 -Turbs26-28.mxd)
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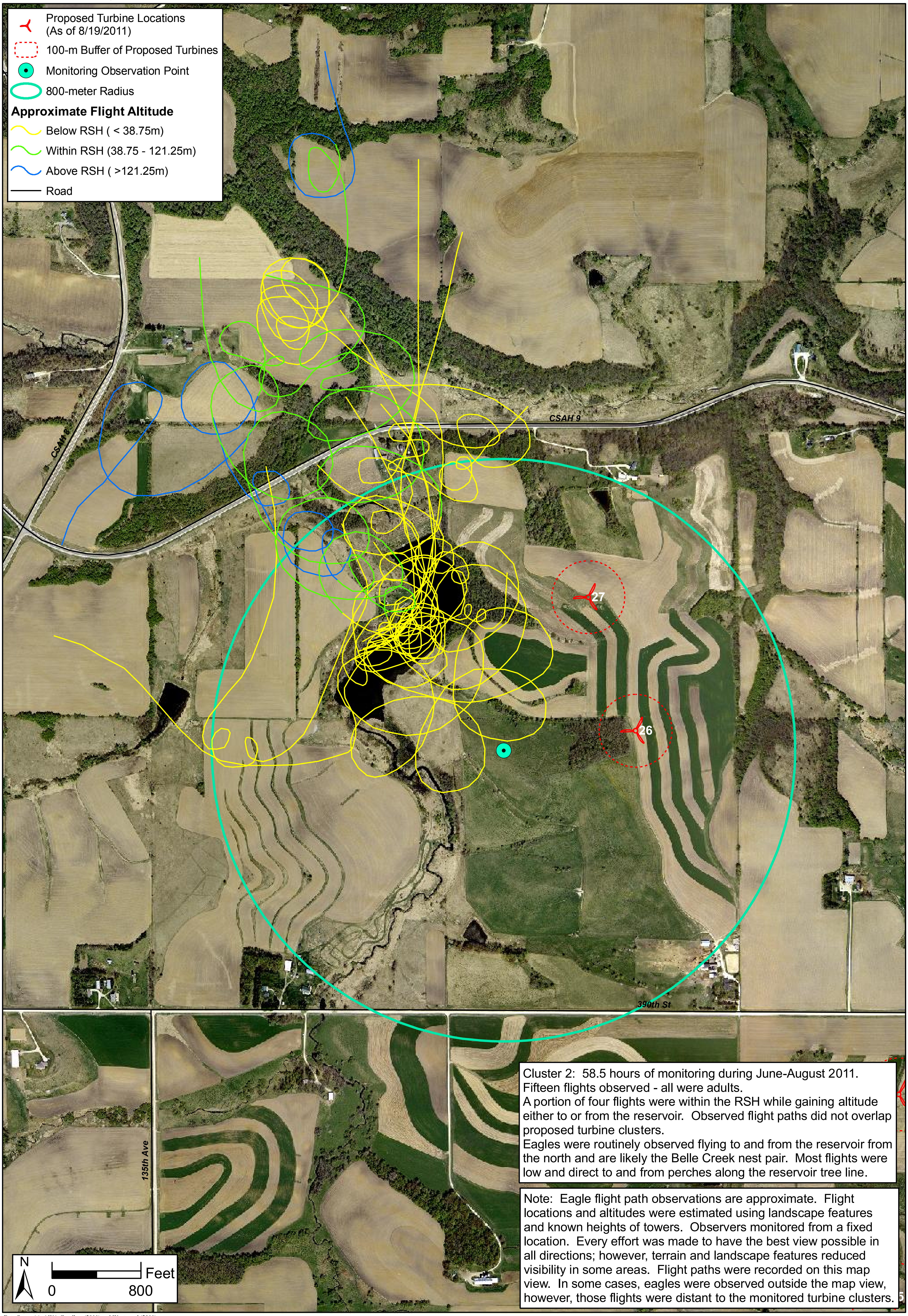

Cluster 2: 58.5 hours of monitoring during June-August 2011. Fifteen flights observed - all were adults.
A portion of four flights were within the RSH while gaining altitude either to or from the reservoir. Observed flight paths did not overlap proposed turbine clusters.
Eagles were routinely observed flying to and from the reservoir from the north and are likely the Belle Creek nest pair. Most flights were low and direct to and from perches along the reservoir tree line.

Note: Eagle flight path observations are approximate. Flight locations and altitudes were estimated using landscape features and known heights of towers. Observers monitored from a fixed location. Every effort was made to have the best view possible in all directions; however, terrain and landscape features reduced visibility in some areas. Flight paths were recorded on this map view. In some cases, eagles were observed outside the map view, however, those flights were distant to the monitored turbine clusters.

Data Source(s): AWA Goodhue (2011) and Westwood (2011).

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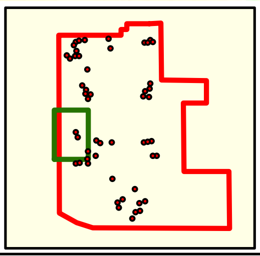

AWA Goodhue, LLC

Goodhue County, Minnesota

2011 Breeding Season Bald Eagle Monitoring Results - Turbine Cluster 2

EXHIBIT 6

Map Document: (P:/20081147/gis/2011Eagles/June-July Monitoring/Results/Loc3 -Turbs35-39.mxd)
12/15/2011 7:48:00 AM

Data Source(s): AWA Goodhue (2011) and Westwood (2011).

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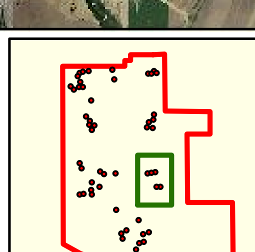

AWA Goodhue, LLC

Goodhue County, Minnesota

2011 Breeding Season Bald Eagle Monitoring
Results - Turbine Cluster 3

EXHIBIT 7

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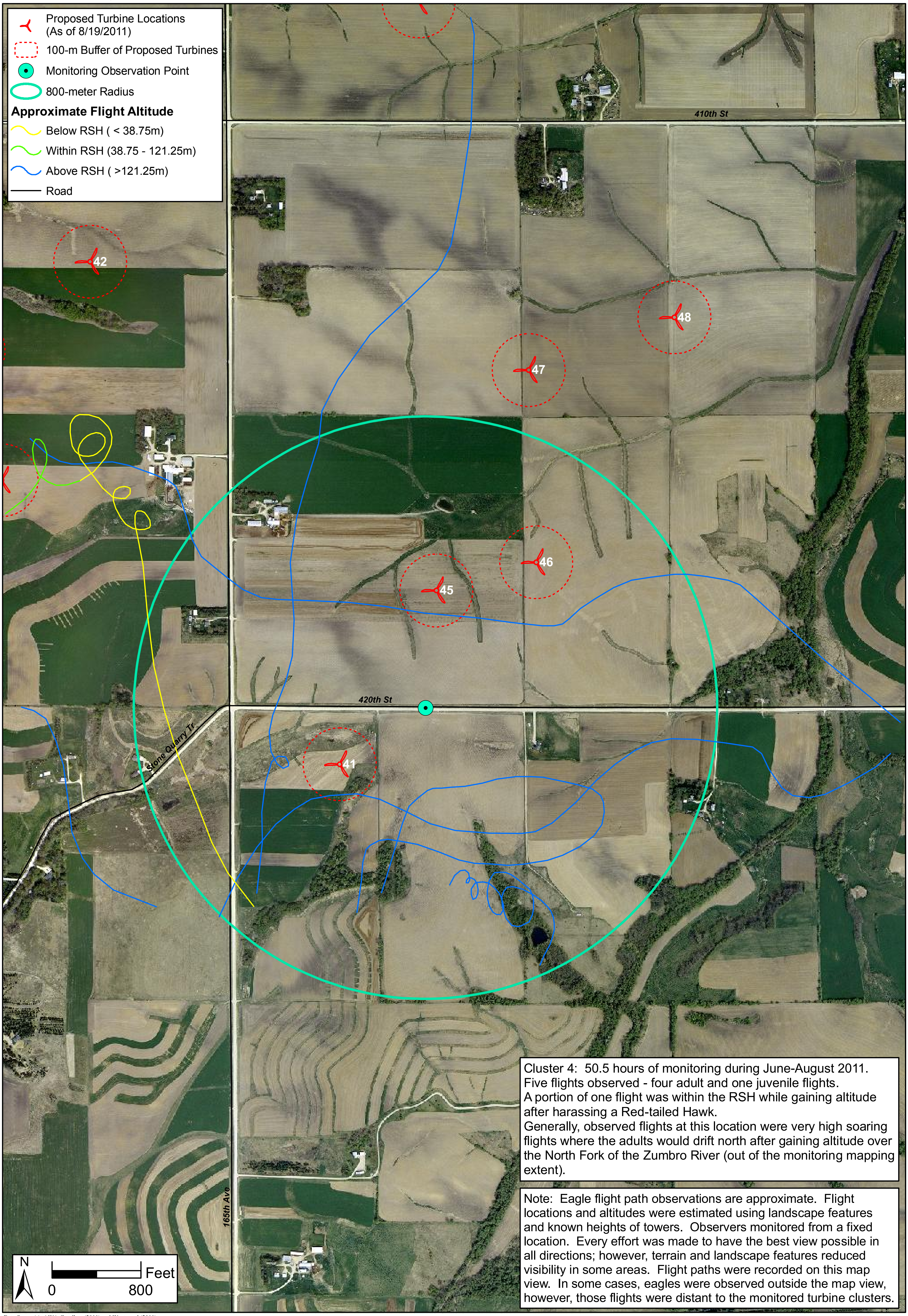

Cluster 4: 50.5 hours of monitoring during June-August 2011. Five flights observed - four adult and one juvenile flights. A portion of one flight was within the RSH while gaining altitude after harassing a Red-tailed Hawk. Generally, observed flights at this location were very high soaring flights where the adults would drift north after gaining altitude over the North Fork of the Zumbro River (out of the monitoring mapping extent).

Note: Eagle flight path observations are approximate. Flight locations and altitudes were estimated using landscape features and known heights of towers. Observers monitored from a fixed location. Every effort was made to have the best view possible in all directions; however, terrain and landscape features reduced visibility in some areas. Flight paths were recorded on this map view. In some cases, eagles were observed outside the map view, however, those flights were distant to the monitored turbine clusters.

Data Source(s): AWA Goodhue (2011) and Westwood (2011).

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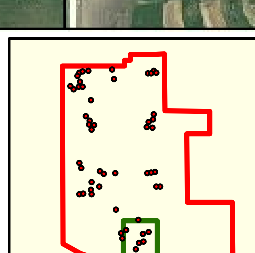

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Goodhue County, Minnesota

2011 Breeding Season Bald Eagle Monitoring
Results - Turbine Cluster 4

EXHIBIT 8

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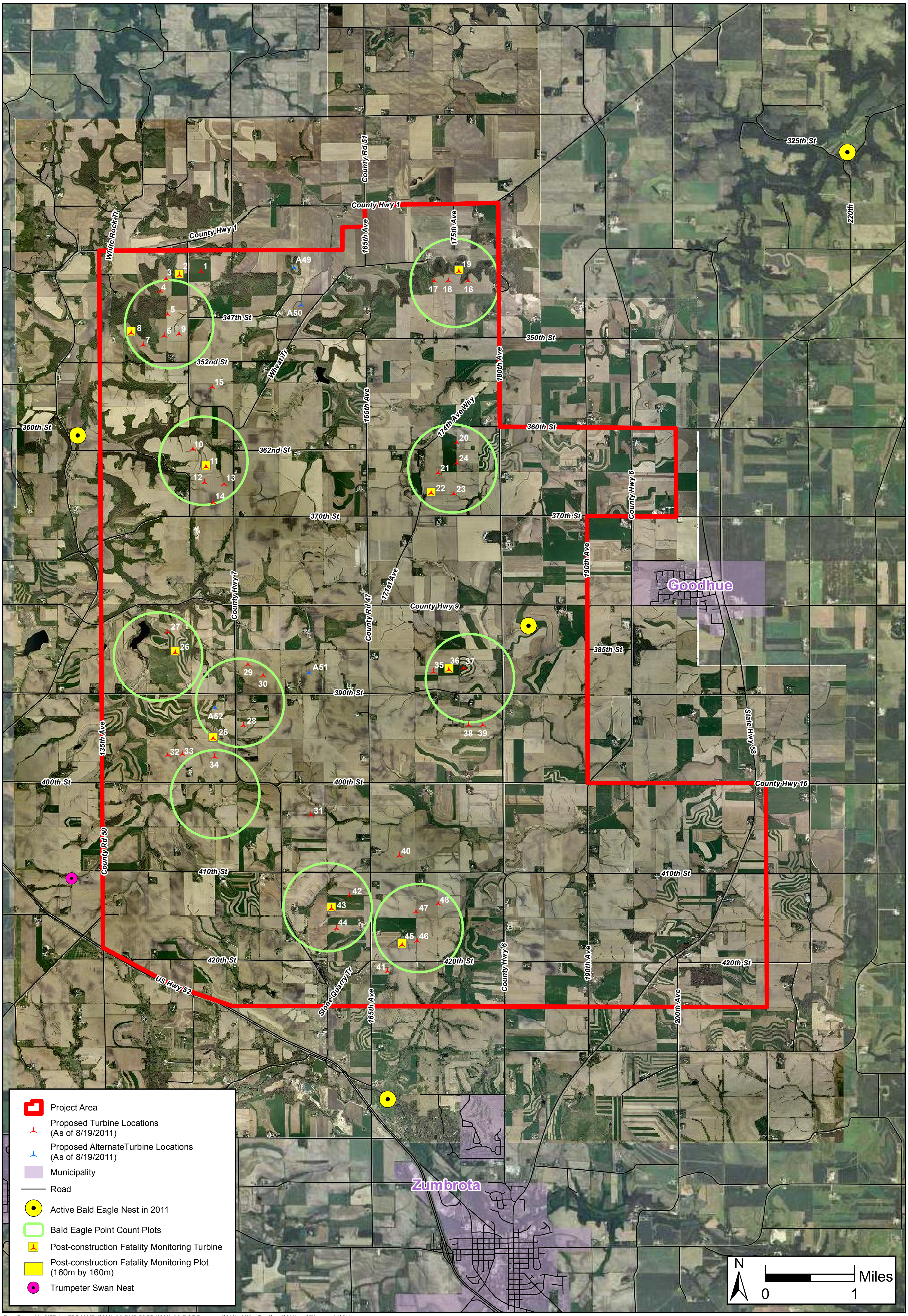

Data Source(s): USDA AFPO NAIP (2009), MnDNR PLSS (1980), MnDOT Basemap (2010), AWA Goodhue (2011) and Westwood (2011).

