

Langdon I Wind Energy Center Construction Inspection Report

*NextEra Energy Resources LLC
Langdon Wind LLC*

Prepared for:

**NORTH DAKOTA
PUBLIC SERVICE COMMISSION**
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Executive Summary

The North Dakota Public Service Commission (PSC) retained Wenck Associates, Inc. (Wenck) to complete a construction inspection of the Langdon Wind Energy Center, Phase 1 constructed in Cavalier County, ND by NextEra Energy Resources, LLC (NextEra) in 2007. The purpose of the construction inspection was to ensure the project was constructed in compliance with the siting laws and rules and the applicable PSC Order for the Project. Prior to the construction inspection, Wenck reviewed all Project documents to identify those which required site verification.

The Site was visually inspected on August 3, 2011 by Wenck, accompanied by NextEra representatives. Overall, the Project was very well-maintained and in good condition. It appeared to have been constructed as planned with numerous efforts to minimize impacts. However, there were several non-critical issues that may need to be resolved for the Project to be considered complete and in full compliance. Wenck recommends the PSC request the following from the company:

- Written documentation of several particular aspects of project implementation identified during the document review (Section 2.0).
- Design and implementation of new erosion control measures for drainage crossings and Geotech fabric underlayment on access roads.
- Fulfillment of planned tree and shrub survival monitoring through 2014.
- Maintenance of public access signs.

The PSC will need to decide whether these recommendations are necessary for fulfillment of Project obligations. Wenck expects any follow-up action taken by NextEra to address these particular issues can be corroborated in writing and will not require a further site visit.

1.0 Background

1.1 INTRODUCTION

The Langdon Wind Energy Center, Phase 1 (Project) was completed in 2007 in Cavalier County, North Dakota to the southeast of the town of Langdon (**Figure 1**). The Project is operated by Langdon Wind, LLC (Langdon Wind), a subsidiary of NextEra Energy Resources, LLC (NextEra). Langdon I comprises a 118.5-megawatt (MW) wind generation plant. The Project is under the jurisdiction of the North Dakota Public Service Commission (PSC), which issued its Findings of Fact, Conclusions of Law, and Order in Case No. PU-07-26 on May 31, 2007, granting a Certificate of Site Compatibility for the Project.

1.2 PURPOSE AND SCOPE OF INSPECTION

The North Dakota Energy Conversion and Transmission Facility Act (North Dakota Century Code Chapter 49-22) authorizes the Public Service Commission to determine that the location, construction, and operation of jurisdictional energy conversion and transmission facilities will produce minimal adverse effects on the environment and the welfare of citizens of North Dakota. Post-construction inspections ensure the project is constructed in compliance with the siting laws and rules and the applicable Commission Findings of Fact, Conclusions of Law, and Order (Order).

The North Dakota PSC retained Wenck Associates, Inc. (Wenck) to complete a construction inspection of the Langdon I Wind Project. The inspection process included a review of the Siting Plan, Order, and other applicable documents to determine Project-specific siting and construction requirements; a site visit and inspection of facilities; documentation of compliance; and a report summarizing findings. This report includes, but is not limited to, documentation of site visit

observations, documentation of compliance deficiencies, and a summary of issues that should be addressed for the Project to be considered complete and in full compliance.

2.0 Document Review

2.1 METHODS

Wenck reviewed North Dakota siting laws and rules, the Application for the Certificate of Site Compatibility (Application), and the Order for the Project to identify what Project-specific documentation was required for compliance. Wenck then reviewed Project documents in the PSC Online Case Search (ND PSC 2011) to identify those siting laws and rules and Application and Order assertions that already had written verification, those which still required documentation, and those which required physical site verification.

2.2 FINDINGS

The following table includes a list of components of the Project that were asserted in the Application and Order which could be documented to verify compliance with siting laws and rules and the Order for the Project (**Table 1**). If Wenck found written documentation in the online PSC files which verified compliance of a particular Project component, this is marked in the second column of the table. If physical site verification was possible, this was marked in the third column and that particular component was verified during the site inspection (Section 3.0).

Several components of the Project were asserted in the Application or proposed construction but have not been documented with the PSC. Many of these components could be verified with simple documentation from NextEra showing that they were indeed implemented or constructed as planned. The PSC should request written verification from NextEra for these items, to show the Project is in full compliance. This would include all items listed in the first column which are not marked in the second and third columns of Table 1.

