

May 1, 2026

Mr. Brian Johnson
Executive Director
North Dakota Public Service Commission
600 East Boulevard Ave., Dept. 408
Bismarck, ND 58505-0480

Re: PrairieWinds – ND 1 Wind Energy Facility
Amend – PrairieWinds – ND 1 Project
Siting Application – Ward County
Case No. PU-26-____

Dear Mr. Johnson:

Basin Electric Power Cooperative (Basin Electric) plans to upgrade the PrairieWinds – ND 1 Wind Energy Facility (Upgrade Project) located in Ward County, North Dakota. As previously represented in connection with the temporary construction variance approved in Case No. PU-25-253, Basin Electric is undertaking equipment upgrade activities at multiple wind facilities in the region. This filing is limited to the PrairieWinds – ND 1 Wind Energy Facility, which is subject to the Commission's siting jurisdiction. While Basin Electric is also upgrading its Minot Wind facilities, those facilities are not subject to the Commission's siting authority and are not included in this filing, and no Commission approval is requested or required for those activities. In support of the Upgrade Project, enclosed for filing are:

1. Certification of Gavin McCollam with accompanying:
 - a. Exhibit A – Environmental and Regulatory Compliance Memorandum with the following appendices:
 - i. Appendix A – Sound Study
 - ii. Appendix B – Shadow Flicker Report
 - iii. Appendix C – FAA Wind Turbine Blade Extension Filing
 - iv. Appendix D – PrairieWinds PSC Redacted Cultural Report
 - v. Appendix E – Prairie Winds Project Natural Resources Inventory Report
 - vi. Appendix F – PWND Wetland and Waterbody Mapping Report
 - vii. Appendix G – Agency Consultation
2. Application to Amend Order and Certificate

Eight hard copies of the enclosed documents will be hand-delivered to your office along with an electronic copy and a newspaper map on a flash drive. Please do not hesitate to contact me if you have any questions regarding this filing.

29 PU-26-164 Filed 08/24/2026 Pages: 351
Exhibit 1 - Certification and Request to Amend
Order (PSC Dkt #1)

Basin Electric Power Cooperative

1 PU-26-164 Filed 05/01/2026 Pages: 350
Application to Amend Orders and Certificate -
Redacted

Basin Electric Power Cooperative
Maggie Olson, Sr. Staff Counsel

May 1, 2026

Page 2

Respectfully submitted,

A handwritten signature in blue ink that reads "Maggie Olson". The signature is fluid and cursive, with the first name "Maggie" and last name "Olson" clearly distinguishable.

Maggie Olson
Senior Staff Counsel

By email: ndpsc@nd.gov
cimartens@nd.gov

STATE OF NORTH DAKOTA
PUBLIC SERVICE COMMISSION

Basin Electric Power Cooperative Amend – PrairieWinds – ND 1 Project Siting Application – Ward County	Case No. PU-26-_____ BASIN ELECTRIC’S APPLICATION TO AMEND ORDERS AND CERTIFICATES
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I. Introduction

Pursuant to N.D.C.C. § 49-22-08(5), Basin Electric Power Cooperative (Basin Electric) submits this application to the North Dakota Public Service Commission (Commission) requesting a limited amendment to the Commission’s August 12, 2009 Findings of Fact, Conclusions of Law, and Order and Certificate of Site Compatibility No. 14 (Case No. PU-08-75) (the "2009 Order and Certificate") issued for PrairieWinds – ND 1 Wind Energy Facility (the "Facility") in Ward County, North Dakota. Specifically, Basin Electric requests that the Commission amend the 2009 Order and Certificate to remove the 1.5 megawatt (MW) per turbine limitation and the overall 115.5 MW facility capacity limitation. No expansion of the approved site boundary, relocation of turbines, or addition of new turbine locations is proposed.

II. Procedural History

A brief overview of the relevant procedural history is provided below:

1. On March 6, 2009, Basin Electric submitted to the Commission an application for a Certificate of Site Compatibility for the Facility.
2. On August 12, 2009, the Commission issued its Findings of Fact, Conclusion of Law, and Order in Case No. PU-08-75 granting Certificate of Site Compatibility No. 14 for the Facility, allowing Basin Electric to construct a wind energy facility comprised of 77 turbines with a capacity of up to 115.5 MW.
3. The Facility was constructed and commenced commercial operation in accordance with the 2009 Order and Certificate.
4. The Certificate of Site Compatibility for the Facility was subsequently reissued in the name of its wholly owned subsidiary, PrairieWinds ND 1, Inc., and later returned to Basin Electric as a result of a corporate merger of the subsidiary into Basin Electric in early 2018, at which time Basin Electric became the successor certificate holder.
5. On September 12, 2025, in Case No. PU-25-253, Basin Electric filed a request for a temporary construction variance under N.D.C.C. § 49-22-25. Basin Electric represented that an amended application would be submitted in 2026 and it would not begin the repower project until it received Commission approval. In its regular

meeting on September 24, 2025, the Commission passed a motion to approve the requested temporary variance.

6. On April 24, 2026, Basin Electric filed a Certification pursuant to N.D.C.C. § 49-22-03(4) notifying the Commission of planned equipment upgrades at the Facility (Upgrade Project).

III. Description of the Upgrade Project

The Upgrade Project consists of removing and replacing components of existing General Electric (GE) 1.5-MW turbines with GE 1.6-MW generator technology, 97-meter rotor diameter blades, hubs, and gearboxes. Existing towers, foundations, and turbine locations will be reused.

Maximum turbine height will increase from approximately 356 feet to 421.6 feet. Nameplate capacity will increase to approximately 128 MW, while operational output remains capped at 120 MW pursuant to the interconnection agreement.

Additional detail regarding the Upgrade Project and its compliance with N.D.C.C. § 49-22-03(4) is provided in Basin Electric's concurrently filed Certification and Exhibit A.

IV. Requested Amendment

Basin Electric requests that the Commission amend the 2009 Order and Certificate to remove the 1.5 MW per-turbine limitation and the overall 115.5 MW facility capacity limitation and to authorize installation and operation of upgraded turbine technology, including increased rotor diameter and turbine height. No other modifications are requested, and all existing turbine locations, site boundaries, facility layout, and operational conditions established by the Commission will remain unchanged.

V. Conclusion

For the foregoing reasons, Basin Electric respectfully requests that the Commission approve the requested amendment to the 2009 Order and Certificate.

Dated this 30th day of April, 2026.



Margaret I. Olson (ND #06352)
Senior Staff Counsel
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Attorney for Basin Electric Power Cooperative

Certificate of Gavin Newsom

STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

Basin Electric Power Cooperative Amend – PrairieWinds – ND 1 Project Siting Application – Ward County	Case No. PU-26-_____ BASIN ELECTRIC'S APPLICATION TO AMEND ORDERS AND CERTIFICATES
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CERTIFICATION OF GAVIN MCCOLLAM

Gavin McCollam, being first duly sworn upon oath, states and alleges as follows:

1. I am the Chief Operating Officer (COO) for Basin Electric Power Cooperative (Basin Electric), which owns the PrairieWinds – ND 1 Wind Energy (Facility) in Ward County, North Dakota. I have the authority to bind Basin Electric with respect to the certifications made herein.
2. I provide this Certification pursuant to N.D.C.C. § 49-22-03 (4)(a)(4).
3. Basin Electric plans to make equipment upgrades at the Facility, which involves replacing certain components of existing turbine technology (Upgrade Project).
4. The Upgrade Project will consist of removing and replacing the existing General Electric (GE) 1.5 megawatt (MW) turbine 77 meter (252.6 feet) rotor diameter blades, hub, and gearbox with an upgraded technology package of GE 1.6 MW generator technology and 97 meter (318.2 feet) rotor diameter blades, hub, and gearbox. All 77 of the turbines will reuse the existing 80 meter (262.5 feet) structural steel towers and existing nacelles. As a result, the Upgrade Project will not affect the Facility layout or expand the site boundary.
5. Due to the increased blade length, the overall turbine height will increase from 108.5 meters (356 feet) to 128.5 meters (421.6 feet).
6. The Facility's total nameplate generating capacity will increase to 128 MW; however, the Facility's output will remain 120 MW in accordance with Basin Electric's Generator Interconnection Agreement.
7. During installation of the upgraded equipment, portions of the existing access roads will be temporarily widened to accommodate delivery and staging of components and equipment. A temporary laydown yard, previously used for the original construction and completely on Basin Electric owned property, will also be used during installation.

8. The Upgrade Project activities are wholly within the site designated by the Commission for the Facility in its August 12, 2009 Findings of Fact, Conclusions of Law, and Order (Case No. PU-08-75) (2009 Order), and are to improve the same type of facility for which Certificate of Site Compatibility No. 14 was issued. See NDCC Section 49-22-03(4)(a).

9. Basin Electric has conducted environmental and regulatory compliance analysis for the Upgrade Project, and an associated report is provided as **Exhibit A**. As set forth in **Exhibit A**:

- a. **Cultural Resources.** The Upgrade Project construction activities will occur primarily within areas previously surveyed for cultural resources. Additional spaces for roads and turnarounds for construction equipment were inventoried at a Class III level by Metcalf Archaeological Consultants (Metcalf) and resources documented following State Historical Society of North Dakota (SHSND) standards. All cultural resources that are eligible or unevaluated for significance will be avoided during construction with appropriate fencing and buffers. If additional space or redesign is needed, Metcalf will inventory any unsurveyed areas and document cultural resources to ensure avoidance. No cultural resources will be affected by the Upgrade Project, as planned.
- b. **Architectural Resources.** Although not recommended at the time the Facility was originally permitted and constructed, in consultation with SHSND for the Project Upgrade, SHSND recommended completion of an architectural history survey in the vicinity of the Upgrade Project area to identify architectural resources potentially eligible for National Register of Historic Places (NRHP)-listing and to evaluate potential impact to those resources. As a result, Metcalf completed an architectural survey for this Upgrade Project and confirmed the limited modifications will not adversely affect architectural history resources.
- c. **Wetlands.** Wetlands and waterbodies have been identified within the Upgrade Project area. No wetland impacts will occur as a result of Upgrade Project activities.
- d. **Sound.** Basin Electric, through Burns & McDonnell, completed a sound study for the Upgrade Project with the proposed upgraded technology. At the time the Facility was originally permitted, the Commission did not have a sound standard for wind energy facilities. The Commission's current sound level requirement is 45 dBA or less within 100 feet of inhabited residences and community buildings. With the upgraded equipment, sound levels within 100 feet of 23 occupied residences were modeled above 45 dBA. Basin Electric is working to obtain waivers from each landowner with an exceedance.
- e. **Shadow Flicker.** Basin Electric, through Burns & McDonnell, completed a shadow flicker analysis for the Upgrade Project with the proposed upgraded

technology. The Commission does not have a shadow flicker standard and shadow flicker was not addressed in the Commission's 2009 Order. However, recent industry standard recommends a 30 hours per year limit to occupied residences. The shadow flicker analysis modeled one resident with over 30 hours per year. Basin Electric is actively pursuing waivers from this resident.