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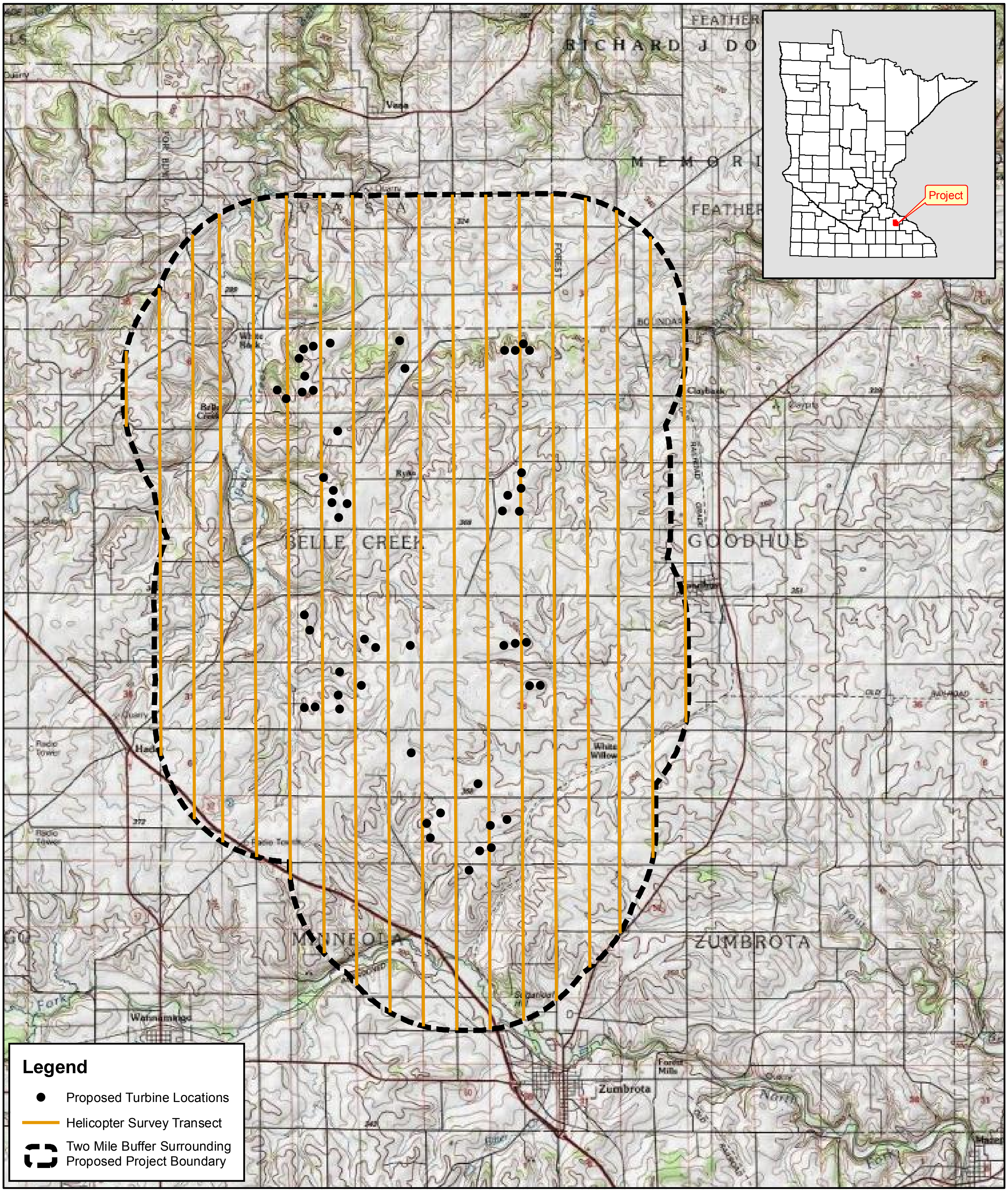
Goodhue County, Minnesota

Bald Eagle Point Count Plots, Post-construction Fatality Monitoring Turbines, and Trumpeter Swan Nesting Site

Exhibit 9



Data Source(s): USGS (2011), Westwood (2011), MN DNR (2008)

AWA Goodhue, LLC

Goodhue County, Minnesota

Aerial Survey Transects

EXHIBIT 10

N

0 2 Miles

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Map Document: (P:/20081147/gis/20081147fi01A.mxd)
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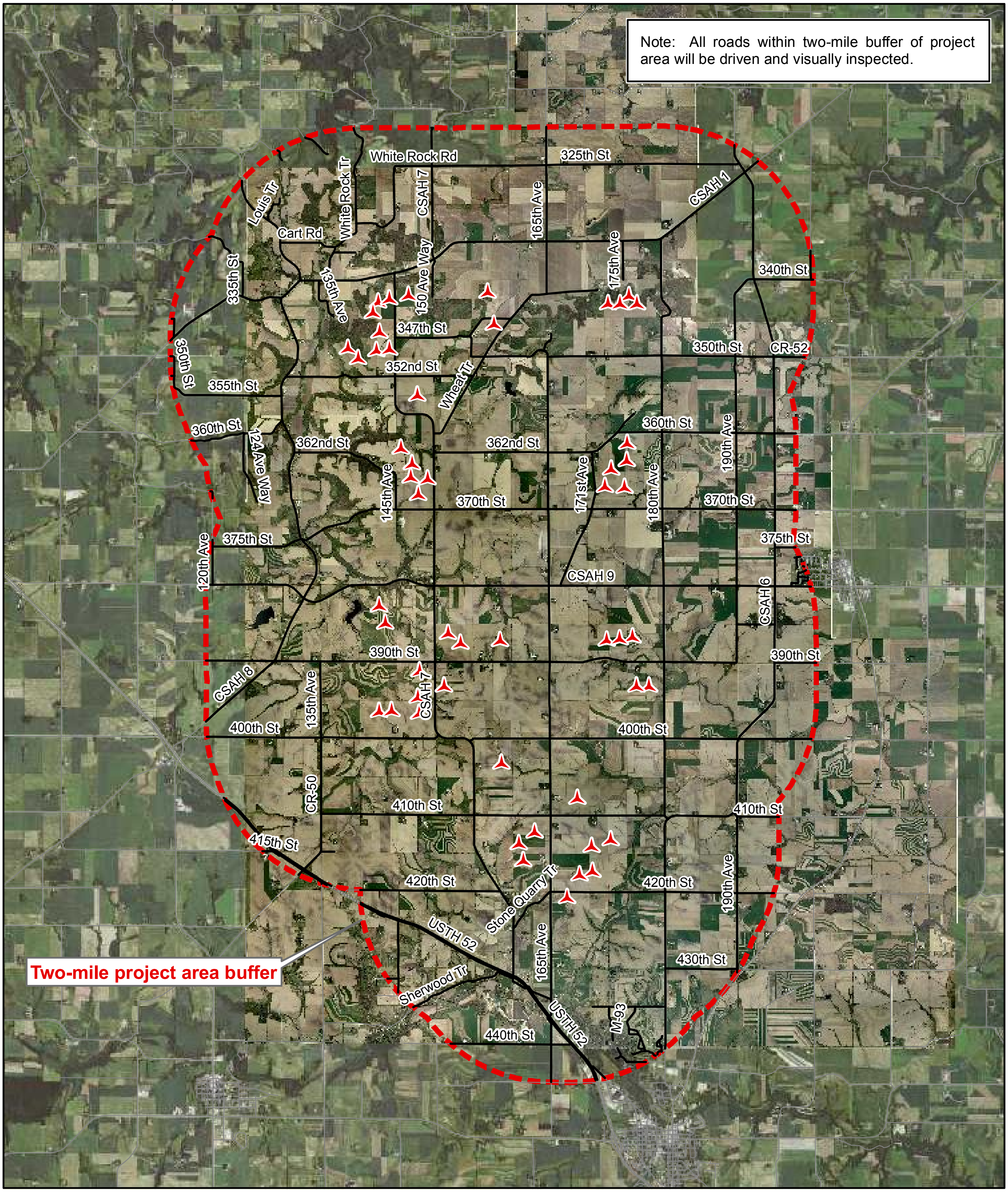

Data Source(s): USGS (2011), Westwood (2011), MNGeo (2011)

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Goodhue County, minnesota

Road Survey Routing

EXHIBIT 11

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N

0 1.75 Miles

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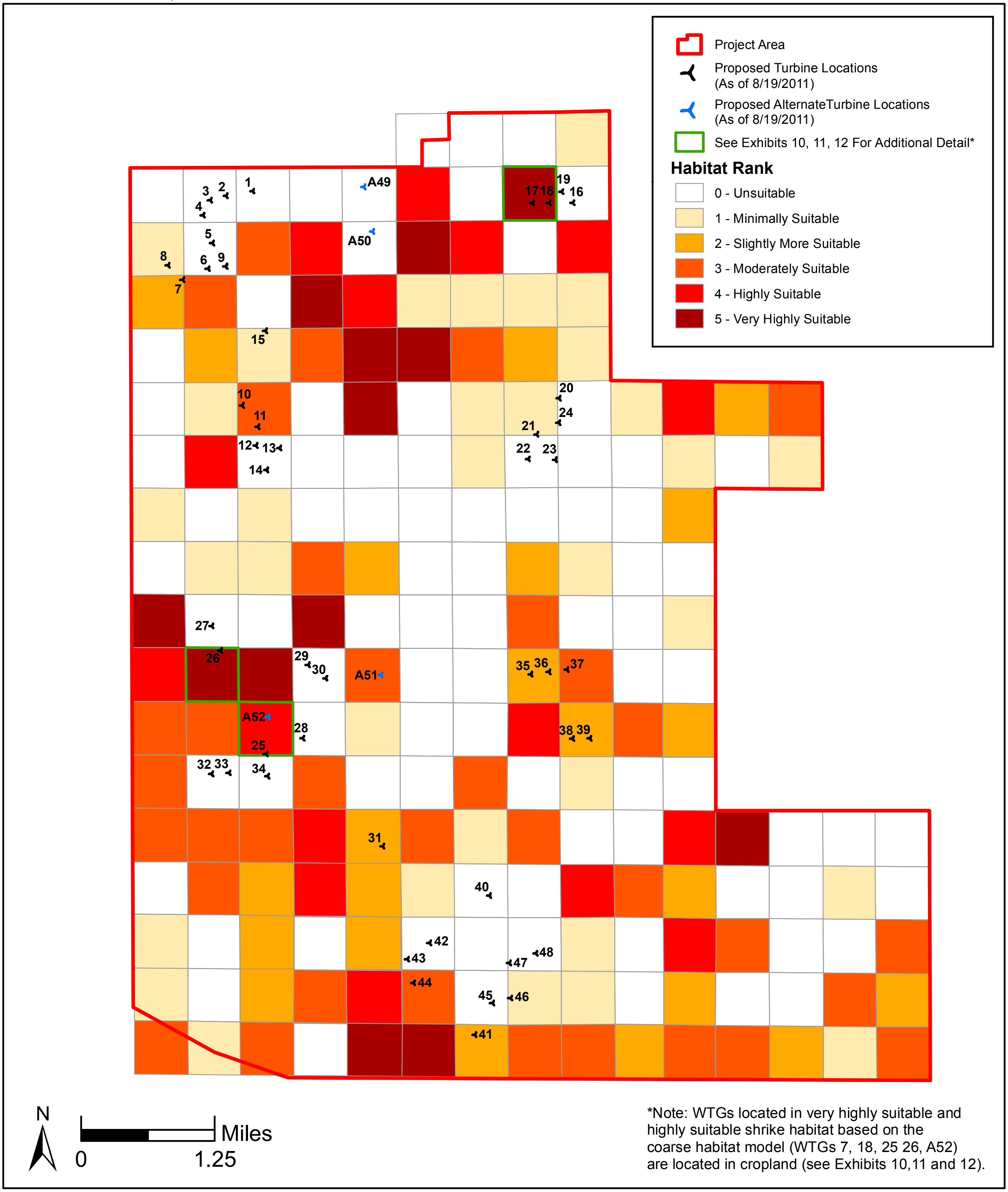

Data Source(s): AWA Goodhue (2011) and Westwood (2011).