Table 1. Langdon Wind Energy Center Document Review Summary

Description of Project Component/Assertion	Written Verification in	
	PSC Files*	Site Verification
Permits/Approvals from other agencies	X	
National Electric Safety Code Compliance		
Rare plant (<i>Carex backii</i>) avoided	X	X
Woodlands avoided (Avoidance Area)		X
Wetlands avoided (Avoidance Area)		X
Cultural resources avoided		X
USFWS WMA setback 1100ft	X	X
Use of Wildlife Response Reporting System		
Groundwater protection, soil conservation, BMP installation		X
No impact on Selection Criteria	X	
No impact on Policy Criteria	X	
No adverse economic/social consequences		
Occupied residence setback 1400ft	X	X
No impacts to animal health & safety (Final Avian Study Report)	X	
Existing transmission lines, roads, railroads setback 420ft	X	X
Local zoning approval	X	
Pre-Construction conference minutes	X	
Intent to start construction notice	X	
Weekly construction reports	X	
Construction according to Application and safety requirements		
Post-construction reports of presence of threatened, endangered species or bald or golden eagles, if applicable		
Reports of cultural, archeological, historical resources found, if applicable		
Restoration of pre-existing roads, lanes, temporary roads		X
Reclamation/reseeding of CRP, native prairie, non-cropped lands, if applicable		X
Reclamation and maintenance throughout life of facility		X
Tree & shrub replacement 2:1, if applicable; annual reports	X	X
Repair/replace all fences and gates, if applicable		X
Repair/replace all drainage tile, if applicable	N/A	
Staging areas not on cultivated land	X	X
Waste removed regularly		X
Prompt restoration of area around each turbine		X
Education material for landowners, if requested; Danger warnings		X
Safety measures for traffic control or public access		X
Notice of extraordinary events, if applicable: tower collapse, injury, death of threatened or endangered species or large number of birds or bats		
Procedure for handling complaints		
Underground utility lines bored under graded roads		X
Topsoil replacement 12in depth		X
Underground collection and feeder lines buried to 48in		X
Mitigation of television & radio interference		
Engineering design drawings prior to construction	X	
As-built drawings within 90 days after construction	X	

*Note: Gray boxes indicate documentation is lacking and site verification is not applicable.

3.0 Site Inspection

3.1 METHODS

Kevin Magstadt, P.E. and Sara Simmers of Wenck visited the Project area on August 3, 2011. Tanya Wirth, NextEra Site Manager for the Project, provided an introduction of the site, answered questions, and provided a safety briefing for Wenck staff. Evan Neuwman, NextEra, accompanied Wenck staff during the site visit and assisted with navigation, pointed out problem areas, and answered questions about the Project. Both the first and second phases of the Project were inspected simultaneously.

The site was inspected visually using a combination of driving and walking the entire Project area, including the substation, utility line routes, access roads and wind turbines. Digital photographs (Canon Power Shot SD1300 IS, 12 megapixel) were taken showing typical Project infrastructure and documenting problem areas (**Appendix A**). Geographic coordinates were recorded at any identified potential problem areas using a handheld Global Positioning System (GPS) (Garmin GPSMAP 60CSx; <10m accuracy; NAD83 datum) (**Figure 2; Appendix B**).

3.2 OBSERVATIONS & FINDINGS

3.2.1 Engineering/Construction/Design & Soils

The following aspects pertaining to engineering, construction, or design of Project infrastructure were inspected at the site.

- *Groundwater Protection/Soil Conservation/BMP Installation.* Several Best Management Practices (BMPs) were installed as part of the construction and maintenance of the Project to minimize erosion and control sediment. During the construction inspection, Wenck identified both effective and ineffective BMP designs in place. Some of these issues were not necessarily because of poor construction, but

rather poor design, which made maintenance difficult. One of the most frequent problems Wenck observed were washed out “Texas crossings”. These were locations where the access roads crossed very minor drainages or low areas; various sized rocks (~2-6 inches in diameter) were placed in the low area to allow water to flow freely through yet to allow vehicles to pass across the top of the rocks. Many of these crossings were in good condition and functioning properly (**Appendix A, Photos 7 and 11**). However many of them had been washed out by precipitation and sediment flowing from upstream, through the crossing, pushing out the rocks, and depositing the rocks and sediment downstream in adjacent fields (**Appendix A, Photos 3, 17, 18, 42 and 49**). There were a few areas where erosion on the access roads was a problem or where deep ruts had been formed (**Appendix A, Photos 12, 13, 15, 26, 27 and 33**). A more common problem was that the Geotech fabric placed underneath the access road surfacing materials had washed out in numerous areas (**Appendix A, Photos 2, 14, 27, 27, 33, 42 and 49**). In some areas this was contributing to further erosion along the road as the fabric was removed by water and sediment flow. NextEra reported that a common problem with the exposed fabric was that farm implements would get entangled and pull out the fabric further. Another erosion problem was observed around the utility junction boxes. Many had no issues (**Appendix A, Photos 16, 19 and 46**), but there were also several where soil settled around the boxes and cement bollards or where there was actually soil being eroded away from the bases (**Appendix A, Photos 8, 9, 20 and 43**). In general, erosion problems and infrastructure of the Project area was well-maintained. Many of the problem areas observed were already on the maintenance list and were being addressed.

- *1400 ft Setback from Occupied Residences.* Wenck verified that there were no occupied residences in the Project area within the 1400 ft setback from Project infrastructure.

- *420 ft Setback from Existing Transmission Lines, Roads, Railroads.* Wenck verified that Project infrastructure maintained at least 420 feet from existing transmission lines, roads, and railroads.
- *Roads Restored to Previous Use.* NextEra reported that there were no temporary roads constructed for the project and that some county roads within the Project area had been improved by adding gravel. During the construction inspection, Wenck noted that all county roads and highways within the Project area appeared to be in good condition and properly maintained. If there had been any effects on local roads from construction of the Project, NextEra has apparently since restored and resolved any issues.
- *On-going Reclamation and Maintenance.* Wenck observed that NextEra has in place an on-going maintenance schedule. The primary maintenance issue was upkeep of tower access roads and erosion control, which was discussed above in “*Groundwater Protection/Soil Conservation/BMP Installation*”. Wenck noted that the gravel pads surrounding the tower structures were all well-maintained and in excellent condition. Annual weeds were sprayed regularly to keep them under control. Wenck did not observe any areas of exposed soil remaining from construction activity or the on-going operation of the Project that were in need of reclamation. One issue that was noted was that landowners planted crops as close to possible to the tower bases and edges of the access roads (**Appendix A, Photos 1, 6, and 30**), sometimes planting over the access roads (**Appendix A, Photo 49**). This can sometimes create a problem for maintenance.
- *Fences/Gates Repaired/Replaced.* There was only one location where a fence was crossed, which was along the access road to tower L2-27 and which accessed a pasture on the eastern edge of the Project area. The fence and gate were in place and fully operable (**Appendix A, Photo 50**).