- f. **Exclusion and Avoidance Areas.** Basin Electric has analyzed the Upgrade Project's compliance with the Commission's current exclusion area and avoidance area criteria. The Upgrade Project complies with applicable exclusion area and avoidance area criteria.

10. The Facility will continue to comply with all requirements set forth in the Commission's Orders regarding the Facility, including applicable laws and rules designating the site.

Dated at Bismarck, North Dakota this 29th day of April, 2026.



Gavin McCollam
Chief Operating Officer

STATE OF NORTH DAKOTA)
)ss.
COUNTY OF BURLEIGH)

This instrument was acknowledged before me this 29th day of April, 2026 by Gavin McCollam on behalf of Basin Electric Power Cooperative.



Notary Public

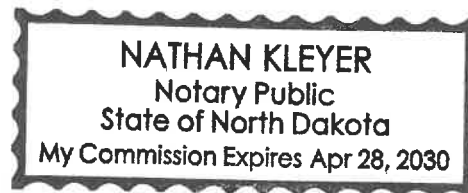


Exhibit A

Exhibit A

Environmental and Regulatory Compliance Memorandum

Amend – Prairie Winds ND 1 Project Upgrade

Case No. PU-26-

Introduction

Basin Electric Power Cooperative (Basin Electric) has prepared this memorandum to support the Certification of Compliance with N.D.C.C. § 49-22-03(4) in connection with equipment upgrade activities (Upgrade Project) for its PrairieWinds – ND 1 Wind Energy Facility (Facility). Basin Electric analyzed the Upgrade Project with respect to natural and cultural resources, as well as sound and shadow flicker. The following sections and referenced figures and appendices summarize the results of the analysis.

Description of the Upgrade Project

The Upgrade Project will consist of removing and replacing the existing General Electric (GE) 1.5 megawatt (MW) turbine 77 meter (252.6 feet) rotor diameter (RD) blades, hub, and gearbox with an upgraded technology package of GE 1.6 MW generator technology and 97 meter (318.2 feet) RD blades, hub, and gearbox. All 77 of the turbines will reuse the existing 80 meter (262.5 feet) structural steel towers and existing nacelles. The total height of the upgrade tower will be 128.5 meters (421.6 feet). Basin Electric plans to use the existing turbine foundations, collection/communication systems, and permanent access roads. As a result, the Upgrade Project will not affect the Facility layout or expand the site boundary.

Once removed, the existing 77 meter RD blades will be cut on-site to fit into legal load transportation sized pieces. Basin Electric's contractor will transport the loads to a recycling facility; no blades will be deposited in a landfill.

Prior to the installation of the upgrade equipment, existing roads will be improved to better accommodate heavy vehicle travel during construction. Road improvements will include adding approximately four inches of aggregate to the road surfaces. Where needed, turning radii will be temporarily widened to allow deliveries with oversized trailers. These improvements will be limited to existing access roads, with exception of one area. The temporary crane paths that were used during the original construction will not be used for the Upgrade Project.

Figure 1 depicts the Upgrade Project Area, layout, and access roads. **Figure 2** depicts the proposed turbine technology.

Upgrade Project Schedule

Basin Electric plans to commence construction in May 2026, pending permit approvals. Construction is anticipated to be complete by December 2026, with reclamation extending into 2027, as needed. Private third-party contractors will repower the turbines. Basin Electric will

ensure that any contractors hired will be familiar with and comply with mitigation measures and any agency or permit requirements.

Key schedule milestones include:

1. **Permitting & County Approvals:** June 2026
2. **Equipment Procurement, Manufacture and Delivery:** Ordering of long-lead equipment is in progress.
3. **Site Work Construction:** Laydown yard and roadway modification preparations beginning in May 2026.
4. **Turbine Repowering Construction:** Approximately 6 months of construction beginning in 2nd Quarter 2026 to 4th Quarter 2026, with restoration extending into 2027, as necessary.
5. **Test and Operations:** Repowered turbines will be commissioned and placed into operation on a turbine-by-turbine basis beginning in 2nd Quarter 2026.
6. **Commercial Operation:** Substantial completion of all turbines and full commercial operation anticipated in 4th Quarter 2026.

Upgrade Project Cost

The estimated cost of the Upgrade Project is \$200 million.

Compliance with Exclusion and Avoidance Areas

Exclusion Areas

Basin Electric completed an analysis of the Commission's current exclusion area criteria per NDAC Section 69-06-08-01(1) and (2), areas as described in **Table 1**. Basin Electric confirmed the Upgrade Project's compliance with the Commission's applicable exclusion area criteria with the exception of one turbine that is within the interstate right-of-way setback, four turbines within the county road setback, one turbine within the transmission line right-of-way setback, and up to five turbines that may be subject to the non-participating property line exclusion area. Basin Electric will obtain waivers from each landowner, as needed.

With regard to the potential non-participating property line exclusion areas, if any of the properties at issue are identified as owned by a non-participating landowner, Basin Electric requests that the Commission grant a variance conditioned upon submission of these waivers, if necessary. If any landowner of property that requires a variance is unwilling to grant a waiver, Basin Electric will not upgrade equipment at the affected turbine. Basin Electric will continue to comply with the setbacks from occupied residences that were established when the Facility was issued a Certificate of Site Compatibility. Exclusion areas, including potential non-participating property line exclusion areas, are mapped for the Upgrade Project Area in **Figure 3**.

Table 1: Exclusion Areas

General Exclusion Area	Present within Upgrade Project Area?	Description
Designated or registered national parks, memorial parks, historic sites/landmarks, natural landmarks, historic districts, monuments, wilderness areas, wildlife areas, wild/scenic/recreational rivers, wildlife refuges, grasslands	None	United States Fish and Wildlife Service (USFWS) administered Waterfowl Production Area (WPA) is located in the vicinity of the Upgrade Project Area. A minimum 0.25- mile buffer was and continues to be maintained from the WPA.
Designated or registered state parks, forests, forest management lands, historic sites, monuments, historical markers, archaeological sites, grasslands, wild/scenic/recreational rivers, game refuges, game management areas, management areas, nature preserves	Present	Archaeological sites are within the Upgrade Project Area; however, no sites will be impacted by construction activities and a recommendation of no significant sites affected has been given to NDSHPO.
County parks and recreational areas; municipal parks; parks owned or administered by other governmental subdivisions; hardwood draws; enrolled woodlands	None	N/A
Areas critical to the life stages of threatened or endangered animal or plant species	None	N/A
Areas where unique or rare animal or plant species would be irreversibly damaged	None	N/A
Areas within 1,200 feet of the geographic center of an ICBM launch or launch control facility	None	The closest turbine is 2,841 feet from an ICMB launch facility
Areas within 30 feet on either side of a direct line between an ICBM launch facility and missile alert or launch control facilities (aboveground structures only)	None	N/A
Wind facilities: setback of 1.1x turbine height from interstate or state roadway right-of-way	Present	One turbine, D50, is within 1.1x the turbine height from the US Highway 85 right-of-way.
Wind facilities: setback of 1.1x turbine height plus 75 feet from centerline of county or maintained township roadway	Present	Four turbines, A09, A16, B24, and E74 are within 1.1x the turbine height plus 75 feet from county-maintained roads.
Wind facilities: setback of 1.1x turbine height from railroad right-of-way	None	N/A
Wind facilities: setback of 1.1x turbine height from 115 kV or higher transmission line right-of-way	Present	One turbine, A09, is approximately 335 feet from an existing 115-kV distribution line.
Wind facilities: setback of 1.1x turbine height from property line of nonparticipating landowner and 3x turbine height from inhabited rural residence of a nonparticipating landowner	Present	Five turbines, B19, B31, C42, C43, and D52 are within 1.1x the turbine height from the property line of a nonparticipating landowner and potentially subject to the setback.

Avoidance Areas

Per NDAC Section 69-06-08-01(3) and (4), the geographical areas listed in **Table 2** may not be approved as a site for an energy conversion facility unless the applicant shows that under the circumstances there is no reasonable alternative.

Table 2: Avoidance Areas		
Avoidance Area	Present within Upgrade Project Area?	Description
Historical resources which are not designated as exclusion areas.	None	N/A
Areas within the city limits of a city or the boundaries of a military installation.	None	N/A
Areas within known floodplains as defined by the geographical boundaries of the hundred-year flood.	None	N/A
Areas that are geologically unstable.	None	N/A
Woodlands and wetlands.	Present	Trees may need to be trimmed or removed for large deliveries, on an as needed basis. If trees need to be removed, Basin Electric will comply with the Commission's Tree and Shrub Mitigation Specifications, and an inventory and replacement plan will be submitted to the Commission for approval. Wetlands are present within the Upgrade Project Area but will be avoided.
Areas of recreational significance which are not designated as exclusion areas.	None	
Additional Avoidance Areas for Wind Energy Conversion Facilities	Present within Upgrade Project Area?	Description
A wind energy conversion facility site must not include a geographic area where, due to operation of the facility, the sound levels within one hundred feet of an inhabited residence or a community building will exceed forty-five dBA.	Present	Sound modeling concluded that 23 residences will have dBA limits exceeding 45 at 100 feet from the residence. Basin Electric is working with each landowner to obtain a sound waiver.

Socioeconomics

The Upgrade Project will have positive impacts on socioeconomics by extending the life of the wind energy facility, which, in turn, extends the time period for which landowners would receive easement payments. In addition, the Upgrade Project will create temporary construction jobs, with associated opportunities for increased local spending.

Land Use

The Upgrade Project will be constructed entirely within the previously designated site, and turbine and other permanent infrastructure locations will remain the same. As a result, land use will also

remain unchanged. The Upgrade Project will result in temporary disturbances, including temporary widening of road approaches to accommodate transportation of the Upgrade Project components and equipment. Temporarily impacted areas will be restored once the Upgrade Project is complete.

Public Services

The Upgrade Project will result in a temporary increase in traffic in and surrounding the Upgrade Project Area but is not anticipated to interfere with local road use. Basin Electric will coordinate with Ward County and the impacted townships regarding local road use, will obtain all necessary road use agreements, and will restore roads impacted by the Upgrade Project.

Sound

At the time the original Facility was permitted, the NDAC Section 69-06-08-01(4) avoidance area of sound levels within 100 feet of an inhabited residence to not exceed 45 decibels (dBA) was not in place. Basin Electric, through its consultant Burns & McDonnell, conducted a sound study utilizing industry-accepted sound modeling software, CadnaA to estimate expected sound pressure levels from the Upgrade Project. Each turbine configuration was modeled at a hub height of 80 meters above ground and a comparison of existing and repowered sound levels identified the sound level differences at each identified receptor. See **Appendix A** for the sound study.