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Goodhue County, Minnesota

Loggerhead Shrike Coarse Filter Habitat Model (August 19, 2011)

Exhibit 12

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Map Document: (P:/20081147/gis/Post_Permit/Post ALJ/20081147losh01A_2011.mxd)
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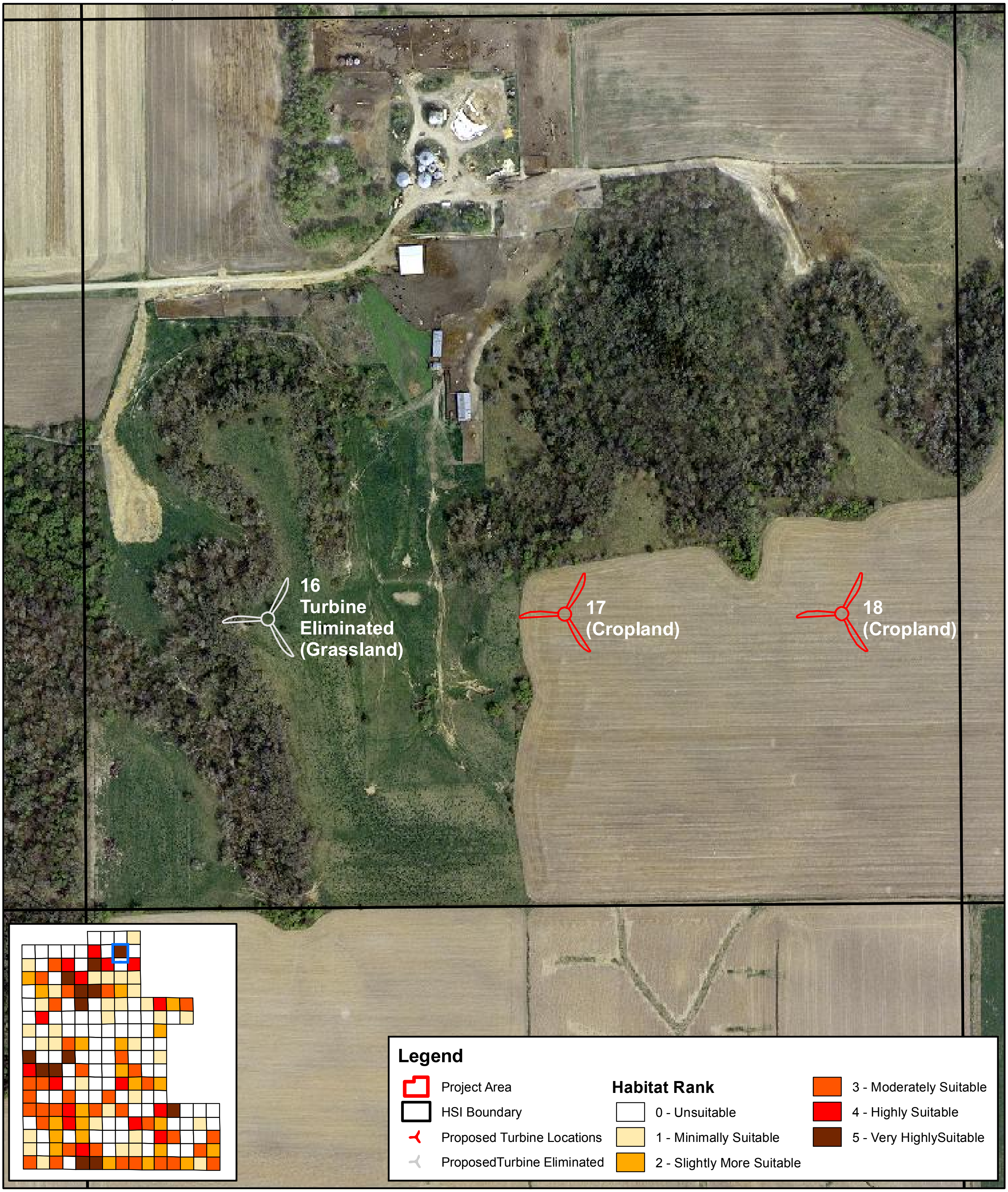

Data Source(s): AWA Goodhue (2011) and Westwood (2011).

AWA Goodhue, LLC

Goodhue County, Minnesota

Field Review Turbine Cluster A

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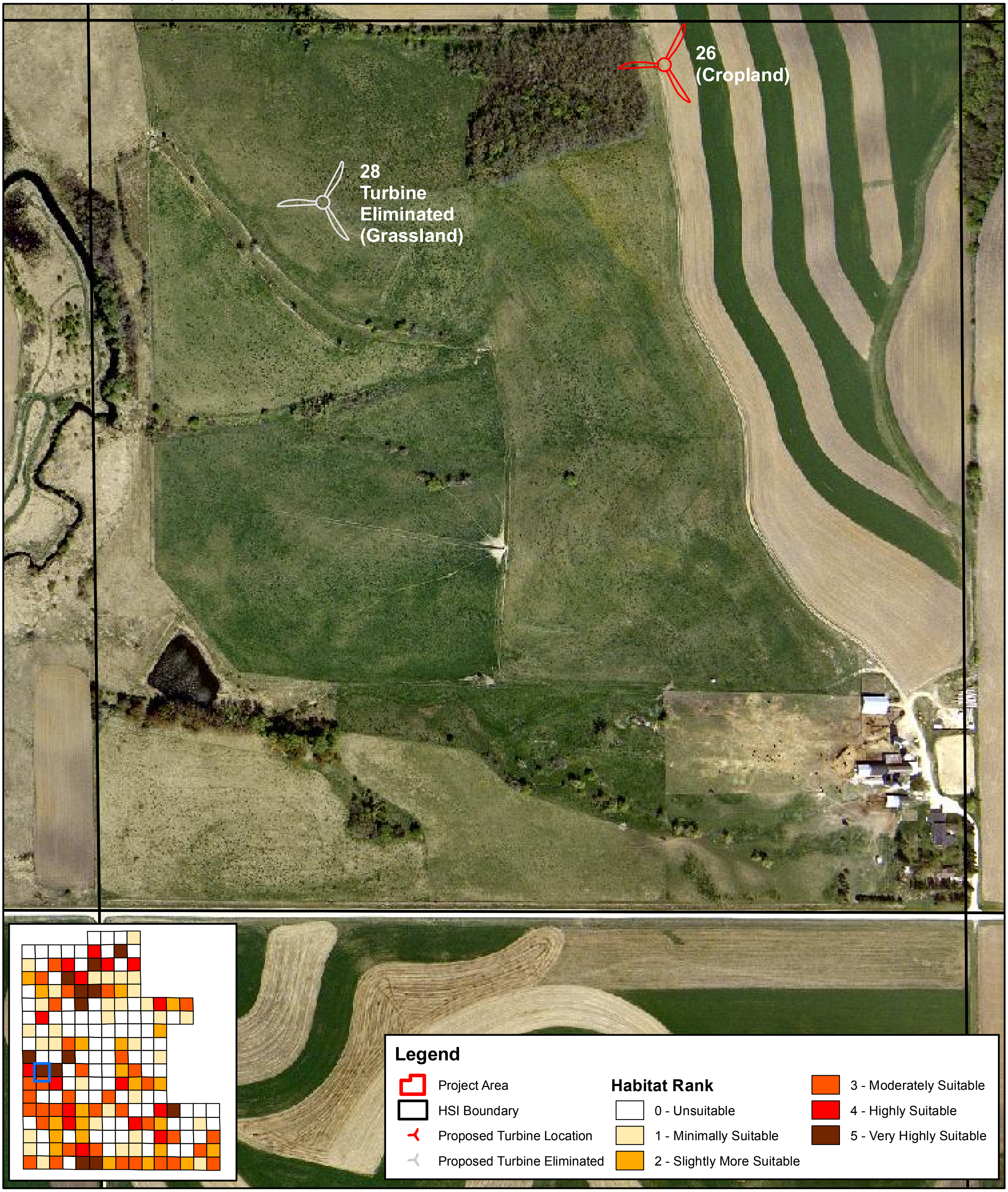
N

Feet
0 400

Exhibit 13

Map Document: (P:/20081147/gis/Post_Permit/Post ALJ/20081147HSI_16_18.mxd)
12/15/2011 8:00:49 AM



Data Source(s): AWA Goodhue (2011) and Westwood (2011).

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Field Review Turbine Cluster B

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N

0 400 Feet

Exhibit 14

Map Document: (P:/20081147/gis/Post_Permit/Post ALJ/20081147HSI_26_28.mxd)
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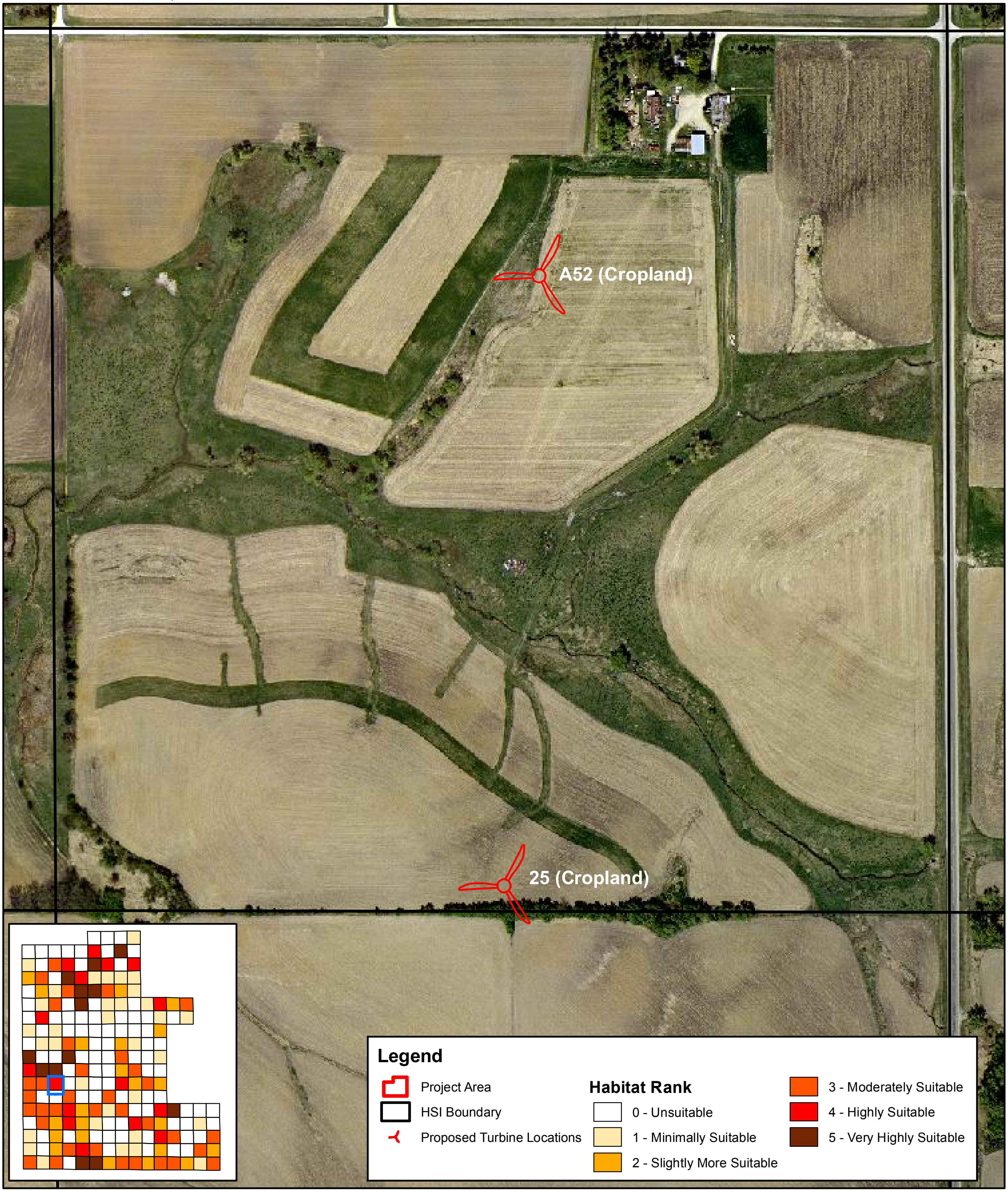

Data Source(s): Westwood (2011) and AWA Goodhue, LLC (2011).

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Goodhue County, Minnesota

Turbine-Centered Habitat Model Review

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N

0 400 Feet

Exhibit 15

Map Document: (P:/20081147/gis/Post_Permit/Post ALJ/20081147HSI_25_52.mxd)
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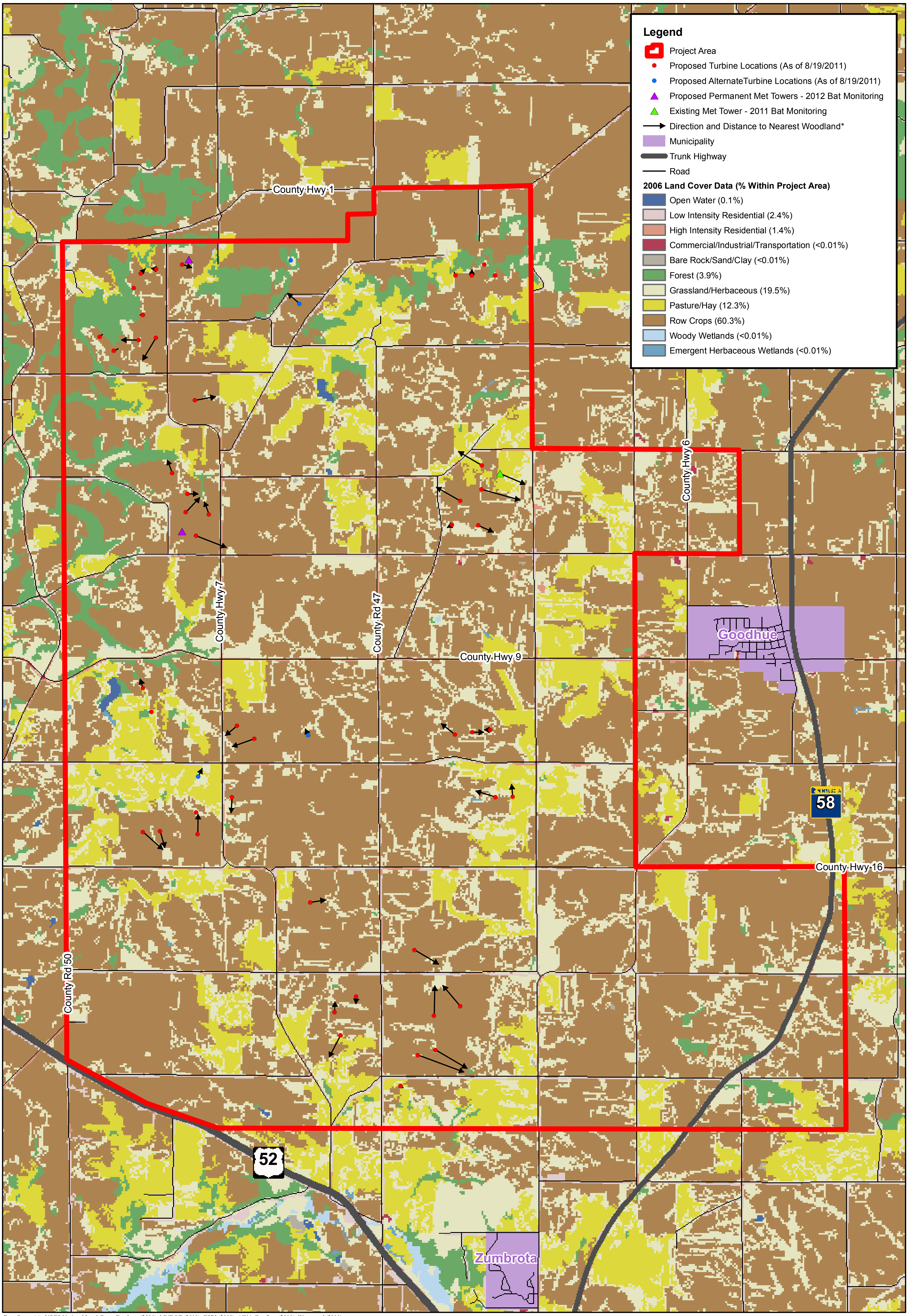

Data Source(s): USGS National Land Cover Database (2006); MNDOT (2010); ESRI (2009); AWA Goodhue (2011); Westwood (2011).