- *Drainage Tile Repaired/Replaced.* Not applicable. NextEra reported there had not been any agricultural fields with drainage tile impacted by construction of the Project.
- *Staging Areas Not on Cultivated Land.* Staging area locations were inspected and none had been on cultivated lands.
- *Waste Removed Regularly.* There was no waste, debris, or abandoned equipment observed during the inspection. The site appeared to be regularly maintained.
- *Restoration around each Turbine.* The gravel pads surrounding the tower structures were all well-maintained and in excellent condition. They appeared to have been constructed properly. There was no soil slumping or settling, no open trenches, and no areas of erosion. Most were bare gravel, though some pads had dead annual weeds that had been sprayed (**Appendix A, Photos 6 and 30**). Crops were planted as close as possible to the tower bases. None of the crops showed visible signs of poorer production or vigor, which would indicate improper topsoil replacement.
- *Road Crossings Bored.* Wenck verified that all county road and highway crossings had been directionally bored, with the route of the underground utility line indicated by red markers (**Appendix A, Photos 4 and 21**). NextEra reported that the bore for each of these crossings began and ended further out in adjacent agricultural fields, not in the road ditches. The vegetation in the ditches did not appear to have been disturbed.
- *Topsoil Replacement 12in Depth.* Wenck observed that all topsoil appeared to be replaced to the required depth. Areas that would have been disturbed during construction of the project were primarily agricultural fields. Crops were in nearly full development at the time of the survey and showed no indication of poor development or production in areas where the soils would have been disturbed compared to areas not disturbed.

- *Underground Utility Lines Buried to 48in.* All utility lines appeared to be buried at the properly required depth.
- *As-built Drawings.* NextEra had submitted as-built drawings to the PSC as required within 90 days after construction of Phase 1 of the Project. Wenck verified during the inspection that the Project had been constructed according to the as-built drawings.

3.2.2 Natural Resources (Wildlife, Wetlands, Vegetation)

The following requirements pertaining to natural resources, including wildlife, wetlands, and vegetation, were inspected at the Project site.

- *Rare Plants Avoided.* There was only one rare plant that has been historically documented in the Project area, the sedge *Carex backii*. In the Application for the project, this species is described as a wetland plant. The rationale for no impact on this species was that since no wetlands were to be impacted by the Project, the species and its potential habitat would not be impacted. A brief review by Wenck indicated that this species is *not* a wetland plant. Its habitat is described from credible sources as “dry, rocky deciduous, mixed, or evergreen open forests or woodlands, often over limestone” and “in open, prairie habitats with scattered bur oak, on open granite outcrops” (eFloras 2011; New York Natural Heritage Program 2011). Nearly the entire Project area has been converted to agricultural land uses; what remained of native habitats in the surrounding area were wetlands and small areas of grassland. Though this plant was historically observed near the Project area, Wenck did not observe the presence of any remnant natural communities in the project area which would be suitable potential habitat for this species and thus Wenck does not anticipate that the Project has impacted this species in any way.
- *Woodlands Avoided.* There were no natural woodlands within the Project area that were impacted by construction of the project. There were several locations where trees or shrubs were removed from planted tree rows. Wenck verified that in these

locations the width of tree/shrub removal was less than the 50ft maximum cut (**Appendix A, Photo 44**).

- *Wetlands Avoided.* NextEra reported that the small acreage of wetlands impacted by the project was covered by a US Army Corps of Engineers Permit. During the construction inspection, Wenck confirmed that, in general, wetlands were avoided in the Project design. There was one shallow intermittent stream crossing on the access road between tower LD-29 and LD-30 that was not avoided (**Figure 2**; between Sections 1 and 12, T159N, R60W), but would be covered under the Permit. There were also several streams (upstream tributaries of the Park River) which were avoided by boring underneath them to install utility lines (**Appendix A, Photos 22 and 23**). It did not appear that the vegetation along the stream margins had been disturbed.
- *1100 ft Setback from USFWS WMAs.* Wenck observed that all infrastructure related to the Project was more than 1100 feet from USFWS Wildlife Management Areas (WMAs). The closest WMA was a Waterfowl Production Area on the southern end of the Project area which was about 0.25 miles (more than 1100 feet) from tower LD-63 (**Appendix A, Photo 37**). Wenck also noted that bird deterrents were in place on the meteorological tower guy wires to help prevent bird collisions (**Appendix A, Photo 29**). Wenck also discussed with NextEra the Wildlife Response Reporting System and verified that this system is in place; any wildlife fatalities observed are recorded and monitored regularly and reports can be obtained if requested.
- *Reclamation/Revegetation of CRP, Native Prairie, Non-cropped Lands, if applicable.* NextEra reported that there were no areas reseeded after construction because disturbed areas were all located within cropland. Wenck observed that tower L2-27 was within a pasture and presumably its construction would have created some soil disturbance (**Appendix A, Photo 50**). It appeared that although the pasture had not been previously plowed and thus likely retained some native species, it was heavily invaded by non-native cool season grasses and the noxious weed musk thistle (*Carduus nutans*). As non-cropped land, there should have been revegetation of

disturbed areas. However, the vegetation around the base of the tower and along the access road appeared to have naturally re-vegetated. There were no annual weed outbreaks in those areas. Wenck does not consider this to be a problem or issue to be resolved.