Modeling concluded that 40 receptors have sound levels exceeding 45 dBA at 100 feet from the receptor. After reviewing the receptors, 17 were either duplicate or non-inhabited residences, leaving 23 inhabited residences over the 45 dBA limit at 100 feet. Six of the inhabited residences are currently over the 45 dBA limit within 100 feet, twelve are currently at the 45 dBA limit within 100 feet. Basin Electric is working to obtain waivers from each landowner with an exceedance.

Shadow Flicker

At the time the original Facility was permitted, the Commission did not specifically address shadow flicker. The current accepted benchmark for shadow flicker levels at an occupied residence is not to exceed 30 hours per year. Basin Electric, through its consultant Burns & McDonnell, conducted a shadow flicker analysis for the Upgrade Project utilizing an industry-leading software package for the design and planning of wind energy projects. The package models the sun's path with respect to every wind turbine location during every minute over a complete year. Any shadow flicker caused by each turbine at a residence is aggregated for the entire year. See **Appendix B** for the shadow flicker analysis.

For the Upgrade Project, one home was modeled to have shadow flicker exceed 30 hours per year, a non-participating landowner who is currently over the 30 hours per year limit. Basin Electric is working to obtain a waiver from this landowner.

Human Health and Safety

Basin Electric submitted updated turbine heights to the Federal Aviation Administration (FAA). The FAA's review also triggered reviews from the Air Force and the Department of War to analyze

the safety of their operations in the area. Basin Electric will comply with all FAA, Air Force, and US Department of War requirements.

The Upgrade Project will continue to comply with all safety-related and other conditions of the Commission's 2009 Order and Certificate.

Cultural and Architectural Resources

The repower is a state level project; therefore, the Commission has statutory authority over the project. The Commission is responsible for ensuring the project complies with NDCC Chapter 55-03 - Protection of Prehistoric Sites and Deposits - and NDAC Chapter 40-02-02 - Permit for Cultural Resource Investigation.

In 2008, Ethnoscience conducted the first phase of cultural field work. In 2009 and 2010, Metcalf Archaeological Consultants, a Terracon Company (Metcalf), conducted the remaining fieldwork (SHSND Ref.: 26-9018). In 2025, Basin contracted Metcalf to conduct the Class III cultural resource inventory and the Class II reconnaissance survey for the repower project. The Class III pedestrian inventory included the areas around roads and areas around turbines. The architectural Class II survey comprises all areas within a two-mile buffer of all turbines, following the SHSND standards for wind farm survey. That survey documents buildings and structures 45 years of age or older which are potentially eligible or *eligible* for inclusion in the State Historic Sites Registry (SHSR).

The Class II reconnaissance survey comprises all areas within a two-mile buffer around the turbines. Metcalf recommends four newly identified architectural resources, 32WDx857 (farmhouse), 32WDx858 (missile silo), 32WDx858 (farmhouse), and 32WDx859 (missile silo), as potentially eligible for inclusion in the SHSR. Twelve previously recorded historical cultural resources remain unevaluated for inclusion in the SHSR. Seventy-four cultural resources were noted but not recorded on North Dakota Cultural Resource Survey (NDCRS) forms.

Six previously unrecorded cultural resources were identified, and 19 previously documented cultural resources were revisited during the Class III inventory. Two cultural resources, 32WD1549 and 32WD1637, are recommended *eligible* for inclusion in the SHSR; neither will be negatively impacted by the repowering project. Inventory data are insufficient to recommend eligibility for inclusion in the SHSR for 21 cultural resources. Two cultural resources, 32WD1660 and 32WDx664 are recommended *not eligible* for inclusion in the SHSR and no further work is advised for this project. Avoidance is recommended for 22 resources. If avoidance is not feasible, the eligibility of each cultural resource will need to be assessed and, if *eligible*, avoided or mitigated before construction impacts the resources. No negative impacts to the identified cultural resources are anticipated from the repowering project.

Metcalf recommends the finding of *no significant sites affected* (N.D.C.C. § 49-22-09) if Basin Electric follows the management recommendations described herein. A redacted version of the Cultural Resources Report is in **Appendix D**.

Recreational Resources

Turbine locations will remain the same with no new turbines or maintenance roads being added. The Upgrade Project will not impact any recreational resources.

Land-Based Economics

The Upgrade Project will not result in any additional long-term land impacts. As a result, the Upgrade Project will not result in any long-term impacts on agriculture use or production. Basin Electric will compensate landowners for any temporary impacts to cropland in accordance with the terms of its wind lease agreements, as applicable.

Soils

Upgrade Project construction may result in minor, short-term impacts to soils around each turbine location. During construction, short-term impacts may include soil compaction, vegetation matting or clearing, and the potential for localized soil erosion and sedimentation. Localized topsoil removal and stockpiling may occur around each turbine location. Measures to control erosion will be implemented during Upgrade Project construction. Once construction is complete, decompaction will occur, as needed and stockpiled topsoil will be respread and revegetated, following Natural Resources Conservation Service guidelines or landowner requests. No adverse impacts to soils are expected as a result of the Upgrade Project.

Geological and Groundwater Resources

The Upgrade Project is not expected to disturb any geological or groundwater resources.

Waterbodies and Wetlands

Basin Electric contracted Western EcoSystems Technology, Inc. (WEST) to conduct a desktop review of wetland and waterbody features identified within the Upgrade Project Area by utilizing Ward County Nation Agriculture Imagery Program aerial photographs, US Fish and Wildlife Service (USFWS) National Wetland Inventory, US Geological Survey National Hydrography Dataset, and the US Department of Agriculture Natural Resources Conservation Service digital Web Soil Survey. Additionally, WEST conducted a field survey to verify wetland and waterbody locations and size.

The Upgrade Project will remain within the areas previously disturbed by the original construction, and no temporary or permanent impacts to wetlands or waterbodies are anticipated. **Appendix F** contains the Wetland and Waterbody Mapping Report.

Vegetation

Vegetation will be cleared around each turbine location as a temporary construction workspace. Topsoil will be stripped and piled within the original disturbance footprint. Once construction is complete, the topsoil will be respread, and the area will be revegetated based on landowner requests.

Trees along roadways may need to be trimmed or removed to allow for large deliveries to each turbine location. If trees need to be removed, Basin Electric will comply with the Commission's

Tree and Shrub Mitigation Specifications, and an inventory and replacement plan will be submitted to the Commission for approval.

Wildlife

The USFWS Information for Planning and Consultation (IPaC) tool was reviewed for a list of threatened, endangered, and candidate species, as well as critical habitat, which could occur within or near the Upgrade Project Area. The IPaC tool identified the endangered northern long-eared bat and whooping crane, and the threatened piping plover, rufa red knot, and Dakota skipper, as well as the proposed endangered Suckley's cuckoo bumble bee and the proposed threatened monarch butterfly and western regal fritillary as having the potential to occur in or near the Upgrade Project Area. **Appendix E** contains the Natural Resources Report.

Construction activities may temporarily cause wildlife to avoid the active construction areas, but their movements are anticipated to return to pre-Upgrade Project levels and patterns after construction. A pre-construction ground nest survey will be completed prior to construction in uncultivated areas.

Impacts to wildlife are expected to be minimal as the proposed construction disturbance areas were previously disturbed for the original construction and the Upgrade Project does not permanently increase from the original construction area.

Agency Correspondence

Basin Electric contacted key local, state, and federal agencies per NDAC Section 69-06-01-05 for assistance in identifying concerns or issues within the Upgrade Project area. Agency correspondence as of April 2025 is included in **Appendix G**.

Conclusion

Table 3 below summarizes Basin Electric's environmental and regulatory analysis of the Upgrade Project. As indicated in Table 3 and previous sections, the Upgrade Project complies with the requirements of NDCC Section 49-22-03(4)(a)(4), including the Commission's current exclusion area and avoidance area criteria. Additionally, the Upgrade Project will continue to comply with all applicable siting laws, rules, and Commission orders, including the conditions specified in the Commission's 2009 Order and Certificate.

Table 3 - Environmental Resources Impact Analysis and Avoidance/Minimization Measures

Resources	Potential Impact of Upgrade Project	Avoidance and/or Minimization Measures
Socioeconomics	Positive economic and social impacts	None proposed.
Land Use	Temporary disturbances only; will utilize previously disturbed areas.	Basin Electric will restore temporarily impacted areas in compliance with applicable provisions of the Commission's 2009 Order.
Public Services	A temporary increase in traffic due to construction will occur.	Basin Electric is coordinating with Ward County and townships regarding local road use agreements, obtaining all necessary road use permits, and will restore roads impacted by the Upgrade Project in accordance with the requirements of the Commission's 2009 Order.
Sound	Initial modeling analysis determined that sound from the Upgrade Project turbines may exceed 45 dBA within 100 feet of 23 occupied residences.	Basin Electric is working to obtain sound waivers from each landowner with sound levels that exceed 45 dBA at 100 feet from the residence.
Shadow Flicker	Initial modeling analysis determined that shadow flicker from the Upgrade Project turbines may exceed 30 hours per year at one occupied residence.	Basin Electric is working to obtain a shadow flicker waiver for the one landowner with shadow flicker levels that exceed 30 hours per year.
Human Health and Safety	Turbine lighting will continue to meet FAA and Commission requirements.	None proposed. The FAA Filing list is shown in Appendix C .
Cultural/Architectural History Resources	Upgrade Project activities will occur within areas previously surveyed for cultural resources and in areas previously disturbed by initial facility construction. The Upgrade Project is not anticipated to impact cultural or architectural history resources.	An Unanticipated Discoveries Plan will be prepared.
Recreational Resources	No impacts to recreational resources are anticipated.	Will continue to maintain the 1,320-foot setback from nearby USFWS WPAs.
Land-Based Economics	Minimal cropland will be temporarily impacted during construction. No additional long-term impacts to agricultural use or production are anticipated.	Basin Electric will compensate landowners for any temporary impacts to cropland in accordance with the terms of its lease agreements, as applicable.
Soils	Temporary land disturbance for construction may cause soil surface to be more susceptible to wind and water erosion.	Basin Electric will implement a Stormwater Pollution and Prevention Plan to minimize erosion and sedimentation and will restore all temporarily impacted areas.
Geological and Groundwater Resources	No impacts to geological and groundwater resources are anticipated.	None proposed.
Waterbodies and Wetlands	No impacts are anticipated.	Basin Electric will implement a Stormwater Pollution and Prevention Plan to minimize erosion and sedimentation and will restore all temporarily impacted areas.
Vegetation	Temporary vegetation clearing will occur. Trees and shrubs may be cleared, if necessary for large deliveries.	Basin Electric will comply with the site restoration and reseeded conditions in the Commission's 2009 Order and all other applicable requirements.