AWA Goodhue, LLC

Goodhue County, Minnesota

Land Cover and Bat Monitoring Locations

Exhibit 16

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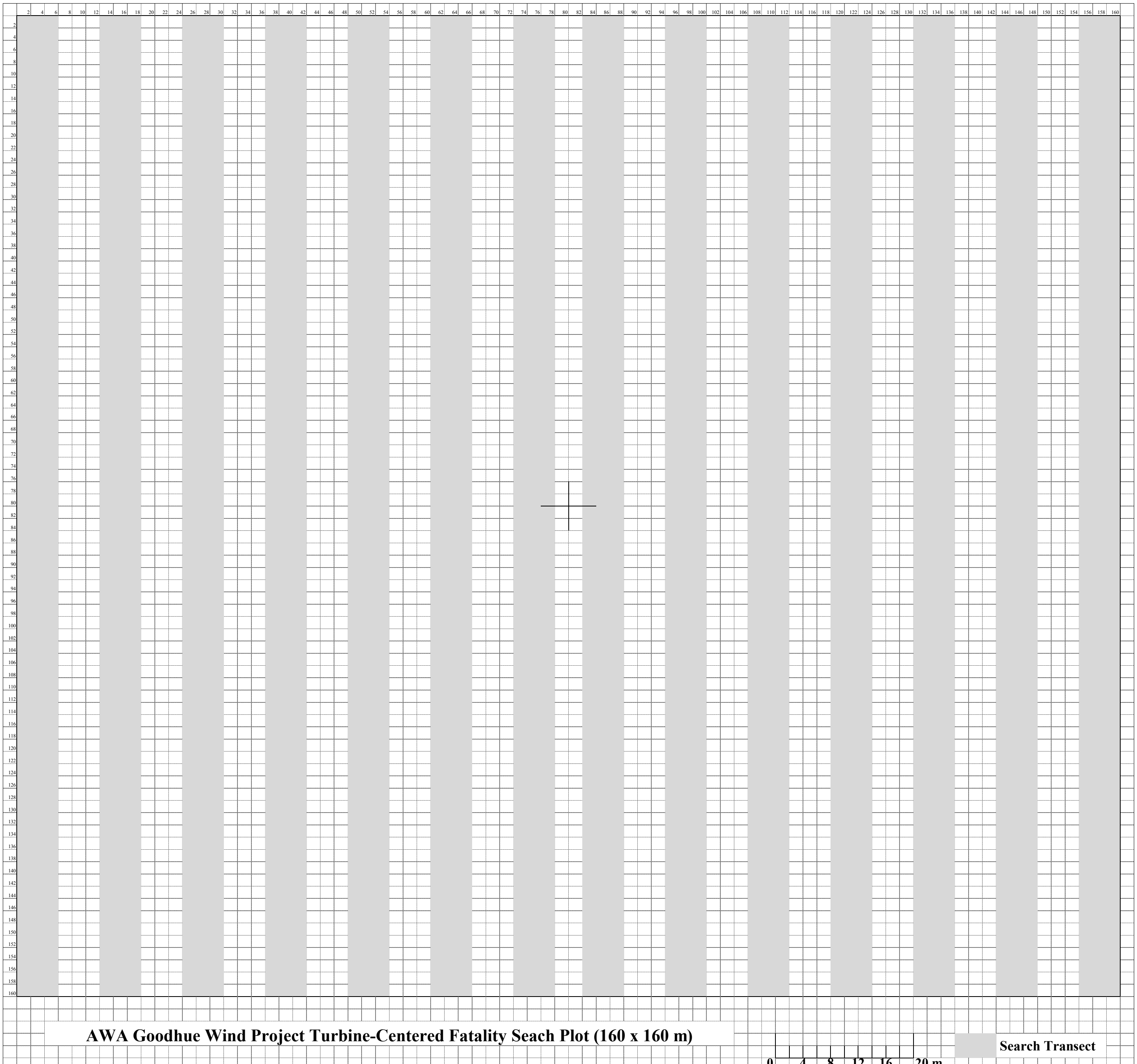
N

0 4,500 Feet

*Note: Some woodlands may not be visible on this map due to the coarse resolution of dataset.



AWA Goodhue Wind Project Turbine-Centered Fatality Seach Plot (160 x 160 m)

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Goodhue County, Minnesota

Fatality Search Plot Schematic

Exhibit 17

Appendix A: Site Selection Factors

Siting wind turbines is an iterative process that balances a number of factors, including site control, wind speeds, turbine characteristics, environmental concerns and community and landowner considerations. When siting the project, AWA Goodhue worked to place wind turbines on the most productive and efficient sites and avoid or minimize environmental and other impacts. A key to achieving this goal was first to select a project area that is compatible with wind development. AWA Goodhue selected the original project boundaries for a number of reasons, including the following:

Wind Resource

Wind speeds in the Project Area show a strong wind resource that supports a commercially viable wind project. The United States Department of Energy (DOE) and the Minnesota Department of Commerce (DOC) have conducted wind resource assessment studies in Minnesota for more than twenty years, and, since 2006, the DOC has produced wind speed maps for Minnesota. In the project vicinity, the mean annual wind speeds are mapped as 13.7 to 17.7 miles per hour (mph) (6.14 to 7.95 meters per second) at 80 meters above ground and 15.3 to 19.0 mph (6.83 to 8.50 m/s) at 100 meters above ground, both of which support commercial wind projects. In addition to reviewing publicly available wind data, AWA Goodhue installed a temporary meteorological tower within the project boundary to gather onsite wind data. Using over a year of onsite data gathered at this location, AWA Goodhue has prepared estimated energy production calculations using the proposed turbine layout. These calculations confirm that the area has a strong wind resource that supports the project's viability.

Participant interest

AWA Goodhue has signed wind lease and easement agreements and participation agreements with over 200 landowners in the project footprint, representing approximately 12,000 acres of site control. Much of the land signed into the project is cropland used for corn and soybeans. The available leased area provides sufficient land area to site the proposed 48 turbines while still meeting the setback and other conditions of the MPUC site permit.

Availability of Transmission Capacity

For new renewable energy generation to be brought to market, available transmission infrastructure needs to already exist or new transmission must be built. The study, engineering, and permitting process for new transmission infrastructure takes many years and sometimes decades. For the state to meet its renewable energy goals, it makes sense to try and first develop renewable resources that have access to existing available transmission infrastructure.

The location of this project was selected in part to take advantage of existing transmission infrastructure that could accommodate additional energy generation without the need for significant system upgrades. By siting the project at this location, AWA Goodhue is able to add 76.8 additional MWs of wind energy to Minnesota's system without building significant additional transmission lines.

Environmental Setting

Most of the project area is agricultural land. Land cover mapping for the project area was obtained from the U.S. Geological Survey National Land Cover Database. Cultivated cropland consisting primarily of corn and soybeans is the predominant land cover and accounts for approximately 60% of the project area. Grasslands, pastures, and hay fields cover up to half of a square mile in certain areas and account for about 31.8% of the land cover in the project area. Wetlands are scattered throughout and primarily isolated around intermittent streams. There are 221 wetlands that cover approximately 319 acres in the project area (< 1% of the project area). Woodlands are limited primarily to farmsteads that are scattered throughout the area and some ravines and hillsides in the western and northeastern portions of the project area.

AWA Goodhue designed the boundaries of this project to exclude sensitive environmental features and wildlife habitat as much as practicable. There are no DNR WMAs, SNA, WPAs, State Parks or State Forests within the boundary. A portion of the Douglas State Trail lies within the project boundary but lies at least 1,760 feet (1/3 mile) from the nearest proposed turbine.

Appendix B. Acronyms and Abbreviations Used in ABPP

Table 1.1: Definitions of Acronyms and Abbreviations used in this ABPP

Abbreviation	Definition
ABPP	Avian and Bat Protection Plan, described above.
APLIC	Avian Power Line Interaction Committee, a nonprofit organization of utilities and resource agencies that develops educational resources, research, and management options designed to reduce avian interactions with utilities.
AWA Goodhue	AWA Goodhue, LLC, a Minnesota limited liability company
AWEA	American Wind Energy Association, a national trade association representing wind power project developers and others involved in the wind industry.
BGEPA	United States Bald and Golden Eagle Protection Act, see Section 1.3 below.
BMPs	Best Management Practices are activities designed to minimize effects of development and land management on the natural environment, including erosion control and storm water management practices.
BOP/EPC	Balance of Plant/Engineering Procurement and Construction, a term used to describe the general construction contractor or the final planning and construction phase of a major project.
CRP	Conservation Reserve Program, a federal farm program that gives agricultural producers annual payments for retiring cropland to perennial vegetation under 10- to 15-year contracts administered by the FSA.
EFP	. Energy Facility Permitting office of the Minnesota Department of Commerce
ESA	United States Endangered Species Act, see Section 1.3 below.
FAA	Federal Aviation Administration, an agency within the U.S. Department of Transportation that regulates and oversees all aspects of civil aviation.
FSA	Farm Service Agency, an agency within the U.S. Department of Agriculture.
ft	Feet, a unit of distance measure equivalent to 12 inches or 0.305 meter.
HCP	Habitat Conservation Plan, see Section 1.3 below.
kW	Kilowatt, a unit of power measurement equivalent to one thousand watts.
LWECS	Large Wind Energy Conversion System, wind turbines and associated facilities with the capacity to generate 5 megawatts or more of electricity.
m	Meter, a unit of distance measure equivalent to 100 centimeters or 3.28 feet.
MBTA	United States Migratory Bird Treaty Act, see Section 1.3 below.
MDNR	Minnesota Department of Natural Resources, a state agency charged with management of the state's natural resources, including state parks, forests, trails, wildlife areas and hunting regulations, lands and minerals, and waters.
MESA	Minnesota Endangered Species Act, see Section 1.3 below.
MPUC	Minnesota Public Utilities Commission, a state agency that regulates electric, natural gas and telephone service, ensuring safe, reliable service at fair rates.
MW	Megawatt, a unit of power measurement equivalent to one million watts.
NHIS	Natural Heritage Information System, a continually updated database that is the most complete information source on Minnesota's rare plants, animals, native plant communities, and other significant natural features.
NRCS	Natural Resources Conservation Service, an agency within the U.S. Department of Agriculture.

Table 1.1: Definitions of Acronyms and Abbreviations used in this ABPP

Abbreviation	Definition
NWCC	National Wind Coordinating Collaborative, a neutral forum formed in 1994 to pursue development of environmentally, economically, and politically sustainable commercial markets for wind power in the U.S.
DOC	The Minnesota Department of Commerce.
project	AWA Goodhue wind project.
RD	Rotor Diameter, 82.5 m (271 ft) on a GE 1.6-82.5 ESS wind turbine.
RIM	Reinvest in Minnesota, a state program that retires environmentally sensitive lands from agricultural production under conservation easements administered by the Minnesota Board of Water and Soil Resources.
RSH	Rotor-swept height, or a distance measured from the turbine base beginning 38.75 m above the base and ending 121.25 m above the base, based on the height and diameter of the blades on a GE 1.6-82.5 ESS wind turbine.
RSZ	Rotor-swept zone, the rotor-swept area of the wind turbine blades based on the circumference of the rotor-swept height.
SCADA	Supervisory control and data acquisition, a centralized system of computer hardware and software that monitors and controls the infrastructure and facility-based processes of a wind project.
SGCN	Species of Greatest Conservation Need, species whose populations are rare, declining, or vulnerable.
SNA	Scientific and Natural Area, state-owned lands set aside to preserve and perpetuate the ecological diversity of Minnesota's natural heritage.
SWCD	Soil and Water Conservation District, local units of government that manage and natural resource programs with an emphasis on agriculture and soils.
USACE	United States Army Corps of Engineers, the federal agency charged with administering wetland regulations under Section 404 of Clean Water Act.
USFWS	United States Fish and Wildlife Service, an agency within the U.S. Department of Interior.
USGS	United States Geological Survey, an agency within the U.S. Department of Interior.
Westwood	Westwood Professional Services is a company that provides leading wind and solar energy development consulting, land development consulting, and authored this document in coordination with AWA Goodhue.
WMAs	Wildlife Management Areas, state lands established to provide wildlife production, public hunting, trapping, fishing, and compatible recreational uses.
WPAs	Waterfowl Production Areas, federal lands purchased for the purpose of increasing the production of migratory birds, especially waterfowl.
WSR	Wild and Scenic River, free-flowing rivers set aside and preserved for their outstanding natural, cultural, and recreational values.
WTG	Wind Turbine Generator, a rotary device that converts wind energy into electricity.
WTGAC	Wind Turbine Guidelines Advisory Committee, an interdisciplinary expert committee appointed by the Secretary of the Interior to recommend measures that avoid or minimize wildlife impacts of land-based wind energy facilities.

Appendix C. Applicable Wildlife Laws

MPUC Site Permit Conditions

The following sections of the MPUC Site Permit issued on August 23, 2011 contain requirements regarding wildlife with which AWA Goodhue must comply:

- Section 6.1: Biological and Natural Resource Inventories
- Section 6.7: Avian and Bat Protection Plan
- Section 13.1: Avian and Bat Protection Plan Special Conditions regarding Eagles, Bats and Loggerhead Shrikes

Detailed discussions regarding the specifics of these requirements and how they will be complied with is provided in the ABPP.

Federal Endangered Species Act (ESA)

The federal ESA (16 USC 1531-1544, as amended) sets forth three species list designations: endangered, threatened and candidate. Species listed as endangered or threatened cannot be legally "taken." A "taking" includes (among other things) harassing, harming, pursuing, hunting, shooting, wounding, trapping, killing, capturing, or collecting listed species within the United States and its territorial seas. The U.S. Fish and Wildlife Service (USFWS) defines harm in the definition of "take" to mean:

> "an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering." [http://library.findlaw.com/1999/Jan/1/241467.html].