- *Trees and Shrubs Replacement, if applicable.* According to documents submitted by NextEra, there were trees and shrubs removed from planted tree rows for construction of Phase 1 of the Project. Wenck verified that trees and shrubs were planted as stated in the *Tree and Shrub Replacement Plan* and the *2011 Planting Report* submitted by NextEra. However, the planting was only installed in 2011 and the PSC requires three years of survival monitoring, until 2014, for the mitigation to be considered satisfactory.

3.2.3 Cultural Resources & Public Safety

The following aspects pertaining to cultural resources and public safety were inspected at the Project site.

- *Cultural Resources Avoided.* Several isolated finds were identified during cultural studies of both phases of the Project which were not eligible for listing and did not require avoidance. One cultural site, a railroad (32CV121), was potentially eligible for listing and required avoidance. Wenck observed the markers where the utility line was directionally bored underneath the railroad to avoid impacts (**Appendix A, Photo 5; Figure 2**). The vegetation did not appear to have been disturbed adjacent to the railroad. Another cultural site, the Nekoma Missile Site (32CV113), was eligible for listing in the National Register of Historic Places and a Cultural Mitigation Plan was developed since impacts could not be avoided.
- *Cultural Mitigation Plan Followed.* The cultural mitigation plan for the Project was regarding the Nekoma Missile site (32CV113), which was within 0.75 miles of the nearest wind turbine. The alteration of the viewshed from the Nekoma Pyramid from construction of the Project was considered an adverse effect. The mitigation plan

called for NextEra to provide the Cavalier County Job Development Authority with funds of \$20,000 to create public interpretive signs for the complex. NextEra reported they had submitted the check as required and that a copy of the check could be provided for verification upon request.

- *Educational Material, if requested; Danger warnings.* Wenck observed an informational kiosk on the west side of the Project area which contained general information about the project for the public (**Appendix A, Photo 25**). Wenck was not aware of any other educational materials disseminated to landowners or the public. Regarding danger warnings, Wenck noted that all required danger warnings were in place on junction boxes, tower doors and electric boxes, and markers indicating buried utility lines (**Appendix A, Photos 4, 30 and 46**).
- *Safety Measures for Traffic Control or Public Access.* Wenck did not identify any areas where traffic control signs were necessary within the Project area. There were public access “No Trespassing” signs at all entrances to tower access roads at each intersection with a county road or highway (**Appendix A, Photo 10**). These signs also denoted the tower identification numbers for the towers in each string. Unfortunately, many of the signs were missing one or more of the signs and many of the signposts were leaning or had been completely bent over (**Appendix A, Photos 28, 32, 34-36, 39-41 and 45-48**). NextEra reported this is an ongoing maintenance problem because the signs are continuously being damaged by farm implements. Regarding public access it should also be noted that NextEra reported that there are no security systems in place on the doors to the towers. However the doors are locked and they are regularly monitored.

4.0 Issues to Resolve and Recommendations

4.1 WRITTEN VERIFICATION OF PROJECT IMPLEMENTATION

As noted in Section 2.0, several components of the Project were asserted in the plans or proposed during construction, but have not been documented with the PSC. Many of these components could be verified simply with copies of final construction reports or ongoing reports from the local operations office – any type of written documentation showing that the Project was indeed implemented or constructed as planned, or that particular impacts have not occurred. Wenck recommends that the PSC requests from NextEra the list of items which, according to our review of the PSC files, have not been documented in writing. This would include all items which are not marked in the second and third columns of Table 1 (Section 2.0). The PSC may be able to verify some of the items/issues before the request to NextEra.

4.2 EROSION CONTROL & MAINTENANCE

The primary problem noted on the site during the construction inspection was the maintenance of erosion control measures. This problem did not stem from the original construction of the Project, which appeared to have been implemented with all BMPs in place as designed. Rather the problem was in maintaining these structures. Wenck observed washed out “Texas crossings” across shallow drainages, exposed and washed out Geotech fabric, road erosion, and erosion around junction boxes (Section 3.2.1). In particular, washouts of the “Texas crossings” and Geotech fabric were very common across the Project area and suggest it might be beneficial to implement longer term solutions to prevent such continuous maintenance that is obviously not sufficient in controlling erosion and sediment deposition. A different crossing design should be considered to replace the “Texas crossings”. For a few of the crossings which were deeper and had severe erosion, installing a culvert might be necessary. A different type of design or material should also be considered to fulfill the purpose of the Geotech fabric, which was unclear.