**Table 3 - Environmental Resources Impact Analysis and
Avoidance/Minimization Measures**

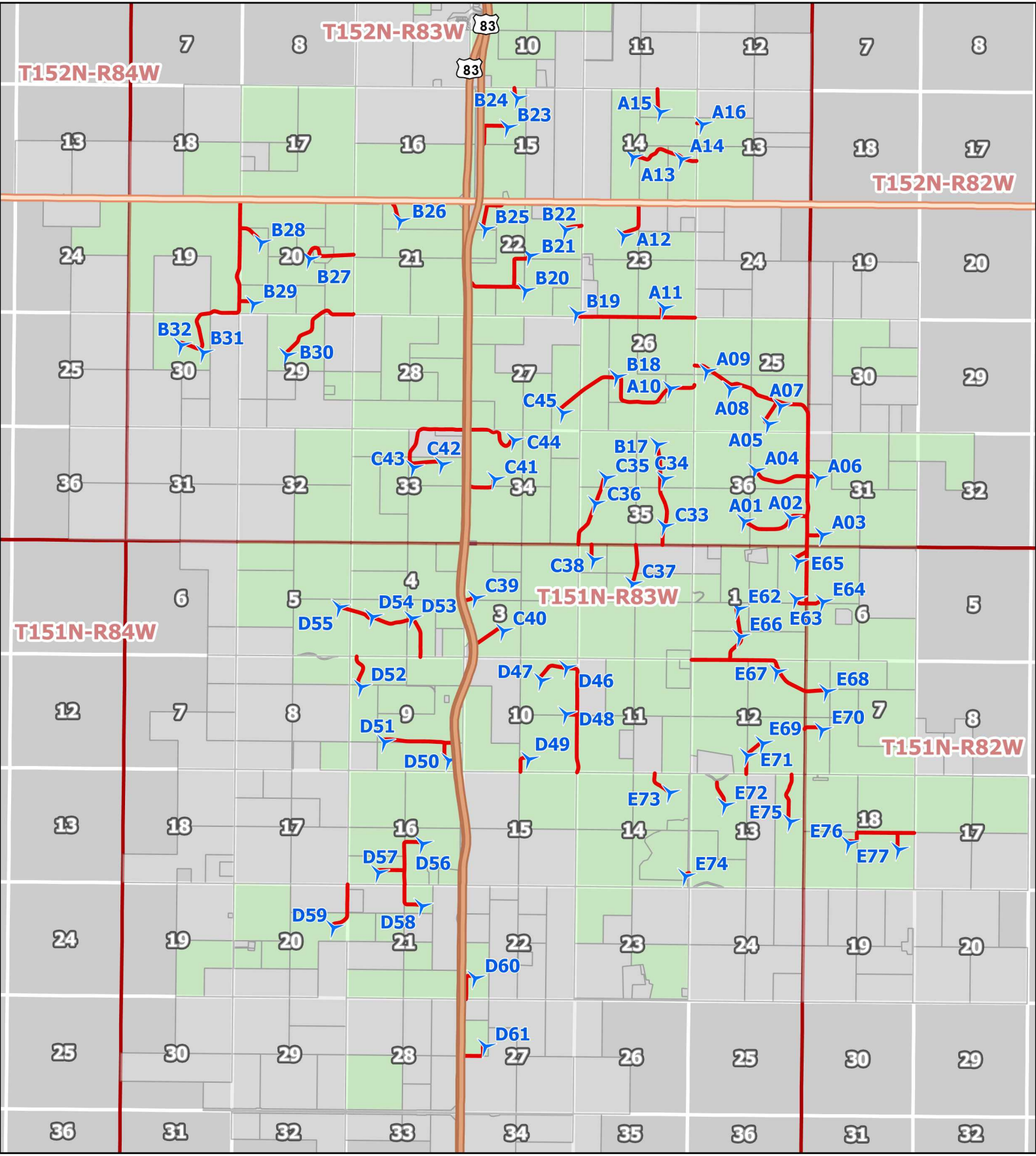
Resources	Potential Impact of Upgrade Project	Avoidance and/or Minimization Measures
Wildlife	Construction impacts will be confined to previously disturbed locations and minimal impacts to wildlife are anticipated. The Upgrade Project is not anticipated to have an impact on threatened or endangered species or have any measurable change to long term wildlife movements.	Basin Electric will continue to implement avoidance, minimization, and monitoring measures outlined in the Commission's 2009 Certification to protect wildlife.

Figure 1 - Prairie Winds ND Overview Map

PrairieWinds North Dakota - Repowering



**BASIN ELECTRIC
POWER COOPERATIVE**
A Touchstone Energy® Cooperative



N

Turbine Locations

Access Roads

U.S. Highway

State Highway

Non-Participating Landowners

Participating Landowners

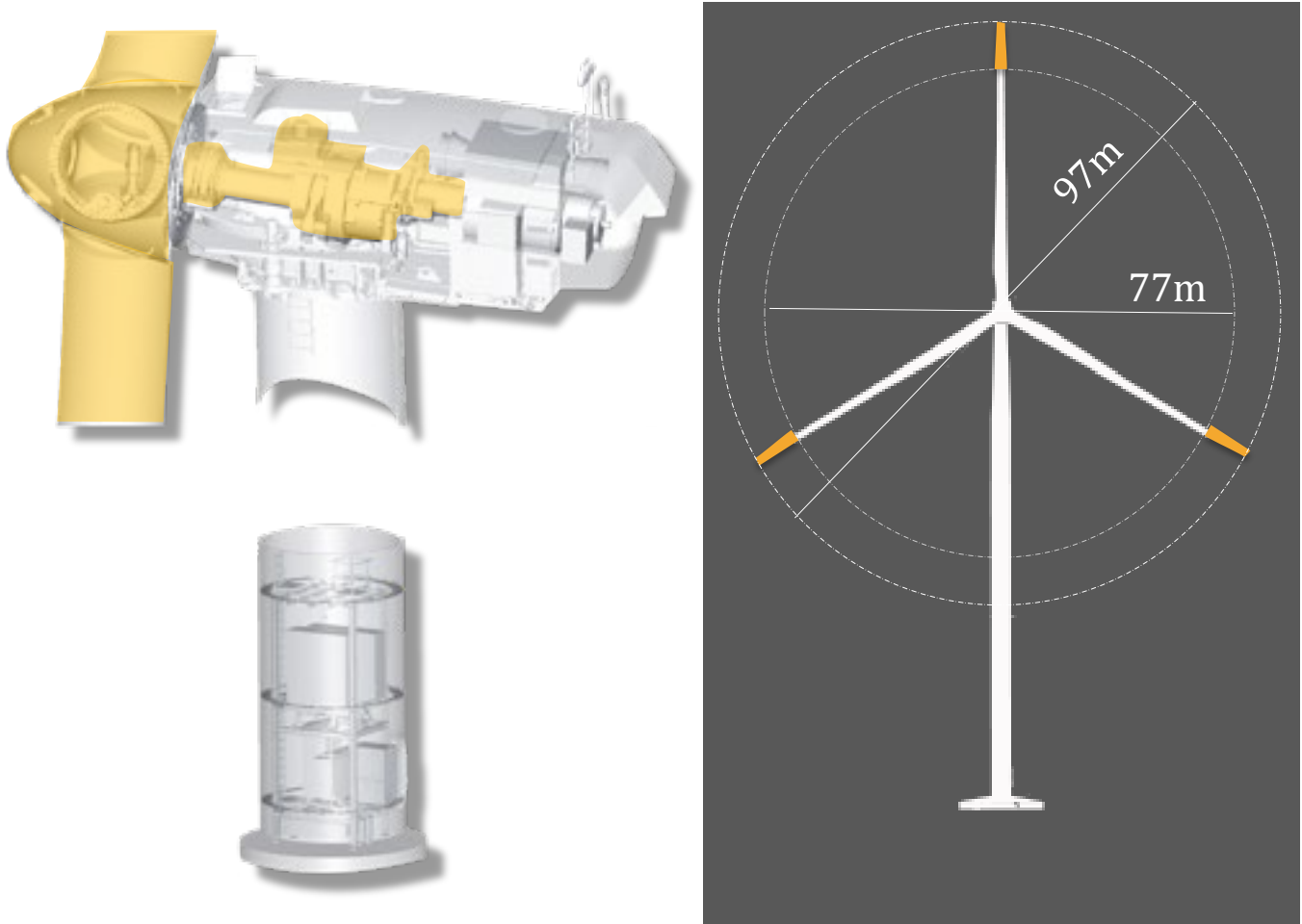
Sections

Townships

0 1 2 Miles

Figure 2 - Proposed Upgrade Turbine Technology

Figure 2 – Proposed Upgrade Turbine Technology



GE Vernova Repowering Kit

Blade Set (97m Rotor Diameter)