Candidate species are animals and plants for which the USFWS has sufficient biological status and risk factor information to propose them as endangered or threatened, but for which a proposed listing regulation is precluded by other higher priority listing activities. Candidate species receive no statutory protection under the federal ESA.

Projects that have federal involvement trigger Section 7 of the ESA. Under Section 7, the USFWS provides informal or formal consultation and may provide a Biological Assessment and Biological Opinion. Where the Section 7 process applies, it typically ends when the USFWS makes an endangered or threatened species determination of no effect, may effect, or adverse effect. The Project does not trigger Section 7 of the ESA because it does not involve federal funding, federal land, or major federal permits, and there are no federally-listed species within the project area.

Private actions that might incidentally harm or "take" threatened or endangered species may obtain an incidental take permit under Section 10 of the ESA even if they do not have federal involvement. The incidental take permit and Habitat Conservation Plan (HCP) process includes a “no surprises” clause, under which the project proposer agrees to implement endangered species mitigation measures in return for protection from prosecution under the ESA. In order to obtain an incidental take permit, a private project proposer must prepare an HCP and the USFWS must approve the HCP. An HCP and incidental take permit is not warranted for the Project because the Ecological Risk Assessment and Pre-construction Avian Survey for Goodhue documented no occurrences of federally endangered or threatened species within the project area.

On June 28, 2011, the USFWS announced that the Northern Long-eared Bat may warrant federal protection as a threatened or endangered species. The announcement followed an initial review of a petition initiated by the Center for Biological Diversity seeking to protect the species under the ESA. The petition indicates that the species may be threatened by several factors, including habitat destruction and degradation, disturbance of hibernation areas and maternity roosts, and impacts related to white-nose syndrome (USFWS 2011). The finding was published in the federal register on June 29, 2011 with a 60-day comment period which ends August 29, 2011. The Project falls within the occupied range of the Northern Long-eared Bat and a small number of individuals of this species were recorded in the project area during the first month of acoustic bat monitoring.

Migratory Bird Treaty Act (MBTA)

The MBTA is a federal criminal statute that prohibits, unless permitted by regulations, activities that "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 USC 703). The MBTA does not contain provisions for “incidental take” permits. Technically, any migratory bird mortality caused by humans would be considered a violation of the MBTA.

The MBTA protects most avian species that inhabit the central United States. Exceptions include non-migratory gallinaceous game birds (e.g., pheasants, grouse, quail) and introduced species (e.g., European starlings, rock pigeons and house sparrows).

According to the USFWS (2003), the MBTA is a “strict liability statute,” meaning that proof of intent to harm or kill a migratory bird is not required for an action to be considered a violation of the MBTA. The USFWS recognizes, however, that some birds may be harmed or killed even if all reasonable measures to avoid bird fatality are implemented.

With regard to wind power, the USFWS considers a developer’s good faith efforts to comply with applicable USFWS guidance when exercising prosecutorial discretion under the MBTA. The USFWS is more likely to prosecute entities that have failed to implement adequate measures to prevent the reasonably foreseeable incidental take of migratory birds. Goodhue Wind has engaged in pro-active consultation with the USFWS, and such consultation generally reduces the potential risk of MBTA prosecution in the future.

Bald and Golden Eagle Protection Act (BGEPA)

The BGEPA (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone without a permit from the Secretary of the Interior, from "taking" bald or golden eagles, including their parts, nests, or eggs. The BGEPA provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The BGEPA defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." "Disturb" means:

> "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

As of the preparation of this document, no developer of a wind power project had been prosecuted under the BGEPA (WTGAC 2008b). However, the USFWS has prosecuted transmission utilities for violation of the BGEPA. A first offense violation of the BGEPA can result in a fine of $100,000 ($200,000 for organizations), imprisonment for one year, or both. Penalties increase substantially for additional offenses, and a second violation of the BGEPA is a felony.

On September 11, 2009, the USFWS finalized permit regulations to authorize limited take of bald eagles (Haliaeetus leucocephalus) and golden eagles (Aquila chrysaetos) under the BGEPA, where the take to be authorized is associated with otherwise lawful activities (USFWS 50 CFR Parts 13 and 22). The regulations also establish permit provisions for intentional take of eagle nests under particular and limited circumstances.

In January 2011, the USFWS released Draft Eagle Conservation Plan Guidance (Draft ECP Guidance), which explains the USFWS's approach to issuing programmatic take permits. The purpose of the guidance document is to assist project developers in avoiding, minimizing, and mitigating adverse effects on bald and golden eagles. The Draft ECP Guidance calls for surveys, monitoring, assessment, and research to be proportionate to the risk to eagles, and provides a process by which developers can follow that could allow for a programmatic permit authorizing unintentional take of eagles at wind energy facilities. Under the Draft ECP Guidance, Eagle Conservation Plans (ECP) can be developed in five stages, with each of the stages building upon the previous. The process provides an increasingly intensive evaluation of the likely effects of the configuration, development, and operation of a particular wind project site on eagles (USFWS 2011).

Evolving USFWS Bald and Golden Eagle Conservation Plan (ECP) Guidance

The USFWS Draft ECP Guidance continues to evolve, and is part of the Department of the Interior's ongoing efforts to improve siting and permitting of renewable energy projects. The guidelines were officially published in the Federal Register on February 18, 2011, and were open for public comment for 90 days ending May 19, 2011. A total of 124 individuals, companies, agencies, and organizations, including the American Wind Energy Association (AWEA), submitted written comments on the Draft ECP Guidance. The USFWS has not announced formal revisions to the Draft ECP Guidance.

Effective November 10, 2009, the USFWS adopted rules establishing an incidental take permit process under the BGEPA, and has prepared Implementation Guidance for Eagle Take Permits (USFWS 2010b). To apply for a taking under the BGEPA, the applicant must complete permit application Form 3-200-71, which requires information such as: 1) a detailed description of the activity that will cause the disturbance or take of eagles; 2) the species and number of eagles that will be taken and the likely means by which they would be taken; 3) and an explanation of why avoidance of the take is not possible (USFWS 50 CFR Parts 13 and 22).

The USFWS reviews the taking applications and makes a determination as to whether a taking is or is not likely to occur under the circumstances described. If the USFWS determines that take is not likely to occur, they may issue the permit if specific permit issuance criteria are met. The mission of the USFWS is to reduce the possibility of eagle take, and to only issue permits when taking is likely and cannot be avoided with practicable means (USFWS 50 CFR Parts 13 and 22).

Minnesota Endangered Species Act (MESA)

The Minnesota Endangered Species Act (Minn. Stat. 84.0895) states that:

> "[n]otwithstanding any other law, a person may not take, import, transport, or sell any portion of an endangered species of wild animal or plant, or sell or possess with intent to sell an article made with any part of the skin, hide, or parts of an endangered species of wild animal or plant, except as provided in subdivisions 2 and 7 [of this Chapter]."

The Minnesota ESA requires the Commissioner of the DNR to develop lists of species that are: (1) endangered, if the species is threatened with extinction throughout all or a significant portion of its range; (2) threatened, if the species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range; and (3) species of special concern, if although the species is not endangered or threatened, it is extremely uncommon in this state, or has unique or highly specific habitat requirements and deserves careful monitoring of its status. Species on the periphery of their range that are not listed as threatened may be included as special concern, along with species that were once threatened or endangered but now have increasing or protected, stable populations.

Species listed by the state as endangered, threatened and special concern are identified in Minn. Rules Chapter 6134. Minn. Rules Chapters 6212.1800-6212.2300 set forth regulations for permits involving the taking or possession of listed species. Neither the Minnesota ESA nor the implementing regulations contain provisions regarding “incidental take” of listed species or any enforcement procedures relating to such “incidental takes.”

The risk of the Project adversely affecting state threatened and endangered species is considered to be low. No state threatened or endangered species were observed in the project area during the Pre-construction Avian Survey. Two state-threatened loggerhead shrikes were observed along power lines and fence lines in the project area during the October 24, 2009 field verification of the loggerhead shrike habitat model. A brood of state-threatened trumpeter swans was observed by others approximately a half-mile west of the southern part of the project area and reported to the MDNR on August 18, 2011. The only two state special concern species observed in the project area were the bald eagle and the Franklin’s gull. The Franklin’s gull was recorded as an incidental observation during the 2010 spring migration survey, but it is considered unlikely to breed in the project area due to the lack of available habitat. The bird was observed flying through the area but was not observed landing or using any habitat within the Project Area. Bald eagles nest in and around the Project Area and are discussed in detail under sections 3.1.1.3 and 5.1 of this document.

Appendix D: Biological Inventories

Geographical Constraint Analysis

AWA Goodhue completed a geographic constraint analysis for the initial project area, which covered approximately 24.4 square miles. The geographic analysis included geographic information system (GIS) data that were compiled and analyzed for the project area and a report that explained data and site development factors that could not be fully articulated in the mapping. Thirty-five sources of GIS data were reviewed during the analysis to assess potential constraints. The GIS data was verified and supplemented by an onsite field review of the project area on August 22, 2008. The field review consisted of driving public roads in the project area and corroborating GIS data to evaluate constraints for wind energy development.

Using a qualitative scale of low, medium, and high, the wind project site was found to have an overall medium risk of affecting sensitive resources. The project area was found to have a number of intermittent drainages and streams, but public roads and upland crop fields appeared to provide sufficient access to largely avoid and minimize effects on wetlands. None of the streams in the project area were designated trout streams, but those in the western and northeastern portions were in the headwaters of streams that have trout water in their downstream reaches. The project area contained some wetlands, which were mostly associated with the above-mentioned drainages.

A large proportion of the project area was in cropland. The good road access provided the potential to avoid and minimize effects on most grasslands and woodlands. No federally listed threatened or endangered species were known or identified as likely to occur in the project area. Avian species of conservation status are discussed under the Desktop Avian and Bat Risk Assessment below. Two state special concern bat species were found to occur in Goodhue County. Their vulnerability when concentrated in hibernacula (usually caves or old mines) was considered a concern. No sites potentially suitable for hibernacula were observed, but several old quarries were identified in the southwest portion of the project area that might offer some limited habitat. Follow up field investigations were recommended for wetlands, wildlife, native plant communities, and cultural resources to aid in the avoidance and minimization of effects on these sensitive resources.

Desktop Avian and Bat Risk Assessment

AWA Goodhue completed a desktop avian and bat risk assessment in October 2009 to assess the risk of the proposed project affecting birds, bats, species of conservation status, and their important habitats. Between August 2008 and October 2009, the project area increased from 24.4 to 50.5 square miles. The predominant land use was agricultural, consisting of corn and soybeans, hay and pasture. Grasslands, woodlands, and wetlands covered smaller areas. Listings for Goodhue County include seven state-listed threatened, endangered, or special concern avian and bat species (**Table D-1**). The Goodhue Wind Project bird list included 211 avian species recorded in Goodhue County as both migrants and breeders. Many of the avian species with conservation status were associated with woodlands or wetlands, which are somewhat limited in the project area.

Many avian species considered likely to nest in the project area were grassland breeding birds. Almost one-third of the project area was grassland or pasture. Bats likely to use the project area were considered fairly common in abundance and distribution. The risk of direct avian and bat fatalities due to collisions with wind turbines was estimated based on available post-construction studies of wind projects in similar environments. Although the project area is located within the broad corridor of the Mississippi Flyway, the closest turbine is located about 15 miles west of the Mississippi River. Review of land cover data suggested that the most suitable migration stopover habitats in Goodhue County were outside the project area. These were the Richard Dorer Memorial Hardwood State Forest, and the Mississippi and Cannon River corridors. Despite the predominance of cropland, the risk assessment advised that the USFWS and the MMDNR routinely recommend pre- and post-construction wildlife field studies.

Table D-1. Goodhue County Birds of Conservation Status[1]

Common Name	***Scientific Name***	**State Status[2]**	**Potential to Occur in Project Area[3]**	**Comments**
Bald Eagle	*Haliaeetus leucocephalus*	SC	Confirmed	Confirmed nest in project area
Red-shouldered Hawk	*Buteo lineatus*	SC	Moderate	More likely to nest along Mississippi or Cannon Rivers
Peregrine Falcon	*Falco peregrines*	THR	Moderate	More likely to nest along Mississippi River
Acadian Flycatcher	*Empidonax virescens*	SC	Moderate	Potential suitable habitat
Loggerhead Shrike	*Lanius ludocicianus*	THR	Confirmed	Suitable habitat in project area
Cerulean Warbler	*Dendroica cerulean*	SC	Low	Lack of suitable habitat
Henslow's Sparrow	*Ammodramus henslowii*	END	Low	Lack of suitable habitat

[1] Information adapted from MDNR (2008).
[2] Status of state-listed species (THR=Threatened, END=Endangered, SC=Special Concern); MDNR (2007).
[3] Species listed as confirmed were documented in the project area during field studies.

Seven species of bats are known to occur in Minnesota (ASM 2001, BCI 2003). **Table D-2** lists the species recorded in the state and their distribution and conservation status according to MDNR (2007). All bat species known to occur in Minnesota were detected in the project area during the acoustic bat monitoring discussed in Section 5.6.1. The Big Brown Bat, Silver-haired Bat, Eastern Red Bat, Hoary Bat, and Little Brown Bat were initially considered the most likely to occur in the project area. Of the seven bat species, three roost primarily in trees, one in man-made structures, one in trees and structures, and two in caves or rock crevices. Land cover mapping indicates the project area is about 4% forested and no caves or mines have been noted in the project area. More abundant roosting habitat for tree roosting bats is available north of the project area in the Richard Dorer Memorial Hardwood State Forest and along the Mississippi River, which generally runs north-south approximately 15 miles east of the project area.

Table D-2. Distribution and Status of Bat Species Known to Occur in Minnesota[1]

Common Name	Scientific Name	Minnesota Distribution	Occurrence	Potential to Occur in Project Area[2]	Species Status[3]	Typical Roosting Habitat
Big Brown Bat	*Eptesicus fuscus*	Statewide	Common	Confirmed		Man-made structures and hollow trees
Silver-haired Bat[4]	*Lasionycteris noctivagans*	Statewide	Common	Confirmed		Under bark and in hollow trees
Eastern Red Bat[4]	*Lasiurus borealis*	Statewide	Common	Confirmed		Trees
Hoary Bat[4]	*Lasiurus cinereus*	Statewide	Common	Confirmed		Trees
Little Brown Bat	*Myotis lucifigus*	Statewide	Common	Confirmed		Man-made structures
Northern Long-eared Bat	*Myotis septentrionalis*	Statewide	Species of Special Concern	Confirmed	SC	Caves and mines
Tri-colored Bat	*Pipistrellus subflavus*	Southeast ¼ of state	Species of Special Concern	Confirmed	SC	Rock Crevices

[1] Information adapted from ASM (2001), BCI (2003), and MDNR (2007).
[2] Species listed as confirmed were documented in the project area during field studies.
[3] SC = Special Concern; MDNR (2007).
[4] Solitary, tree-roosting bat species, typically more affected by wind energy projects.