4.3 TREE & SHRUB REPLACEMENT

The replacement of trees and shrubs to mitigate those removed during construction of the Project had been delayed until this past spring 2011. Wenck verified that the replacement planting was installed; however survival monitoring is required for the following three years until 2014. Wenck recommends that the PSC retain its requirement for the full three years of survival monitoring to ensure 75% survival of the replacement planting.

4.4 PUBLIC ACCESS SIGNS

Many signs restricting public access across the site were missing due to farm implements pushing them over. Wenck recommends that NextEra repair and replace all missing signs.

5.0 Conclusion

Overall, the Project appeared to have been constructed as designed with minimal impacts to the surrounding natural or human environment. The Project site was well-maintained and in good condition. However, Wenck observed several issues that may need to be resolved before the Project is considered complete and in full compliance. This includes provision of written documentation of particular aspects of project implementation, erosion control and maintenance, tree and shrub survival monitoring, and maintenance of public access signs. None of these are critical issues, but they should be reviewed by the PSC to determine what the company should comply with. It should be noted that NextEra representatives were very easy to work with during the construction inspection process. They were fully transparent and answered any questions we had during the survey. NextEra stated they will be willing to provide any further documentation necessary to fulfill requests of the PSC.

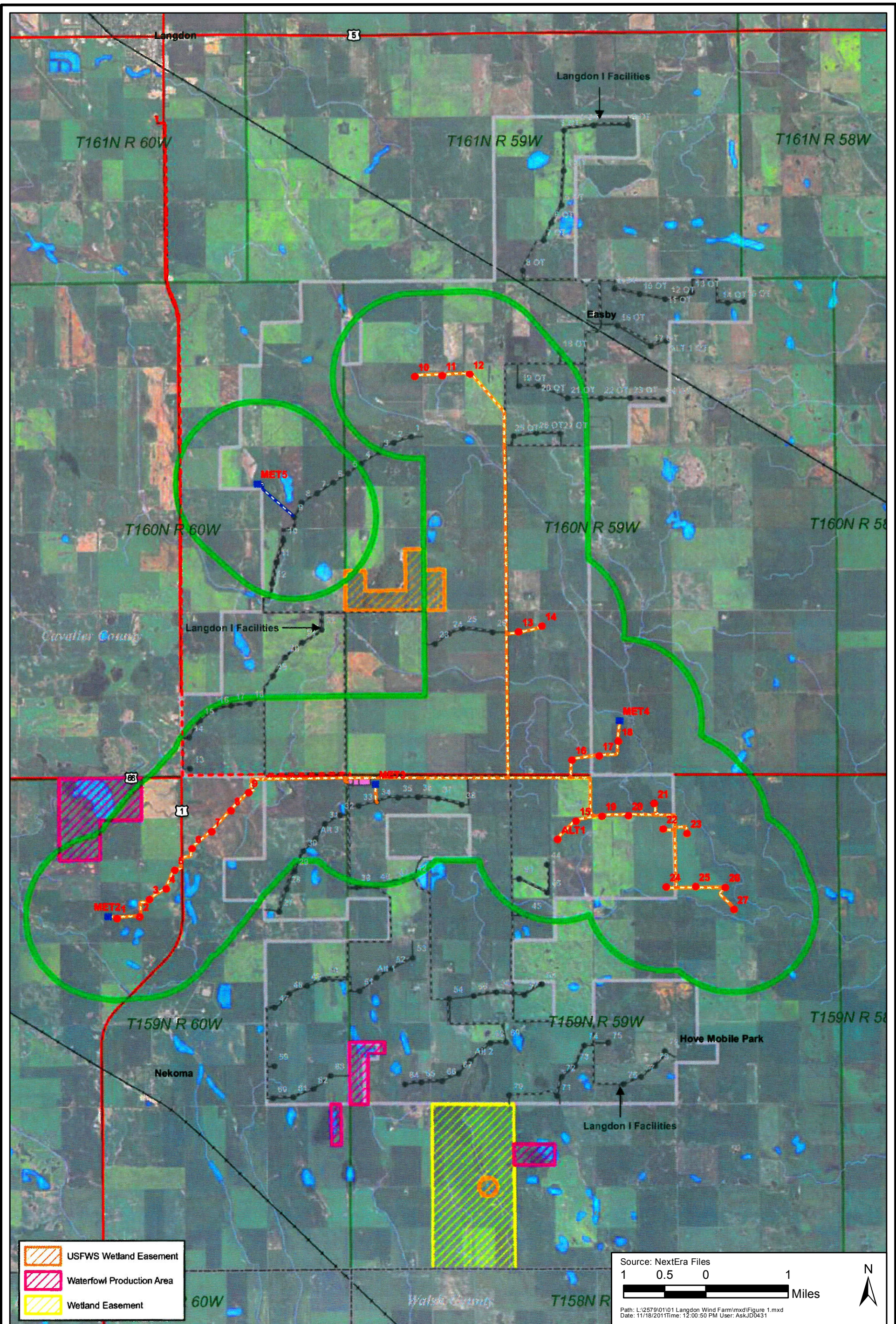
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Figures