Complete Hub

Main Shaft

Main Bearing Assembly

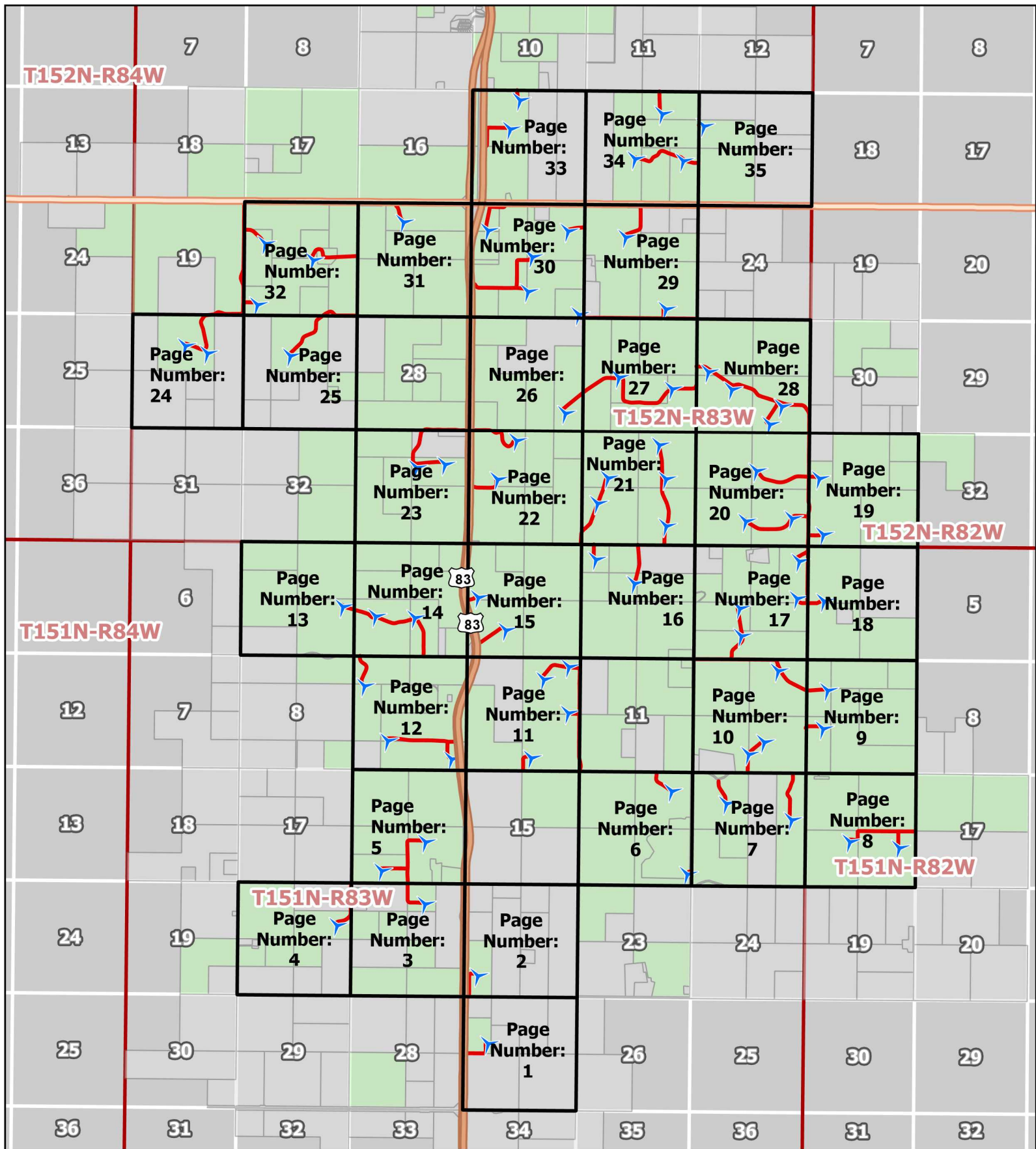
Gearbox

Generator Refurbishment

Extends end of life 20 years

1.6MW Capacity

Figure 3 - Prairie Winds ND Mapbook



Turbine Locations
 Access Roads

U.S. Highway
 State Highway

Non-Participating Landowners
 Participating Landowners

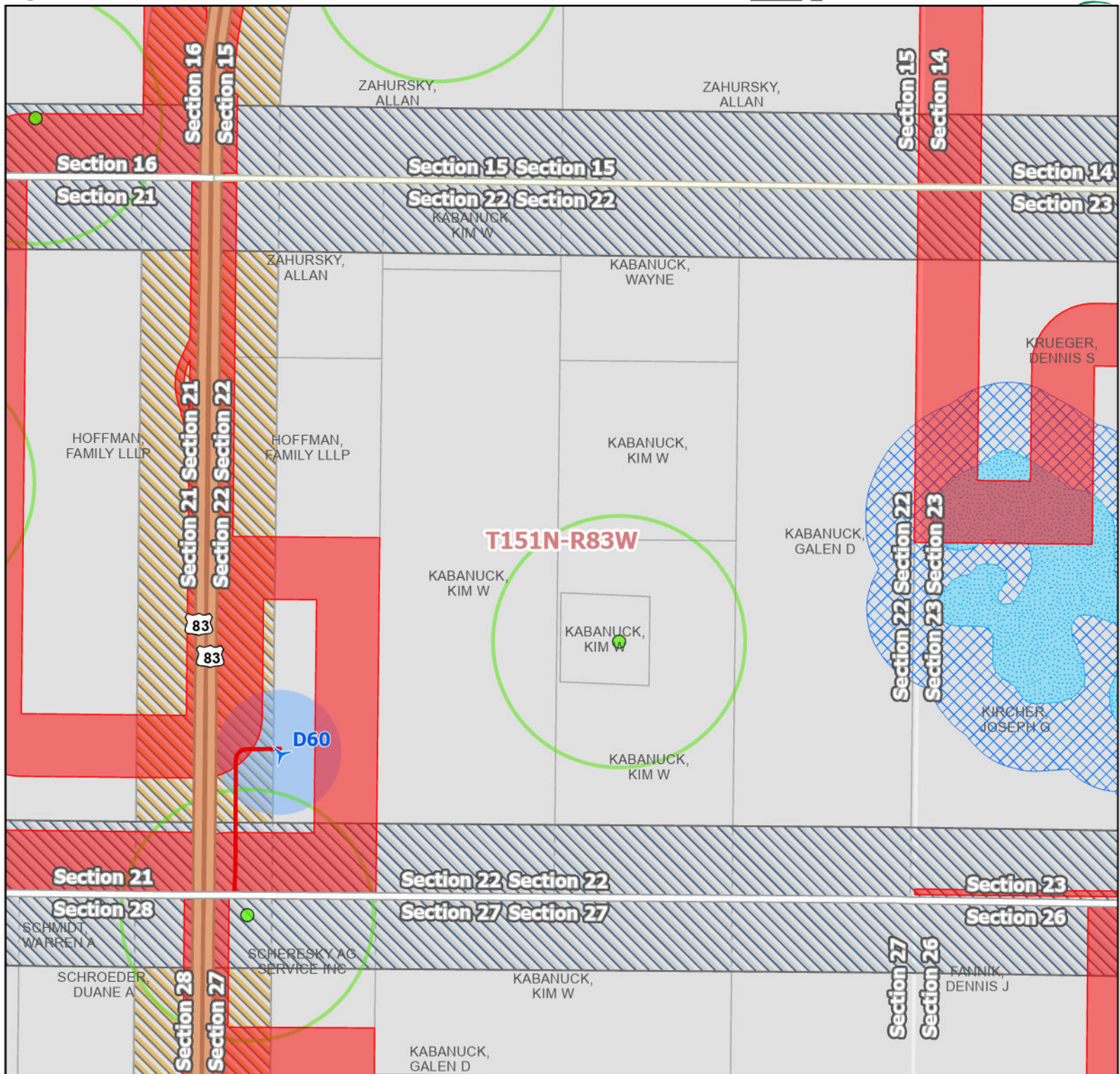
Townships

Sections



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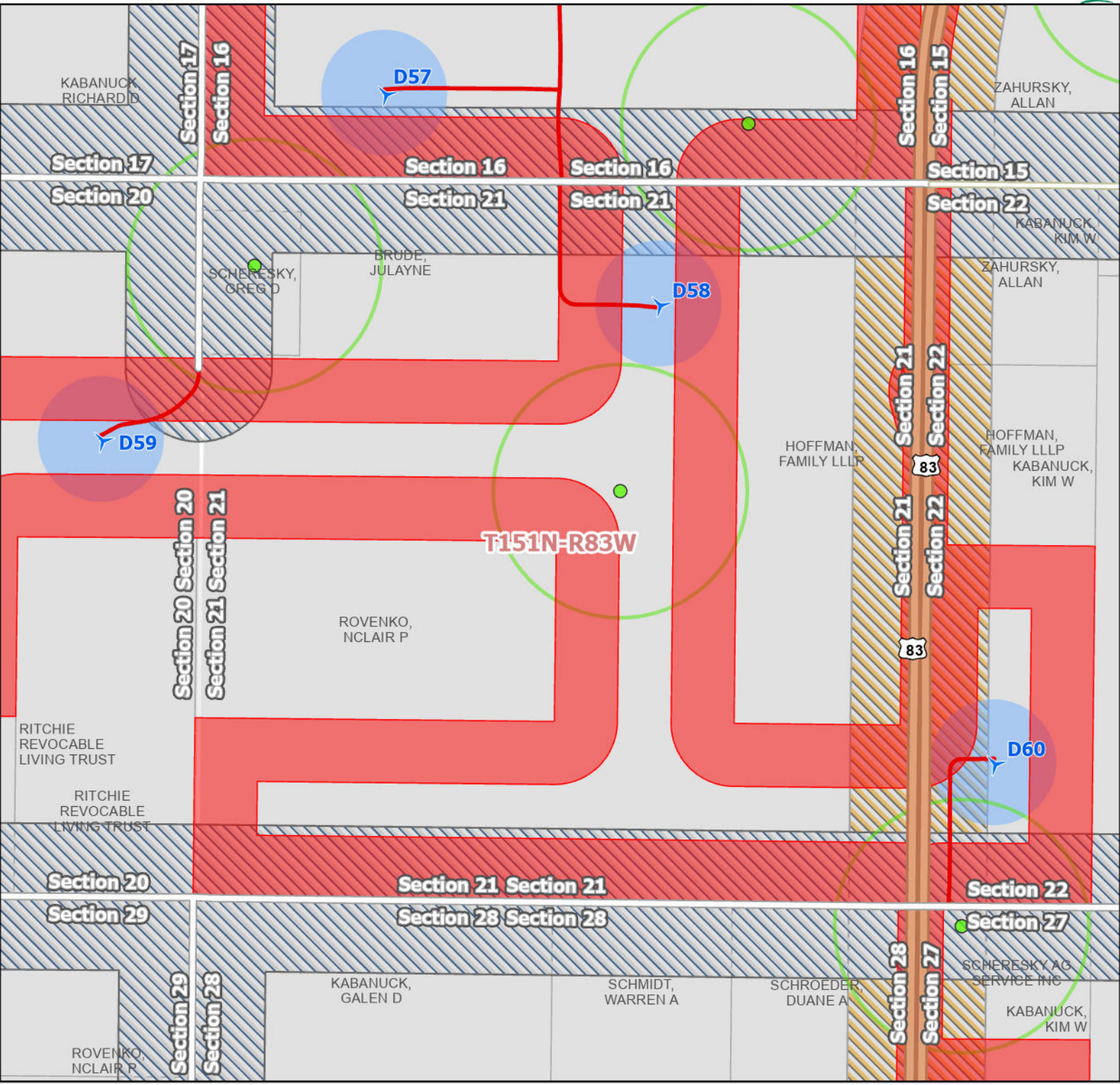
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Map Features

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| Turbine Locations | Interstate | 3x Turbine Height Rural Residences Setback | Existing 115-kV Transmission Line ROW (100ft) | Non-Participating Landowners |
| Occupied Residence | U.S. Highway | Non-Participating Landowner Property Line Setback | Fish and Wildlife Service | Participating Landowners |
| ICBM Sites | State Highway | 1200' ICBM Site Buffer | Fish and Wildlife Service Setback (WPA) | Townships |
| Graded & Drained | Access Roads | 1.1x Turbine Height Setback | ≥ 50 acres Wetlands | Sections |
| Gravel | Existing 115-kV Transmission | State and Federal Highway Setback | ≥ 50 acres Wetlands Setback | |
| Paved | | City and County Maintained Roads Setback | | |

N



Map Features

- Turbine Locations

Occupied Residence

ICBM Sites

Graded & Drained

Gravel

Paved
- Interstate

U.S. Highway

State Highway

Access Roads

Existing 115-kV Transmission
- 3x Turbine Height Rural Residences Setback

Non-Participating Landowner Property Line Setback

1200' ICBM Site Buffer

1.1x Turbine Height Setback

State and Federal Highway Setback

City and County Maintained Roads Setback
- Existing 115-kV Transmission Line ROW (100ft)

Fish and Wildlife Service

Fish and Wildlife Service Setback (WPA)