Initial Pre-Construction Avian Surveys

2010 Spring Migration Point Counts

AWA Goodhue completed a pre-construction avian migration survey at the Goodhue Wind Project from April 5 to May 24, 2010. A field ornithologist conducted 5-minute point counts at 20 locations along roadside transects, recorded other observations of rare birds, and documented locations of raptor stick nests visible from the survey route. Point counts were established at approximate 2-mile intervals throughout the project area in representative habitats and area of proposed turbines. This avian study characterized the spring avian community and quantified flight patterns and collision risk.

Westwood observed a total of 2,927 birds of 58 species in the project area during the 8-week spring survey. Generally, species observed are common in distribution and/or abundance. Overall mean bird use was 18.3 birds per 5 minutes. The most frequently seen species was the Red-winged Blackbird. The avian community was dominated by passerines (songbirds), most of which are common and/or abundant in an agricultural landscape during migration and/or breeding seasons. Waterfowl/waterbirds were notably absent, presumably due to the lack of water features these birds characteristically utilize during migration and breeding.

No federally listed species were observed. The only two state listed special concern species recorded include the Bald Eagle and the Franklin’s Gull. At the time of the Pre-construction

Avian Survey, three Bald Eagles nests existed at distances of 0.25, 1.0 and 3.5 miles outside the project area, but no bald eagles nests were observed inside the project boundary during these initial surveys. One Franklin's gull was recorded as an incidental observation during the first week of the avian survey. The incidental Franklin's gull observation was recorded outside of the point counts and Franklin's gulls are considered unlikely to breed in the project area due to the lack of suitable habitat. The project area has limited public wildlife lands, contiguous tracts of grassland, and water features that typically supports rare species. It also has limited suitable migration stopover habitat for birds in general.

Observations of large flocks of migrating birds, such as warblers, sparrows, and ducks and geese, were fewer than expected. Of 1,114 avian observations recorded, only 27 (2.4%) involved groups of more than 10 birds, and only one involved more than 25 birds. Only about 5% of flights were above the RSH where migratory flights typically occur, few flocks were observed, and few species known to breed further north were recorded. High flights were generally of raptors. However, high raptor flights do not necessarily indicate migratory behavior because raptors soar on thermals or hot air pockets that facilitate effortless flight, even in their daily movements. The lack of flock and non-breeding bird observations may be partially attributed to the uncharacteristically early spring in 2010.

There were 38 species of birds observed in flight. Only 12 of these species had a measurable index of collision hazard ($I > 0.001$). The species with the highest indices of collision hazard were Brown-headed Cowbird (0.02), Common Grackle (0.015), and American Crow (0.011). Only 15% of flights were within the rotor-swept height (RSH).

Nationwide, passerines have been the most abundant bird fatality at wind-energy facilities, often accounting for over 80% of avian fatalities at wind projects outside of California (Erickson et al. 2002, NWCC Wildlife Workgroup 2010). However, high passerine use has not been clearly correlated with high mortality (Erickson et al. 2002). Passerines accounted for 88% of the individual birds observed at Goodhue. Most passerines were generalist species that are adapted to the agricultural landscape.

2010 Leaf-off Raptor Nest Survey

Westwood conducted a leaf-off raptor nest survey in conjunction with the migration period point counts. Raptor nests were identified and mapped on March 24, 2010, and nests were monitored during April 5-19, 2010 to assess raptor activity and species use. Raptor nests were identified by driving the point count survey route and other roads within the project area and observing forested areas, woodlots and tree lines through a spotting scope and binoculars. Nest clumps and raptor activity suggestive of a nest were mapped and documented.

At the time the 2010 nest survey was completed, the project area was found to contain seven active Red-tailed Hawk nests and one active Great Horned Owl nest. Additional raptor nests identified include one Red-tailed Hawk nest and one Great-horned Owl nest located outside the project area and 13 other possible raptor nests with no documented raptor nesting activity. These 13 nests could either be inactive or used by crows, squirrels or raptors. Visual obstructions caused by vegetation and rolling terrain limited the potential for observation of raptor activity during this initial raptor nest survey.

2010 Bald Eagle Nest Monitoring

An AWA Goodhue avian field biologist surveyed the project area and a 2-mile buffer to verify the status of the three bald eagle nests identified by wildlife agencies and to search for other eagle nests in and near the project area. The USFWS had recommended monitoring of bald eagle nests within 2 miles of the project area, and later revised their recommendation to include an additional nest approximately 3.5 miles from the project boundary.

Monitoring of active eagle nests focused on flight paths of eagles to and from nests to assess potential local food sources and roost sites. Observed flight paths were recorded on aerial mapping, along with notes on eagle behavior (i.e., material carry for nest repair, food carry, territory defense, etc.). Monitoring occurred at each active nest for two half-day (4 hour) intervals between March 24 and April 16, 2010. Each nest was monitored for one morning and one afternoon. The monitoring timing corresponded to the eagle incubating and early brood rearing period. Compilation of flight paths and behavioral clues helped highlight potential flight path corridors, local food sources, and roost sites.

At the time of the 2010 avian surveys, three bald eagle nesting territories were known to exist near the drainages of Belle Creek, Zumbro River, and Hay Creek. These nests are located 0.25, 1.0 and 3.5 miles outside the project area boundary, respectively. The raptor nest survey conducted in March and April 2010 did not reveal any other eagle nests within 2 miles of the project area and there were no confirmed citizen reports of new bald eagle nests during 2010. Observations of bald eagle flights to and from nests indicated they were mainly utilizing the stream corridors in the vicinity of their nests. No local food source concentrations or preferred roost sites were observed during these initial observations. No eagle flight paths were observed through the project area during 2010.

One eagle fatality occurred on May 12, 2010 when an eagle was struck by a motor vehicle on U.S. Highway 52 as it fed on a road-killed raccoon. The eagle fatality was located 2.4 miles west of the southwestern part of the project and 3.1 miles from the nearest proposed turbine location. The eagle carcass was reportedly delivered to the Raptor Center at the University of Minnesota by a private citizen.

Loggerhead Shrike Habitat Assessment

Methods

AWA Goodhue's Loggerhead Shrike Habitat Assessment (Westwood Professional Services 2009) identified and ranked suitable shrike breeding habitat based on an adaptation of a previously developed shrike habitat model for Minnesota (Brooks and Temple 1990). The assessment and related work were designed to:

- assess the suitability of loggerhead shrike habitat in the project area;

- assess the compatibility of the Goodhue Wind Project with loggerhead shrikes; and
- demonstrate wind turbine siting that avoids and minimizes effects on loggerhead shrikes.

AWA Goodhue enlisted the assistance of Ms. Bonnie (Brooks) Erpelding to complete the loggerhead shrike habitat assessment. Ms. Erpelding is an authority on loggerhead shrikes in Minnesota. She completed her M.S. on loggerhead shrikes in Minnesota and previously served as the MDNR Nongame Wildlife Specialist for southeastern Minnesota.

Known records of shrike observations near the project area were reviewed during the initial phase of the habitat assessment. Most recorded shrike observations in Goodhue County occur in the northwest portion of the county, with others distributed throughout the county. There is one breeding season record within two miles of the project area, indicating potential suitable breeding habitat in the project vicinity. Brooks and Temple (1990) found substantial suitable, but unoccupied habitat in Minnesota, strongly suggesting that availability of breeding habitat is not limiting the Minnesota shrike population.

The habitat suitability model was modified from Brooks and Temple (1990) to efficiently evaluate the project area and apply the expert opinion of Ms. Erpelding. The project area was divided into 207 quarter sections and each quarter section was ranked for breeding loggerhead shrike habitat suitability based on interpretation of 1”=550’ scale 2008 aerial photography. Preliminary rankings for some quarter sections were revised after field verification. The habitat model was referred to as a “coarse filter” because it relied primarily on interpretation of aerial photography, and because the 160-acre sampling frame is much larger than the reported shrike territory size of 10-30 acres per pair in the Midwest (Kridelbaugh 1982). The habitat rankings were based on the criteria listed in **Table D-3**.

Table D-3. Loggerhead Shrike Coarse Filter Breeding Habitat Ranking

Rank	Description	Per 160 Acres (Quarter Section; 65 ha)		
		Grass/Pasture (ac)	Nest Sites[1]	Perches
0	Unsuitable	< 20	< 8	NA
1	Minimally Suitable	20-30	≥ 8	NA
2	Slightly Suitable	30-40	≥ 10	NA
3	Moderately Suitable	40-50	≥ 12	Available
4	Highly Suitable	50-60	≥ 15	Available throughout
5	Very Highly Suitable	> 60	≥ 15	Available throughout

[1] A potential nest site was defined as isolated low growing trees, or tree rows or windbreaks only one tree wide.

Results

The coarse filter model indicated that 58.5% of the project area is unsuitable or minimally suitable for loggerhead shrikes (**Table D-4**). Roughly a third (30.9%) of the project area contains habitat at least moderately suitable for shrikes (ranks 3-5). Quarter sections containing suitable habitat are dispersed throughout the project area. Notably, due to the "coarse filter" characteristics of the assessment, quarter sections ranked moderately suitable may contain up to 120 acres of unsuitable shrike habitat such as cropland and woodland. Quarter sections ranked highly suitable or very highly suitable may contain up to 110 acres of unsuitable shrike habitat.

Eastern red cedar trees, which are generally preferred by shrikes, were observed in grasslands, mostly in the northern half of the project area. Field verification resulted in decreased preliminary habitat suitability rankings for 28 of 207 quarter sections due to a lack of suitable nest sites. This suggests a need for caution during aerial photograph interpretation due to the potential to overestimate nest site availability and habitat suitability.

During the October 24, 2009 field verification, the observation of two loggerhead shrikes along power lines and fence lines in habitats ranked 3 and 4 confirmed that loggerhead shrikes are present in the project area during fall migration and helped to validate the habitat model. The lack of previous records of shrikes in the project area is likely due to a lack of surveys or reports of sightings rather than an absence of shrikes.

Table D-4. Coarse Filter Habitat Rankings for Project Area and Turbine Locations

Habitat Rank	Project Quarter Sections		2010 Turbine Layout[1]		2011 Turbine Layout[1]	
	No.	%	No.	%	No.	%
0	88	42.5	28	56.0	29	60.4
1	33	16.0	4	8.0	2	4.2
2	22	10.6	8	16.0	7	14.6
3	35	16.9	4	8.0	4	8.3
4	16	7.7	1	2.0	1	2.1
5	13	6.3	5	10.0	5	10.4
Total	207	100.0	50	100.0	48	100.0

[1] The turbine layout was revised several times to address multiple constraints. Turbine layouts include alternate turbine locations. The 2010 layout was the layout before the MPUC on October 21, 2010 and the 2011 layout was shown at the MPUC public hearing on June 30, 2011. Alternate turbine locations were not included in this analysis.

Wetland Delineation

Westwood delineated and located parts of 45 wetlands in proximity to proposed construction zones within the project area. Wetland delineations were performed within a 2,624-acre (4.10 square mile) area encompassing the Project Construction Area. The Project Construction Area encompasses all areas that would potentially incur temporary or permanent disturbance during construction of wind turbines, access roads, underground electrical collection cables, crane paths and substations for the project. The Project Construction Area is larger than the ultimate zone of disturbance, the latter being dictated by the final design of the project. Delineation field work was performed on June 16-17, July 28, August 2-3, and October 10, 2010. Of the 45 wetland areas, 40 were associated with creeks, ditches, or drainages. The remaining five delineated wetlands were Type 1, 2, or 3 wetlands that are not associated with ditches, creeks, or drainages and are believed to be isolated basins. All but two wetlands have been substantially disturbed by previous ditching, sedimentation and/or tillage.

The wetland delineation is being updated to include additions to the Project Construction Area that may result from relocation of turbines in response to MPUC Site Permit conditions or other constraints.

Native Prairie Survey

Throughout the various field surveys that performed in the project area, Westwood biologists have field reviewed areas to be affected by construction and found no native prairie remnants. Primary patches of grassland in the project area were reviewed during field verification for the loggerhead shrike habitat assessment and the only potential prairie remnant identified was later determined to be enrolled in the Conservation Reserve Program, indicating it had been retired from cropland and seeded to native grasses. A final survey for native prairie remnants will be performed as part of detailed micrositing of turbines, access roads and collection cables. Effects on any native prairie remnants that may be identified will be avoided and minimized to the extent practicable. If it becomes apparent that impacts to native prairie remnants are unavoidable, a prairie management plan will be prepared. At least ten days prior to construction, AWA Goodhue will report the results of its native prairie avoidance efforts to DOC EFP and MDNR. If a prairie management plan is required, it will be submitted at that time.

Appendix E: Summary of Agency Coordination to Date

AWA Goodhue initiated wildlife agency consultation and coordination activities in October 2008, when initial comments were requested from USFWS and MDNR. An initial Natural Heritage Inventory System (NHIS) database search was conducted on October 24, 2008. The project boundary was subsequently enlarged and supplemental consultation letters were sent to these agencies in December 2008. An updated NHIS search was conducted on September 30, 2009. USFWS provided a comment email on November 25, 2008, and MDNR provided comment emails on November 4, 2008 and January 13, 2009. USFWS provided an additional comment letter on July 9, 2009.

Westwood conducted a loggerhead shrike habitat assessment, desktop avian and bat risk assessment and avian and bat assessment protocols between November 15, 2009 and January 15, 2010. Westwood responded to USFWS and MDNR comments on January 18, 2010 and conducted a meeting with these agencies on February 2, 2010. USFWS submitted a supplemental comment letter on February 19, 2010. Westwood submitted initial and revised avian field survey protocols to USFWS on March 31, 2010 and May 12, 2010. Over the summer and fall of 2010, Westwood prepared a pre-construction avian survey and risk assessment report and final loggerhead shrike habitat assessment, both of which were provided to USFWS and MDNR on October 10, 2010.