North Dakota Public Service Commission

Site Overview Map



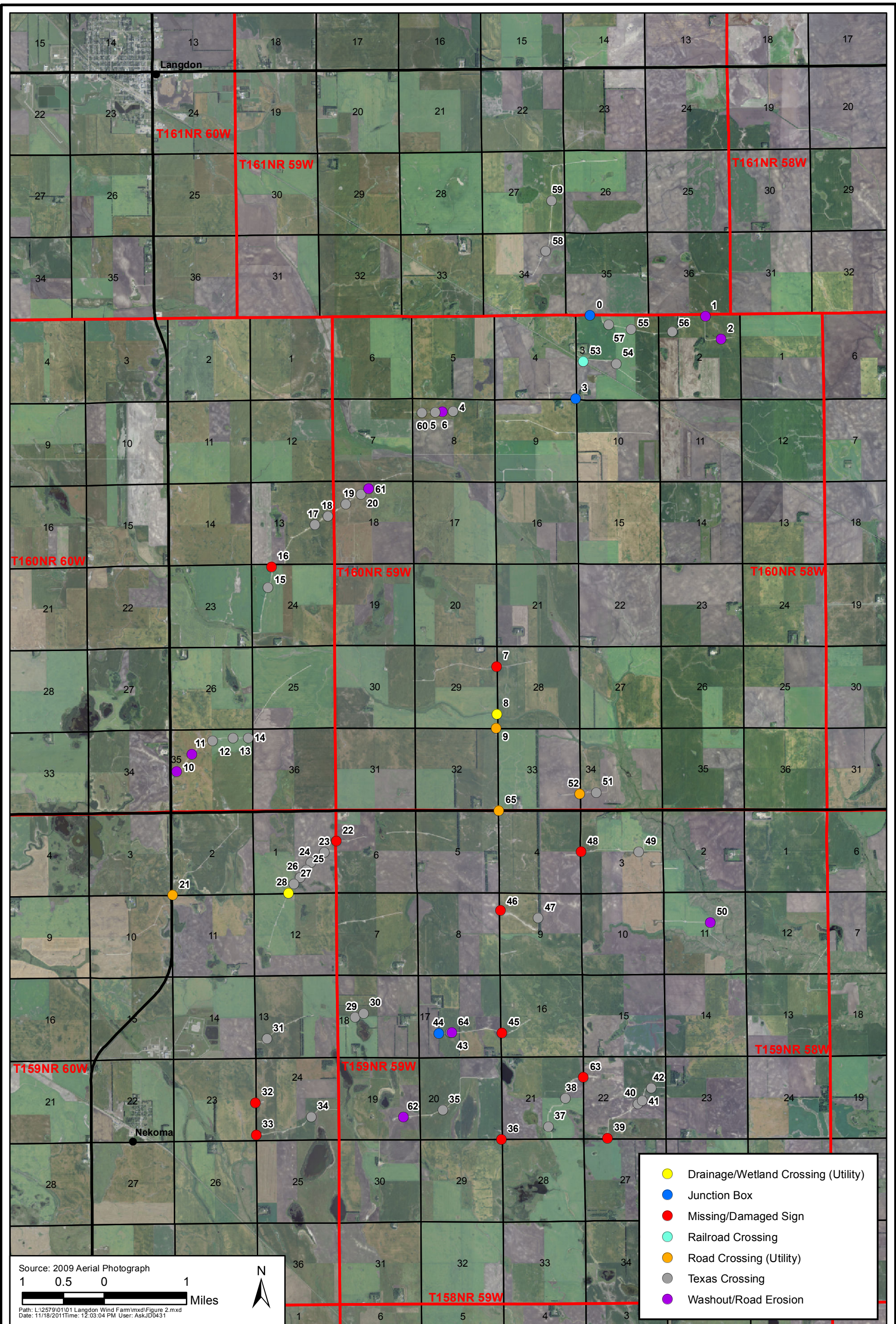
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NOV 2011

Figure 1



Source: 2009 Aerial Photograph
 1 0.5 0 1 Miles
 Path: L:\2579\0101 Langdon Wind Farm\mxd\Figure 2.mxd
 Date: 11/18/2011 Time: 12:03:04 PM User: AskJD0431

- Drainage/Wetland Crossing (Utility)
- Junction Box
- Missing/Damaged Sign
- Railroad Crossing
- Road Crossing (Utility)
- Texas Crossing
- Washout/Road Erosion

Appendix A



Photo 1. Direction: North. Tower L2-18 on the east-central side of the project area was an example of a typical tower and access road, surrounded by cropland with the crop planted immediately adjacent to the edge of roadway.



Photo 2. Close-up of Geotech fabric placed beneath gravel surfacing materials during construction was now visible in numerous locations. It reportedly gets washed out by rain and sometimes gets caught in farm implements.



Photo 3. Texas crossing washed out on the access road between towers L2-17 and L2-18. Plants growing along the road edge included foxtail barley (*Hordeum jubatum*), marsh elder (*Iva xanthifolia*), and inland saltgrass (*Puccinellia* sp.).



Photo 4. Red marker in ditch indicated directional bore for utility line crossing underneath the county road between towers L2-16 and L2-17.



Photo 5. Direction: Northwest. Red markers indicate directional bore for utility line crossing underneath railroad tracks. The bore actually began and ended further out beyond the ditches in the adjacent fields. The railroad is a historical site (32CV121) and disturbance was avoided by boring. The vegetation in the ditches were typical wetland/mesic grassland vegetation that did not appear to have been disturbed, including reed canarygrass (*Phalaris arundinacea*), cattail (*Typha* sp.), Canada thistle (*Cirsium arvense*), smooth brome (*Bromus inermis*), reedtop (*Agrostis stolonifera*), and Kentucky bluegrass (*Poa pratensis*).