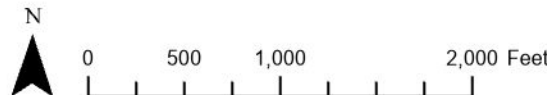
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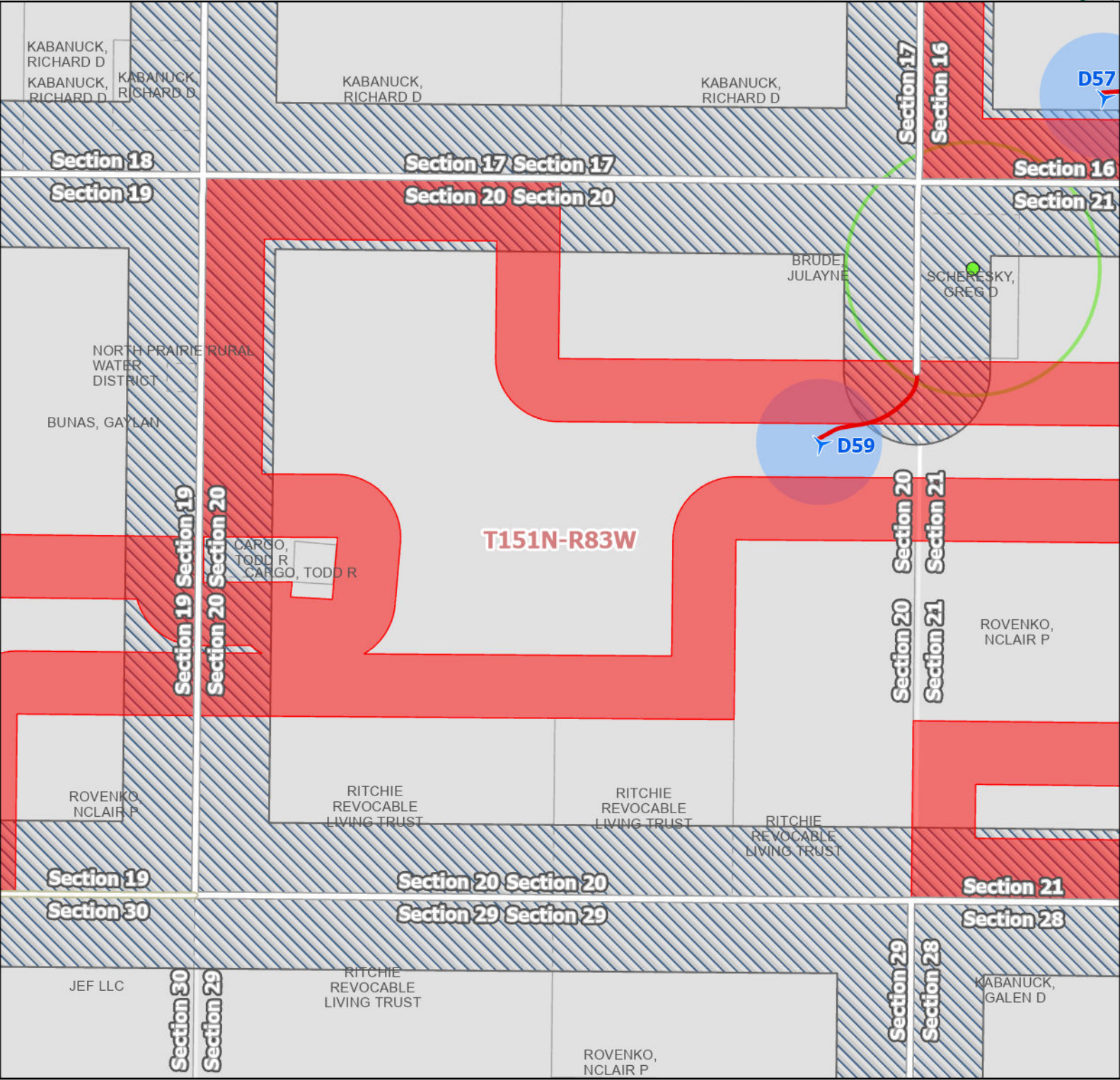
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- Non-Participating Landowners

Participating Landowners

Townships

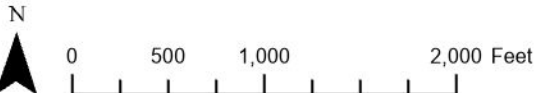
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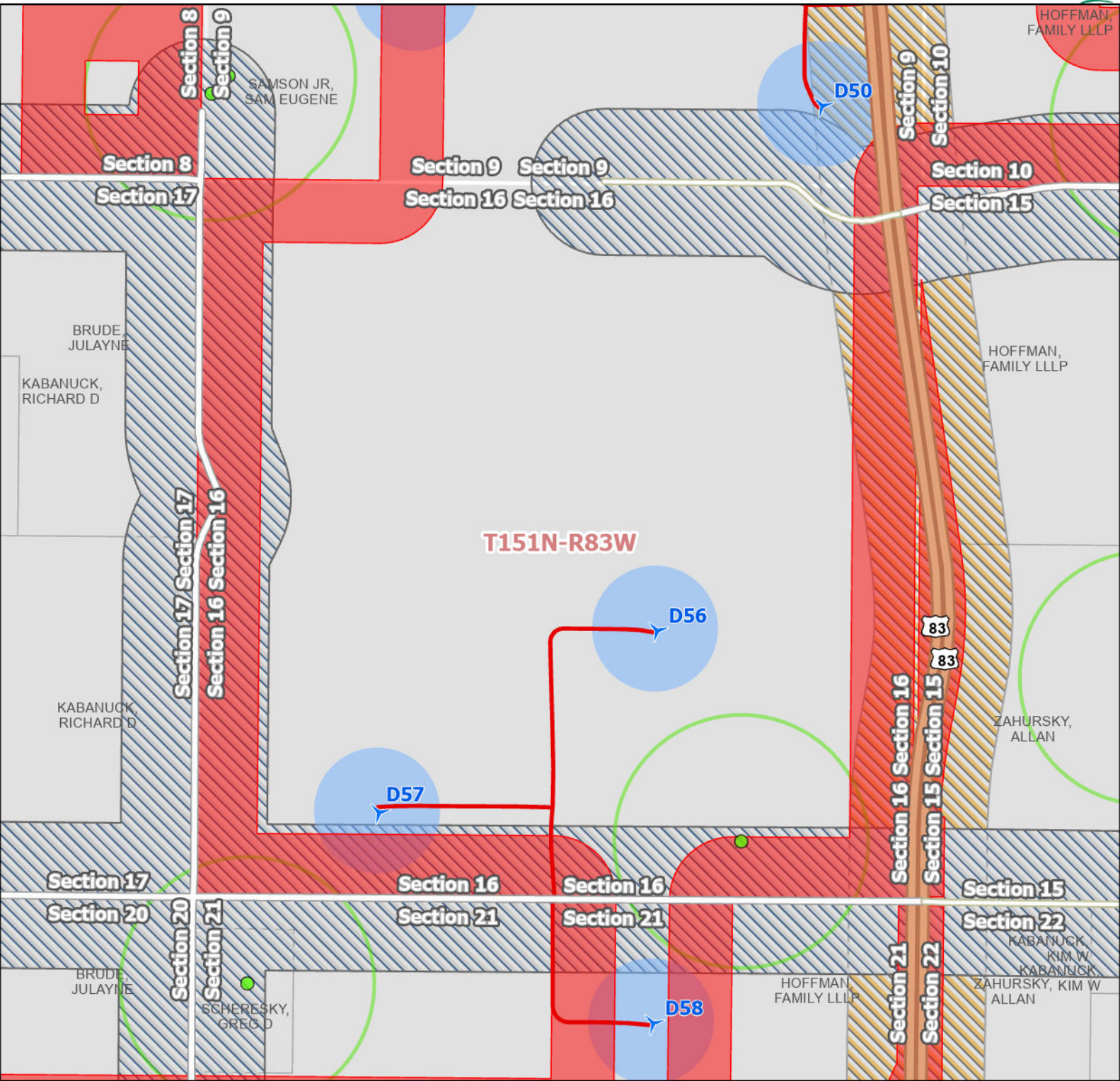




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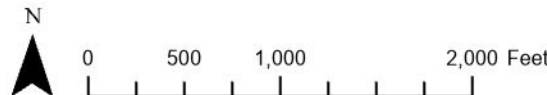
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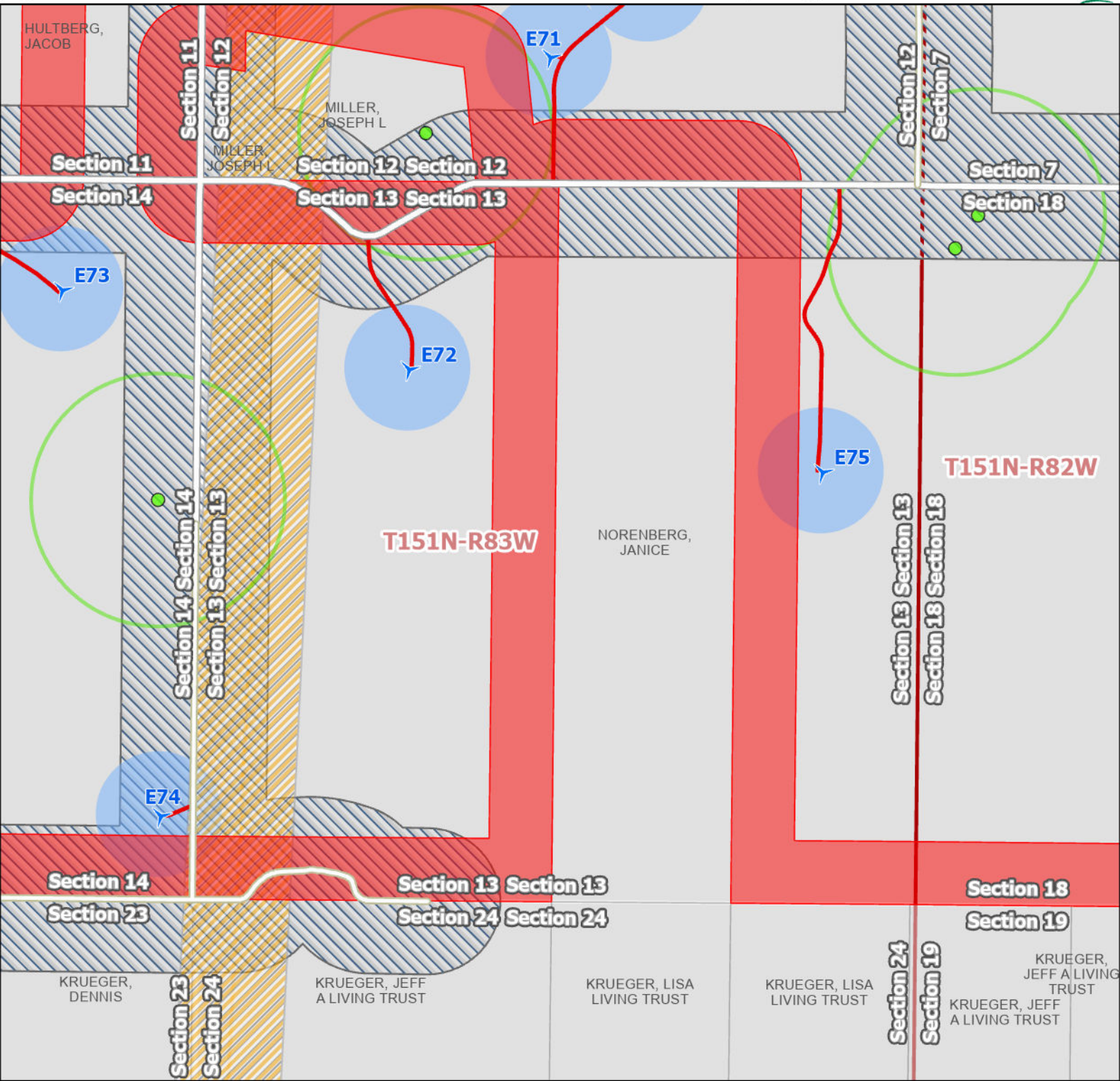
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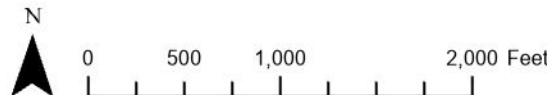
A Touchstone Energy® Cooperative