On October 5, 2010, Goodhue County adopted a wind power ordinance with setbacks that would have precluded siting most of the turbines AWA Goodhue proposed in the MPUC Site Permit application. On October 21, 2010, the MPUC held a hearing to consider approving the Site Permit for the Project. In its deliberations, the MPUC remanded to an Administrative Law Judge (ALJ) the question of whether good cause existed not to apply the county ordinance. Given the uncertain future of the AWA Goodhue project, most agency coordination and avian survey and monitoring work (along with other project development activity) were suspended from October 21, 2010 until the ALJ's recommendation was issued on April 29, 2011. During this period of suspended activity, AWA Goodhue and Westwood did conduct a November 18, 2010 meeting with the MDNR to discuss the results of the loggerhead shrike habitat assessment.

Shortly after issuance of the ALJ's recommendation on April 29, 2011, agency coordination, avian surveys and field studies were reinitiated by AWA Goodhue and Westwood. Coordination was re-initiated with USFWS regarding bald eagles the first week of May 2011 in response to citizen reports of new bald eagle nests in or near the Project Area, and monitoring on two new eagles nests was initiated. On June 9, 2011, AWA Goodhue and Westwood participated in a meeting and conference call with staff from the DOC- EFP, USFWS and MDNR to discuss the results of nest monitoring activities and plans for ongoing monitoring. USFWS recommended that monitoring be shifted from the new nests to four turbine clusters in nearest proximity to active nests. Westwood immediately implemented this change. On June 13, 2011, Westwood met on-site with the MDNR and USFWS and conducted a field review of two specific turbine locations that were of concern with regard to loggerhead shrikes (both of which were subsequently deleted from the project layout). A subsequent meeting and conference call was held with staff from the DOC- EFP, USFWS and MDNR on July 29, 2011 to discuss the results of turbine cluster monitoring and modifications being made to the turbine layout in response to MPUC Site Permit Conditions and MDNR concerns about loggerhead shrikes. Extensive and frequent agency coordination has occurred during the preparation of this ABPP written comments on a draft of the ABPP from DOC-EFP, USFWS and MDNR as well as meetings involving AWA Goodhue, Westwood and the three agencies on August 12, 15, 18, 22 and 29, 2011. An additional meeting was held with DOC-EFP and the USFWS to discuss eagle surveys and issues on December 1, 2011.

Appendix F: Minnesota DNR Fatality Monitoring Report Forms

Minnesota Department of Natural Resources

Ecological and Water Resources

AVIAN AND BAT FATALITY SURVEY REPORT

Project Name:____
Project Location: ____

Company/
Organization/
Name:____

Address: ____
____
____

Phone: (______)_______-_________ Fax: (______)________-_________

E-Mail:____

Project Supervisor Name:____

Supervisor Contact: Phone: (______)________________

E-Mail: ______________________

If this is contracted work, provide the name & address of the individual/organization work is being performed for:

____
____
____

GPS Locations of All Wind Turbines
(Provide Lat/Lon coordinates in UTM Zone 15N NAD83)

Project Name:________________________________ Page: _____ of _______

Total No. of Turbines:________

Lat/Lon GPS Location Information for All Turbines.

DATUM used:

Turbine No.	Latitude			Longitude			Comments
	°	'	"	°	'	"	
	°	'	"	°	'	"	
	°	'	"	°	'	"	
	°	'	"	°	'	"	
	°	'	"	°	'	"	
	°	'	"	°	'	"	
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	°	'	"	°	'	"	
	°	'	"	°	'	"	
	°	'	"	°	'	"	
	°	'	"	°	'	"	

Description of Wind Turbine Searched for Carcasses

Project Name:____________________ **Turbine Number:**__________

1. **Diameter of Blade Span:** ________m

2. **Blade Height Above Ground-** Max.:__________m; Min.:__________m

3. **Surface Area of Search Plot:**____________m^2

4. **Attach a map of each turbine with 100 meter plot, search boundaries, location and numbering of transects, and vegetation classification on a separate sheet.**

5. **Attach a spread sheet with weather data collected at 60-minute intervals. Data should include wind speed, temperature, precipitation, cloud ceiling height, etc.**

6. **General Habitat Description and Topography within 100 m of Turbine:**

   (Use Anderson Classification System)

7. **General Habitat Description and Topography >100m to 1000m from Turbine:**

   (Use Anderson Classification System)

8. **Distance of Turbine to High Value Habitat(s) (see DNR Wind Guidance document):**

Form Carcass Search 2 **MINNESOTA DEPARTMENT OF NATURAL RESOURCES**

01/11

Project Name:____________________

Daily Search Summary

(complete each day of search)

Page: ______ **of** ______

[a]Weather: F= fog, D= drizzle, R= steady rain, W=wind over 10mph (Use additional Pages as needed)

	Turbine		Time			Number of Carcasses Found				
Date	Number	Observer	Start	End	Weather[a]	Bat	Bird	Other	Total	Comments

Carcass Data Sheet

Observer Name:______________________________

Date:______________________________

Project Name:______________________________

Cloud Cover:______% **Temperature:** ______ºC **Precipitation:** ________(fog, drizzle, rain, wind)

	Carcass Tag Information[a]				Check One		From Turbine					
Time (h)	Turbine No.	Date	Transect No.	Specimen No.	Bat	Bird	Azimuth	Dist.(m)	Species	Age[c]	Sex[d]	Condition[e]

[a]Carcass Number= Turbine # - Date - Transect No. - Sequential Specimen No.; [c]Age= A (adult), J (juvenile) Unk (unknown); [d]Sex= M(male), F(female), Unk (unknown); [e]Condition: E= excellent, F= fair, P= poor.

MINNESOTA DEPARTMENT OF NATURAL RESOURCES

FATALITY REPORT GUIDELINES

- Below is an outlined guide of what we are looking for in the annual and final post-construction reports.
- Some general guidelines include:
  - Explain all methods used in detail.
  - If species codes are used, we recommend the American Ornithologist Union 4-letter codes (http://www.birdpop.org/AlphaCodes.htm).
  - Provide all equations and methods used for all calculations.
  - Provide average, range, confidence intervals, *p* values, and other statistics where applicable.
  - Provide raw data as Appendices or as accompanying files on a CD to the Natural Heritage Review Coordinator (651-259-5109).
- For final reports, include all years of study reporting on each individual year, as well as overall results and trends, detailing any similarities and/or difference between years of study.
- All reports should be submitted by January 1 following that years data collection. Reports need to be sent to the DNR Regional Environmental Assessment Ecologist, Natural Heritage Review Coordinator, and the Department of Energy Resources.

1. **Executive Summary**

2. **Introduction**
   a. Description of project area
      i. Map of site including turbine locations, roads, transmission lines, substation, etc.
      ii. Distribution, number and size of turbines (height, MW, rotor swept zone, etc.)
      iii. Location of project (state, county, township, etc.)
      iv. Any other general information
   b. Habitat/landcover
      i. Landcover types – map and percentages of each
      ii. High Value habitats identified as per DNR Wind Guidance document.
   c. Wind speed
      i. Overall wind speed and direction (wind rose)
      ii. Prevailing winds from which direction and what times of the year

3. **Methods**
   a. Carcass searches
      i. Turbines & search area
         1. No. turbines searched
         2. How turbines selected
         3. Dates of survey
         4. Time of day searched
         5. Maps of each turbine's search plot delineating vegetation classes and habitat
         6. Table showing searchable area in each vegetation class for each turbine
      ii. Search methods
      iii. Incidental kills – how documented

   b. Fatality Patterns
      i. Temporal patterns - seasonal
      ii. Spatial patterns - distance from turbine
      iii. Weather and generation associations - how collected and analyzed

1. Temperature
2. Wind speed
3. Other variables (MW, rotor sweep zone, etc.)

iv. Age, species, and gender

c. Fatality estimates and adjustment– methods used (Erickson, Manuela Huso, & others) showing all equations used
    i. Searcher efficiency trials & scavenger removal trials
        1. Searcher efficiency methods
        2. Scavenger removal methods
        3. Searcher efficiency and scavenging removal corrections (SESR) – methods and equations used
    ii. Searchable area corrections

d. Fatality and habitat (landcover) correlations

4. Results

a. Carcass searches
    i. Overall data
        1. Summary of search effort
            a. Average time each turbine searched
            b. # days surveys conducted
            c. Explanation why any days and/or turbines were not surveyed
        2. Bird carcasses
            a. Total No. found
            b. Breakdown by turbine
            c. Breakdown by species
            d. Breakdown by date, month, etc.
            e. Alive, injured, sent to rehab, etc.
        3. Bat carcasses
            a. Total No. found
            b. Breakdown by turbine
            c. Breakdown by species
            d. Breakdown by date, month, etc.
            e. Alive, injured, sent to rehab, etc.
        4. Maps showing carcass location at each search turbine, broken down in 10 m increments; any trends?
    ii. Temporal patterns - Seasonal distribution of fatalities
        1. Day
        2. Week
        3. Month
    iii. Spatial patterns
        1. Distance from turbines
        2. Direction from turbine (showing N, S, E, W)
    iv. Weather and generation associations
        1. Temperature
        2. Wind speed
        3. Other variables (MW, rotor sweep zone, etc.)
    v. Age, species, and gender
        1. Males vs. females
        2. Species
        3. Adults vs. juveniles

b. Fatality estimates and adjustments (see pages 6- 8 for guidance)
    i. Searcher efficiency trials & scavenger removal trials
        1. Searcher efficiency
            a. Overall searcher efficiency average and range
            b. Individual searcher average and range

c. No. trials and searcher efficiency broken down by bat carcasses, bird carcasses, vegetation class, and date of trial
d. Fresh vs. frozen, intact vs. broken, colored vs. dull (birds), etc. and effects on searcher efficiency if any

2. Scavenger removal
   a. Overall average No. days before scavenger removal and range
   b. Average and range of all bat and bird scavenger removal trials
   c. No. trials broken down by bat species and bird species
   d. No. trials and mean scavenger removal broken down by bats & birds, vegetation class, and date of trial
   e. Fresh vs. frozen, intact vs. broken, colored vs. dull (birds), etc. and effects on scavenger removal time if any
   f. Scavenger removal by vegetation class
3. Searcher efficiency and scavenger removal (SESR) Corrections

ii. Searchable area corrections

iii. Fatality estimates and adjustments
1. Bats
   a. Total estimated No. of bats killed at site
   b. Bats/turbine/year include confidence interval
   c. Bats/MW/year include confidence interval
   d. Bats/ft^2 of rotor area/year include confidence interval
2. Birds
   a. Total estimated No. of birds killed at site
   b. Birds/turbine/year include confidence interval
   c. Birds/MW/year include confidence interval
   d. Birds/ft^2 of rotor area/year include confidence interval
3. Turbines with greatest/least kills
4. Other trends?

c. Correlation of fatalities and Weather data
   i. Temperature
   ii. Wind speed
   iii. Other variables
d. Note any other trends observed

5. Discussion
   a. Avian fatality
   b. Bat fatality
   c. Implications of results
   d. Suggestions for improvements to protocol
   e. Any recommended adjustments for this site for next year's surveys
   f. If final report, discuss entire study (both years)

6. Data sheets
   a. Fatality datasheets
      i. Cover
      ii. GPS location of all wind turbines
      iii. Description of wind turbine searched for carcass (using Anderson Level III land cover codes)
      iv. Daily Search Summary
      v. Carcass Data Sheet
   b. Searcher efficiency data
   c. Scavenger removal data

Appendix G: Eagle Collision Risk Modeling – 2011 Breeding Season Data

Step	PREDICTED NUMBER OF EAGLE-TURBINE COLLISIONS: AWA Goodhue Wind Farm -- 2011 Breeding Period Data Only -- 100 m Buffer around WTGs			
	BAND ET AL (2007) MODEL STAGE 1	Units		Comments
1	Point Count Plot radius	m	100	100 meter buffer around each of 18 turbines withi n 800 meter survey plots
2	Area of Point Count Plot	m^2	31415.92654	
3	Number of Plots		18	There are 18 turbine locations (including 100 m radius buffer) within the five 800 m survey plots
4	Total Plot Area	m^2	565486.6776	
5	Plot Height	m	175	
6	Risk Volume (V_w) (Total Observation Plot Volume)	m^3	98960168.59	
7	Number of turbines		48	
8	Rotor radius	m	41.25	
9	Rotor depth	m	2	
10	Bird length	m	0.94	
11	Critical Volume (V_r) (Total Rotor Swept Volume for 48 turbines)	m^3	754373.3651	
12	Proportion of Risk Volume Occupied by Critical Volume		0.007623	Total rotor swept volume/total survey plot volume
13	Plot Observation Time	minutes	12,600	5 plots monitored for average of 242.3 minutes each
14	Observation Time Birds Spent in Flight w/in Risk Volume (V_w)	minutes	2.04	1835 meters of flight observed within 100m radius turbine buffers/15 meters per second = 122.3 seconds = 2.04 minutes
15	Proportion of flights at RSH		0.297	From flight lengths collected during breeding season point counts = 544m/1835m = 0.297
16	Observation Time Birds Spent at RSH w/in Risk Volume (V_w)	seconds	36.3528	
17	Observation Time Birds Spent at RSH w/in Critical Volume	seconds	0.277117394	Portion of observation time birds would be w/in rotor swept volume
18	Daylight hours in a year in Project Area	hours	4468	Per U. S. Naval Observatory
19	Percentage of Hours Turbines Operational		0.85	Conservative estimate
20	Potential total bird occupancy	minutes per year	227868	Minutes per year birds could be interacting with moving turbine rotors
21	Proportion of Total Bird Occupancy represented by Obs Time		0.055295171	
22	Bird occupancy at RSH of Critical Volume (V_r) per Year	bird-seconds/yr	5.01160	Seconds per year that birds would be within total rotor swept volume
23	Flight speed	meters/second	15.00000	15 m/sec = 33.6 mph (estimated average flight speed per Whitfield (2009))
24	Time taken for transit through rotors	seconds	0.19600	
25	Number of transits through rotors/year	transits/year	25.56940	
26	BAND Collision % of transits (From Stage 2 results)	collisions/transit	0.09100	From Stage 2 spreadsheet for GE 1.6 MW WTG - Bird flapping, not gliding
27	Collisions per annum w/o avoidance/displacement factor	collisions/year	2.32682	
28	Avoidance factor (for golden eagles from Whitfield 2009)		0.01000	
29	**Predicted collisions per annum**	collisions/year	0.02327	
30	**Years between predicted collisions**	years/collision	42.97720	1 collision every 43 years