Photo 6. Direction: Northeast. Base of tower OT-17, showing an example of proper seasonal maintenance with annual weeds sprayed on the gravel pad. Note the surrounding crop was planted as close to the edge of the pad as possible by the landowner.



Photo 7. Direction: North. Texas crossing between towers OT-17 and OT-16. This crossing was in good condition, with rocks still in place for drainage.



Photo 8. Direction: South. Junction box F2-JB25. Soil was eroded around the box and the bollards were tipping to the sides.



Photo 9. Close-up of erosion around junction box. NextEra stated that the problem is currently on their maintenance list and is being addressed.



Photo 10. Direction: Southeast. Sign on access road for towers OT-9 to OT-15. Example of proper signage restricting public access. Many of these signs were bent, reportedly from farm implements running into them.



Photo 11. Direction: East. Texas crossing between towers OT-10 and OT-11 was in good condition with minimal erosion.



Photo 12. Direction: South. Erosion on edge of roadway at the north end of the access road to towers OT-14 and OT-15.



Photo 13. Direction: Southeast. Close-up of erosion on roadway, showing gravel being washed into adjacent field. NextEra stated that this problem has already been noted and will be repaired.



Photo 14. Direction: East. Erosion on edge of roadway between towers OT-14 and OT-15. The Geotech fabric was washed out on both sides of the road and the erosion extended partially across the roadway with sedimentation into adjacent fields.



Photo 15. Direction: East. Erosion between towers OT-5 and OT-6 to the south of a Texas crossing, immediately to the east of tower OT-6. Geotech fabric was showing through gravel surface.



Photo 16. Direction: Northwest. Two junction boxes (F3-JB36 and F2-JB24) at intersection straight east of tower OT-18. The site was in good condition with no signs of settlement or erosion around the boxes or bollards.



Photo 17. Direction: East. Texas crossing east of tower L2-11 between towers L2-11 and L2-12 (in distance). The crossing had been eroded to a deep and rough washout. A culvert would likely be better suited for the drainage at this particular crossing.



Photo 18. Direction: Northwest. Another angle of the washed out Texas crossing east of tower L2-11, showing sedimentation into adjacent field.



Photo 19. Direction: North. Junction box FB-JB34, which appeared to have no signs of settlement or erosion around the box or bollards.



Photo 20. Direction: Northwest. Ditch with junction box (barely visible in center along edge of field, note white stake) and a newly installed culvert to the southeast of it (in foreground obscured by tall, dense grasses). The location of the culvert and its proximity to the junction box creates potential for a washout in the ditch which may affect the soil around the junction box.



Photo 21. Direction: East. Access road to towers L2-13 and L2-14. The sign has been knocked down.



Photo 22. Direction: Southwest. South side of drainage which flows into the Park River. Red markers indicate the route of the underground utility line, where a directional bore was used to cross underneath the drainage to avoid its disturbance.



Photo 23. Direction: Northwest. North side of drainage which flows into the Park River. Red marker on left indicates the utility line crossing on the other side of the stream.



Photo 24. Direction: West. Transmission line connection at substation.



Photo 25. Informational kiosk at windfarm for use by public.



Photo 26. Direction: East. Rutting and settlement of roadway surface materials near tower LD-14. Geotech fabric was exposed in various areas.



Photo 27. Direction: Northeast. Deep rutting of roadway surface material between towers LD-15 and LD-16. Geotech fabric was exposed in various areas.



Photo 28. Direction: South. “No trespassing” sign was missing from post at entrance of access road to towers LD-10 to LD-12.



Photo 29. Direction: Northwest. Meteorological tower 5 at the northwest side of project area. Note the large orange spheres at the top of the guywires which is a birdsafe design feature.



Photo 30. Direction: West. Typical gravel placement around turbine bases (tower L2-1 shown). The gravel pads were well-maintained in good to excellent condition, with no signs of erosion or settlement and with monitoring of annual weeds.



Photo 31. Direction: West. Location of directional bore underneath Highway 66 for utility lines. Red markers were present but are not visible in the photo. Note the signs were missing at the entrance to the access road for towers L-1 to L-5.



Photo 32. Sign at entrance to access road for towers LD-34 and LD-35 was being washed out by nearby culvert.



Photo 33. Direction: Southwest. Edge of roadway was washed out on the access road to the northeast of tower LD-30. Geotech fabric was exposed in various areas.



Photo 34. Direction: East. “No trespassing” sign was missing from post at entrance of access road to towers LD-48 to LD-51.



Photo 35. Direction: East. “No trespassing” sign was missing from post at entrance of access road to tower LD-59.



Photo 36. Direction: Southeast. “No trespassing” sign was missing from post at entrance of access road to towers LD-60 to LD-63.



Photo 37. Direction: Northwest. Southwest corner of Waterfowl Production Area (WPA) on the west edge of Township 159N, Range 59W. This WPA was the closest in proximity to towers within the project area. Tower LD-63 is visible on the left of the photo. It was just outside the 1100 foot setback required from the WPA.