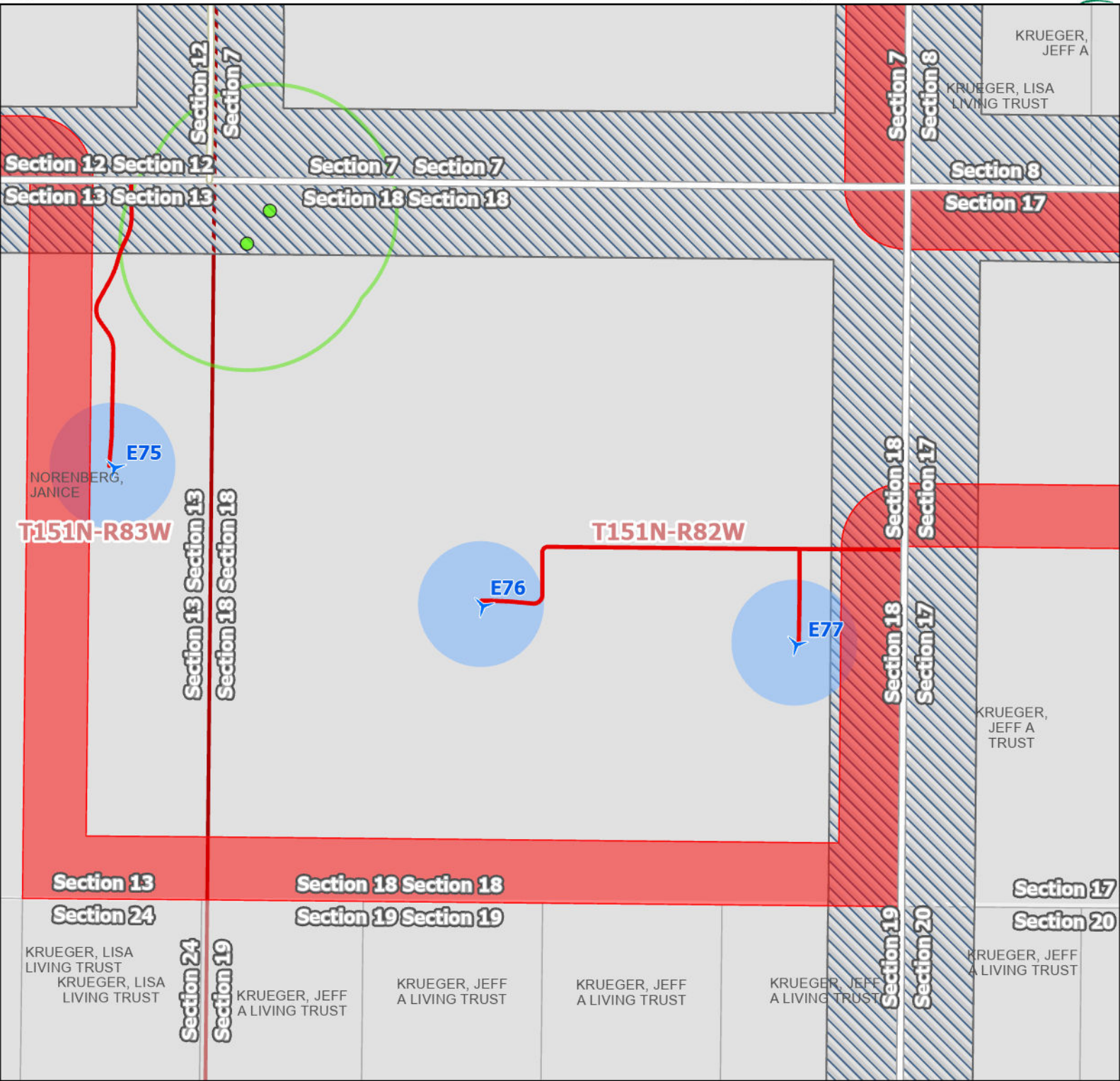
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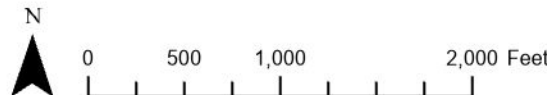
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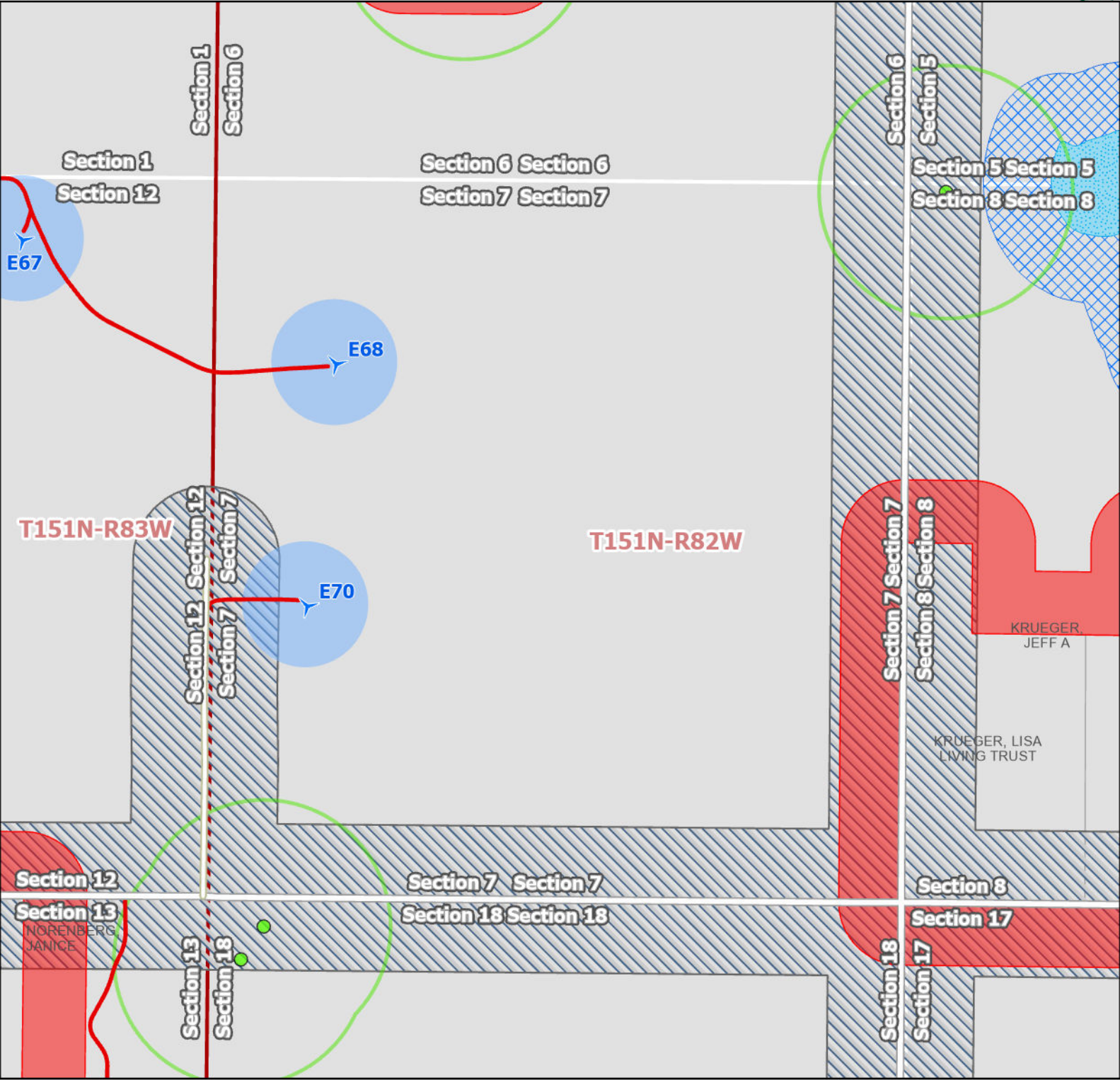
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Map Features





Map Features

- Turbine Locations

Occupied Residence

ICBM Sites

Graded & Drained

Gravel

Paved
- Interstate

U.S. Highway

State Highway

Access Roads

Existing 115-kV Transmission
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Non-Participating Landowner Property Line Setback

1200' ICBM Site Buffer

1.1x Turbine Height Setback

State and Federal Highway Setback

City and County Maintained Roads Setback
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Fish and Wildlife Service

Fish and Wildlife Service Setback (WPA)