PREDICTED NUMBER OF EAGLE-TURBINE COLLISIONS: AWA Goodhue Wind Farm -- 2011 Breeding Period Data Only -- 800 m Radius Plot around Observation Point			
BAND ET AL (2007) MODEL STAGE 1	Units		Comments
Point Count Plot radius	m	800	800 meter survey plot around each observation point
Area of Point Count Plot	m^2	2010619.298	
Number of Plots		5	
Total Plot Area	m^2	10053096.49	
Plot Height	m	175	
Risk Volume (V_w) (Total Observation Plot Volume)	m^3	1759291886	
Number of turbines		48	
Rotor radius	m	41.25	
Rotor depth	m	2	
Bird length	m	0.94	
Critical Volume (V_r) (Total Rotor Swept Volume for 48 turbines)	m^3	754373.3651	
Proportion of Risk Volume Occupied by Critical Volume		0.000428794	Total rotor swept volume/total survey plot volume
Plot Observation Time	minutes	12,600	5 plots monitored for average of 242.3 minutes each
Observation Time Birds Spent in Flight w/in Risk Volume (V_w)	minutes	177	159,304 meters of flight observed/15 meters per second = 10,620 seconds = 177 minutes
Proportion of flights at RSH		0.3579	From flight lengths collected during breeding season point counts
Observation Time Birds Spent at RSH w/in Risk Volume (V_w)	seconds	3800.898	
Observation Time Birds Spent at RSH w/in Critical Volume	seconds	1.629801307	Portion of observation time birds would be w/in rotor swept volume
Daylight hours in a year in Project Area	hours	4468	Per U. S. Naval Observatory
Percentage of Hours Turbines Operational		0.85	Conservative estimate
Potential total bird occupancy	minutes per year	227868	Minutes per year birds could be interacting with moving turbine rotors
Proportion of Total Bird Occupancy represented by Obs Time		0.055295171	
Bird occupancy at RSH of Critical Volume (V_r) per Year	bird-seconds/yr	29.47457	Seconds per year that birds would be within total rotor swept volume
Flight speed	meters/second	15.00000	15 m/sec = 33.6 mph (estimated average flight speed per Whitfield (2009))
Time taken for transit through rotors	seconds	0.19600	
Number of transits through rotors/year	transits/year	150.38045	
BAND Collision % of transits (From Stage 2 results)	collisions/transit	0.09100	From Stage 2 spreadsheet for GE 1.6 WTG - Bird flapping, not gliding
Collisions per annum w/o avoidance/displacement factor		13.68462	
Avoidance factor (for golden eagles from Whitfield 2009)		0.01000	
Predicted collisions per annum		0.13685	
Years between predicted collisions		7.30747	1 collision every 7.3 years

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA

Only enter input parameters in blue

W Band 12/14/2011

K: [1D or [3D] (0 or 1)	1		**Calculation of alpha and p(collision) as a function of radius**										
NoBlades	3						Upwind:				Downwind:		
MaxChord	2.8	m	r/R	c/C	α	collide		contribution	collide		contribution		
Pitch (degrees)	15		radius	chord	alpha	length	p(collision)	from radius r	length	p(collision)	from radius r		
BirdLength	0.94	m	0.025	0.575	13.89	53.83	1.00	0.00125	52.99	1.00	0.00125		
Wingspan	2.29	m	0.075	0.575	4.63	18.22	0.61	0.00455	17.39	0.58	0.00435		
F: Flapping (0) or gliding (+1)	0		0.125	0.702	2.78	12.14	0.40	0.00506	11.12	0.37	0.00463		
			0.175	0.860	1.98	9.78	0.33	0.00571	8.54	0.28	0.00498		
Bird speed	15	m/sec	0.225	0.994	1.54	8.41	0.28	0.00630	6.96	0.23	0.00522		
RotorDiam	82.5	m	0.275	0.947	1.26	6.81	0.23	0.00624	5.44	0.18	0.00499		
RotationPeriod	6.00	sec	0.325	0.899	1.07	5.70	0.19	0.00617	4.39	0.15	0.00476		
			0.375	0.851	0.93	4.87	0.16	0.00609	3.64	0.12	0.00454		
			0.425	0.804	0.82	4.23	0.14	0.00599	3.06	0.10	0.00434		
			0.475	0.756	0.73	3.72	0.12	0.00588	2.62	0.09	0.00415		
Bird aspect ratioo: β	0.41		0.525	0.708	0.66	3.29	0.11	0.00577	2.27	0.08	0.00397		
			0.575	0.660	0.60	2.94	0.10	0.00564	1.98	0.07	0.00380		
			0.625	0.613	0.56	2.64	0.09	0.00549	1.75	0.06	0.00364		
			0.675	0.565	0.51	2.37	0.08	0.00534	1.55	0.05	0.00350		
			0.725	0.517	0.48	2.14	0.07	0.00518	1.39	0.05	0.00336		
			0.775	0.470	0.45	1.94	0.06	0.00500	1.25	0.04	0.00324		
			0.825	0.422	0.42	1.75	0.06	0.00481	1.14	0.04	0.00313		
			0.875	0.374	0.40	1.61	0.05	0.00470	1.07	0.04	0.00312		
			0.925	0.327	0.38	1.51	0.05	0.00465	1.03	0.03	0.00319		
			0.975	0.279	0.36	1.41	0.05	0.00458	1.01	0.03	0.00327		
				Overall p(collision) =			**Upwind**	**10.4%**		**Downwind**	**7.7%**		
								Average	**9.1%**				

NOTES

Max chord 2.8m from estimate

Pitch 15 deg from estimate

Bird length female maximum 0.94 m - from natureserve.org

Wingspan female maximum 2.29 m from natureserve.org

Bird speed 15 m/s (34mph) - per Whitfield (2009) for golden eagles

Rotor diameter 82.5m for GE 1.6 xle WTG

Rotational period 6 sec for GE 1.6 WTG operating at 8m/s (10 RPM; 700kW; average output for site)

CALCULATION OF COLLISION RISK FOR BIRD PASSING THROUGH ROTOR AREA

Only enter input parameters in blue

W Band 12/14/2011

K: [1D or [3D] (0 or 1)	1	
NoBlades	3	
MaxChord	2.8	m
Pitch (degrees)	15	
BirdLength	0.94	m
Wingspan	2.29	m
F: Flapping (0) or gliding (+1)	1	
Bird speed	15	m/sec
RotorDiam	82.5	m
RotationPeriod	6.00	sec
Bird aspect ratioo: β	0.41	

Calculation of alpha and p(collision) as a function of radius

			Upwind:			Downwind:		
r/R radius	c/C chord	α alpha	collide length	p(collision)	contribution from radius r	collide length	p(collision)	contribution from radius r
0.025	0.575	13.89	42.27	1.00	0.00125	41.43	1.00	0.00125
0.075	0.575	4.63	14.37	0.48	0.00359	13.53	0.45	0.00338
0.125	0.702	2.78	9.83	0.33	0.00410	8.81	0.29	0.00367
0.175	0.860	1.98	8.13	0.27	0.00474	6.89	0.23	0.00402
0.225	0.994	1.54	7.12	0.24	0.00534	5.68	0.19	0.00426
0.275	0.947	1.26	5.76	0.19	0.00528	4.39	0.15	0.00402
0.325	0.899	1.07	4.81	0.16	0.00521	3.50	0.12	0.00380
0.375	0.851	0.93	4.10	0.14	0.00512	2.86	0.10	0.00358
0.425	0.804	0.82	3.55	0.12	0.00503	2.38	0.08	0.00338
0.475	0.756	0.73	3.11	0.10	0.00492	2.01	0.07	0.00319
0.525	0.708	0.66	2.74	0.09	0.00480	1.72	0.06	0.00301
0.575	0.660	0.60	2.44	0.08	0.00467	1.48	0.05	0.00284
0.625	0.613	0.56	2.17	0.07	0.00453	1.29	0.04	0.00268
0.675	0.565	0.51	1.95	0.06	0.00438	1.13	0.04	0.00254
0.725	0.517	0.48	1.74	0.06	0.00421	0.99	0.03	0.00240
0.775	0.470	0.45	1.56	0.05	0.00404	0.88	0.03	0.00228
0.825	0.422	0.42	1.40	0.05	0.00385	0.79	0.03	0.00217
0.875	0.374	0.40	1.61	0.05	0.00470	1.07	0.04	0.00312
0.925	0.327	0.38	1.51	0.05	0.00465	1.03	0.03	0.00319
0.975	0.279	0.36	1.41	0.05	0.00458	1.01	0.03	0.00327

Overall p(collision) = **Upwind** **8.9%** **Downwind** **6.2%**

Average **7.6%**

NOTES

Max chord 2.8m from estimate

Pitch 15 deg from estimate

Bird length female maximum 0.94 m - from natureserve.org

Wingspan female maximum 2.29 m from natureserve.org

Bird speed 15 m/s (34mph) - per Whitfield (2009) for golden eagles

Rotor diameter 82.5m for GE 1.6 xle WTG

Rotational period 6 sec for GE 1.6 WTG operating at 8m/s (10 RPM; 700kW; average output for site)

AWA Goodhue Wind Project -- 2011 Breeding Bald Eagle Flight Calculations

	Total Flight Length (m)				Flight Length within 100m of Turbine					
	Below	Within	Above	Total	Below	Within	Above	Total		
Location 1a	2688	2782	29241	34711	512	418	244	1174		
Location 1	0	0	4489	4489	0	0	0	0		
Location 2	32297	9156	4548	46001	0	0	0	0		
Location 3	5826	44585	9549	59960	278	0	0	278		
Location 4	2281	488	11374	14143	0	126	257	383		
Total	43092	57011	59201	159304	790	544	501	1835		
	Proportions of Flights within 100m of Turbine - per location									
	Below	Within	Above							
Location 1a	0.190476	0.150252	0.008344			within / total length of 1a			0.012042	
Location 1	0	0	0							
Location 2	0	0	0							
Location 3	0.047717	0	0							
Location 4	0	0.258197	0.022595			within / total length of 4			0.008909	
	Proportions of Flights within 100m of Turbine - all flights per location									
Location 1a	0.033822									
Location 1	0									
Location 2	0									
Location 3	0.004636									
Location 4	0.027081									
	All flights - proportion within 100m of turbine									
	Below	Within	Above							
	0.018333	0.009542	0.011519							
	1.80%	0.95%	1.15%							
	overall proportion of flights overlapping 100m of turbines									
		0.011519	1.15%							
	overall proportion of flights overlapping 100m of turbines AND within RSH									
	0.003415									
	0.34%									

Appendix H: Wildlife Incident Reporting Form

Wildlife Incident Reporting Form
AWA Goodhue Wind Project

SECTION NO. 1 - DISCOVERY DATA

Report Date:____
(Date on which the animal(s) was found and the report completed)

Injury/Fatality
(Circle appropriate choice)

Complete/Dismembered/Feathers
(Circle appropriate description. Complete would indicate a complete and intact carcass or injured animal. Dismembered would indicate a missing or amputated wing or other appendage. Feathers would indicate that only feathers were found.)

Notification to:_____________________________________
(See notification requirements below)

Date/Time:____

Note: All notifications must occur within 24 hours of discovery to ensure permit compliance.

- For Injured Animals that are not raptors, notify Wildlife Rehabilitation Center of Minnesota (**651-486-9453**) and Wildlife Consultant (**952-937-5150**) or AWA Goodhue Site Manager (**Phone # TBD**). For injured raptors, notify the Raptor Clinic at the University of Minnesota Raptor Center (**651-486-9453**) and Wildlife Consultant (**952-937-5150**) or AWA Goodhue Site Manager (**Phone # TBD)**. If the injured animal is found after normal weekday office hours, protect the animal and report it the Wildlife Rehabilitation Center of Minnesota or Raptor Clinic at the Minnesota Raptor Center on the next available working day.

- For Fatalities, Notify Wildlife Consultant (**952-937-5150**) and/or AWA Goodhue Site Manager (**Phone # TBD**).

SECTION NO. 2 - LOCATION OF FIND

Structure:
____
(Include turbine number, Pole number, or other landmark feature if nothing is nearby)

Location Remarks:
____
____
____
(Include closest turbine number, distance from turbine, and general direction [for ex, 50 feet south of turbine A-1]. Include any other details, such as –found on the road, power lines overhead, etc.)

SECTION NO. 3 - WILDLIFE IDENTIFICATION

Species:
____

(If known, write the species. If not sure, write Unidentified.)

Field marks used: ____

(Identification marks that helped you determine the species of the bird, if you are not sure and have an educated guess, put it here. For example, red tail and white chest)

Number of Photos Attached: _____________

(Print digital photos and attach to Wildlife Incident Reporting Form – include both in situ and close up photos that allow confirmation of diagnostic characteristics).

SECTION NO. 4 – OBSERVATIONAL DATA

Physical condition:
____
____
____

(Describe the physical condition at the time of discovery, including broken wings, all appendages attached?, all pieces found?, skeleton visible?, infested with anything?, etc)

Estimated Time since Death or Injury (days): ____________ (<1, <4, <7, <14, <30, >30)

(Use your best judgment. Carcasses less than a few days old will have round, fluid filled eyes and will lack insect infestation. Carcasses with maggots are probably one to two weeks old. If bones are visible, the carcass is probably over 30 days old. Bones visible indicate over 30 days. Keep in mind that in cold weather carcasses will look fresh for much longer than in warmer weather.)

Other Field Notes:
____

(Note anything else relevant to incident such as presence of other fatalities in the area, evidence of electrocution details, extreme weather conditions, or other details).

Ultimate Disposition of the Bird or Bat:
____

(Taken to rehab center, Left in the field, or Placed in avian freezer)

SECTION NO. 5 - RESPONDENT

Respondent Name: ____ Date________

Signature: ____Date________

All Wildlife Incident Reporting Forms should be sent to Wildlife Consultant and AWA Goodhue Site Manager at the end of each calendar year.