Photo 38. Direction: Northeast. View of LD-64 through LD-67 (on right of photo) and LD-54 through LD-58 (on left of photo) tower strings.



Photo 39. Direction: North. “No trespassing” sign was missing from post at entrance of access road to tower LD-70.



Photo 40. Direction: North. Sign at entrance of access road to towers LD-71 to LD-73 was rotated away from line of site.



Photo 41. “No trespassing” sign was missing from post at entrance of access road to towers LD-76 to LD-79.



Photo 42. Direction: East-Northeast. Texas crossing washed out near tower LD-78.



Photo 43. Junction box F7-JB72 near tower LD-54 which showed signs of settlement around bollards.



Photo 44. Direction: East. Access road between towers LD-55 and LD-54 showing where several Siberian elm trees had been removed from a planted tree row on the edge of a field. The cut was less than 50 feet in width, as required by the PSC.



Photo 45. Direction: East. Sign at the access road for towers LD-57 and LD-58 was pushed over.



Photo 46. Direction: North. A signpost had been broken off and was placed beside junction box F6-JB62.



Photo 47. Direction: West. Sign missing on the entrance to the access road for tower L2-15.



Photo 48. Direction: East. “No trespassing” sign missing from entrance to access road for towers L2-19 through L2-17.



Photo 49. Direction: East. Access road to tower L2-26 was washed out with deep ruts and exposed Geotech fabric. Note the crops had been seeded across the roadway.



Photo 50. Direction: Southeast. Access gate replaced and in working condition at the access road for tower L2-27 which was within a pasture used for grazing. The pasture was upland grassland on the margins of the Park River drainage system.

Appendix B

Appendix B. Field Observation Points (GPS Coordinates)

Point	Feature	Northing (m)*	Easting (m)*
0	Junction Box	555235.32	5396335.91
1	Washout/Road Erosion	557492.10	5396321.13
2	Washout/Road Erosion	557803.21	5395876.39
3	Junction Box	554951.42	5394704.10
4	Texas Crossing	552551.80	5394466.66
5	Washout/Road Erosion	552340.23	5394451.13
6	Texas Crossing	552203.39	5394448.09
7	Missing Sign	553402.53	5389456.25
8	Drainage/Wetland Crossing	553410.21	5388529.66
9	Road Crossing	553395.68	5388249.03
10	Washout/Road Erosion	547138.25	5387400.40
11	Washout/Road Erosion	547433.50	5387742.90
12	Texas Crossing	547836.92	5388002.59
13	Texas Crossing	548241.35	5388056.18
14	Texas Crossing	548534.86	5388060.46
15	Texas Crossing	548927.77	5391011.58
16	Missing Sign	548989.45	5391417.08
17	Texas Crossing	549840.04	5392236.92
18	Texas Crossing	550097.95	5392402.54
19	Texas Crossing	550444.21	5392637.02
20	Texas Crossing	550744.05	5392830.68
21	Road Crossing	547059.26	5384982.30
22	Missing Sign	550262.84	5386039.62
23	Texas Crossing	550026.08	5385821.31
24	Texas Crossing	549760.55	5385616.18
25	Texas Crossing	549677.39	5385479.19
26	Texas Crossing	549552.60	5385330.40
27	Texas Crossing	549433.63	5385196.17
28	Drainage/Wetland Crossing	549328.73	5385024.46
29	Texas Crossing	550635.02	5382591.84
30	Texas Crossing	550797.08	5382670.99
31	Texas Crossing	548903.69	5382170.94
32	Missing Sign	548678.29	5380915.34
33	Missing Sign	548693.98	5380282.94
34	Texas Crossing	549770.24	5380646.58
35	Texas Crossing	552345.81	5380774.75
36	Missing Sign	553495.80	5380195.20
37	Texas Crossing	554415.42	5380453.01
38	Texas Crossing	554750.72	5381001.58
39	Missing Sign	555575.13	5380220.78
40	Texas Crossing	556171.27	5380899.43
41	Texas Crossing	556255.67	5380961.21
42	Texas Crossing	556432.61	5381199.85
43	Texas Crossing	552498.91	5382286.99
44	Junction Box	552267.88	5382272.98
45	Missing Sign	553509.65	5382277.57
46	Missing Sign	553477.79	5384685.93
47	Texas Crossing	554218.47	5384537.71
48	Missing Sign	555056.34	5385833.29
49	Texas Crossing	556187.96	5385833.14
50	Washout/Road Erosion	557588.41	5384444.54
51	Texas Crossing	555352.35	5386995.14
52	Road Crossing	555033.38	5386965.40
53	Railroad Crossing	555101.36	5395436.13
54	Texas Crossing	555744.52	5395392.47
55	Texas Crossing	555604.51	5396151.42
56	Texas Crossing	556038.90	5396068.82
57	Texas Crossing	556842.34	5396021.43
58	Texas Crossing	554365.90	5397604.98
59	Texas Crossing	554476.47	5398591.45
60	Texas Crossing	551935.01	5394440.54
61	Washout/Road Erosion	550895.68	5392943.78
62	Washout/Road Erosion	551577.55	5380631.89
63	Missing Sign	555100.43	5381417.01
64	Washout/Road Erosion	552524.01	5382287.25
65	Railroad Crossing	553447.08	5386636.98

*Northing/Easting are in Universal Transverse Mercator Coordinate System.