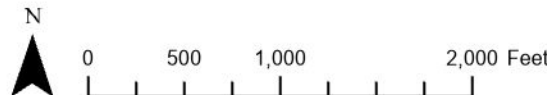
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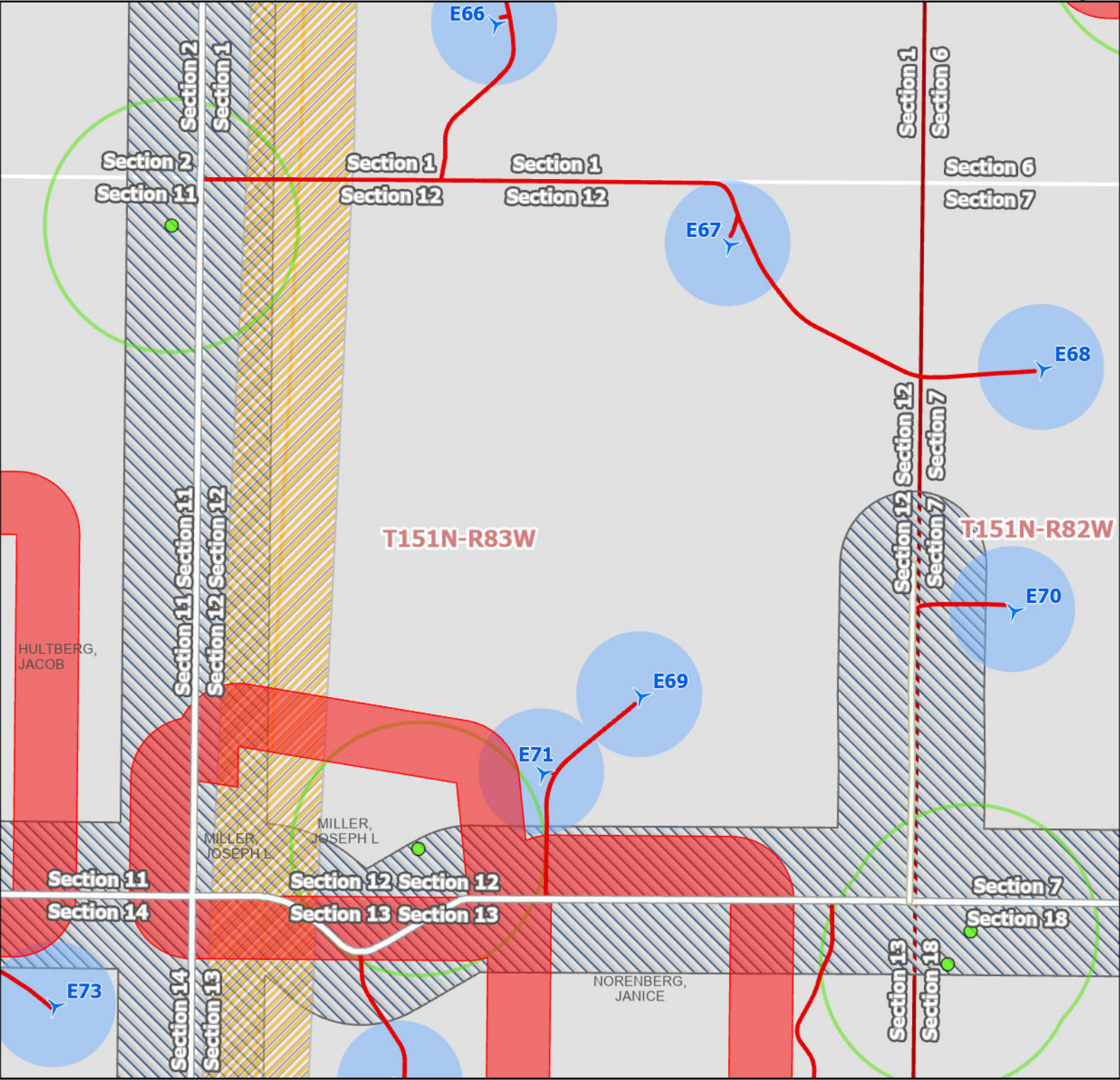
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Participating Landowners

Townships

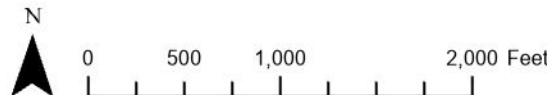
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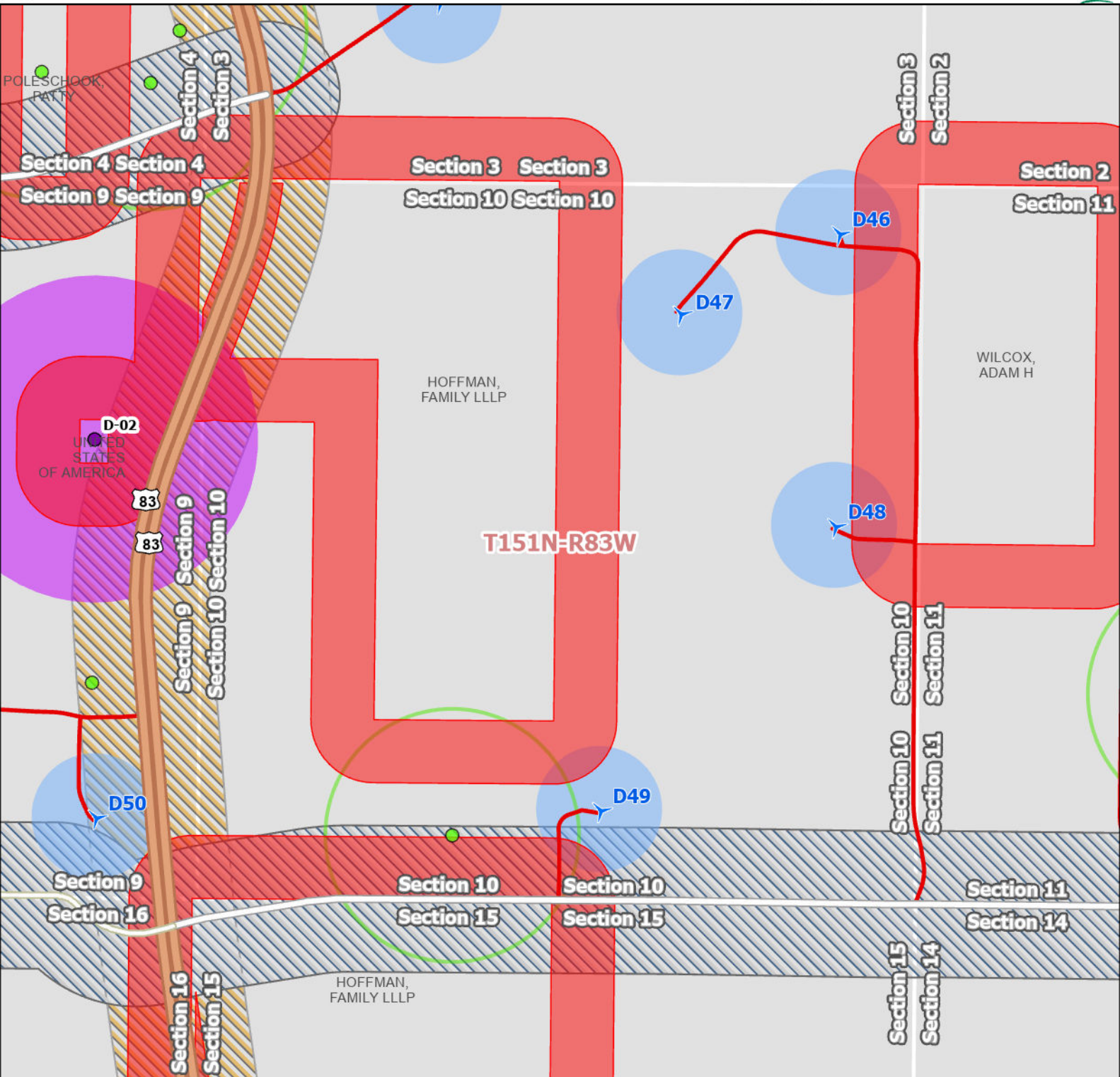




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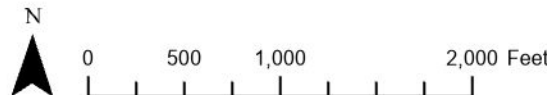
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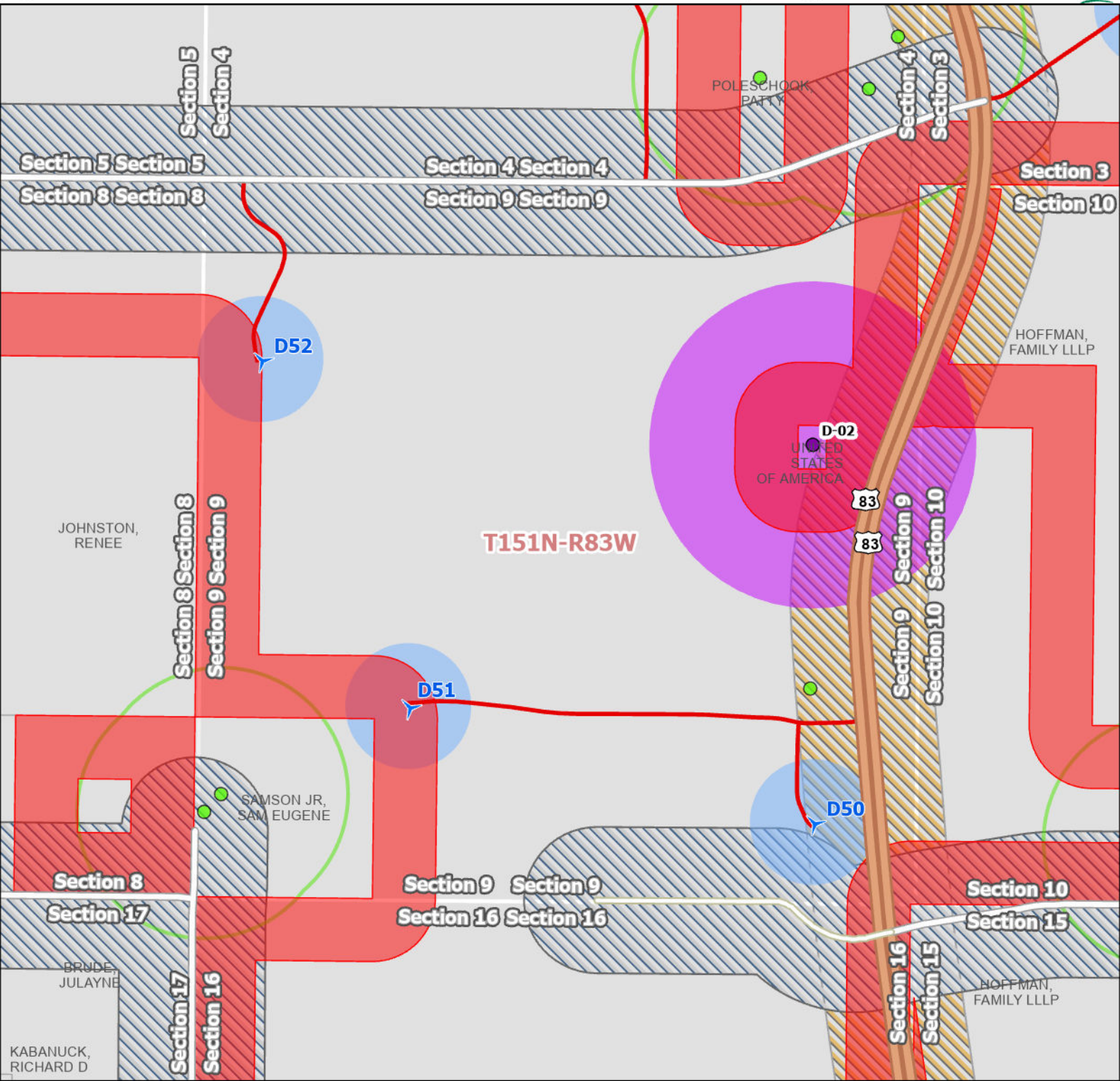




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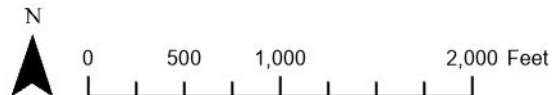
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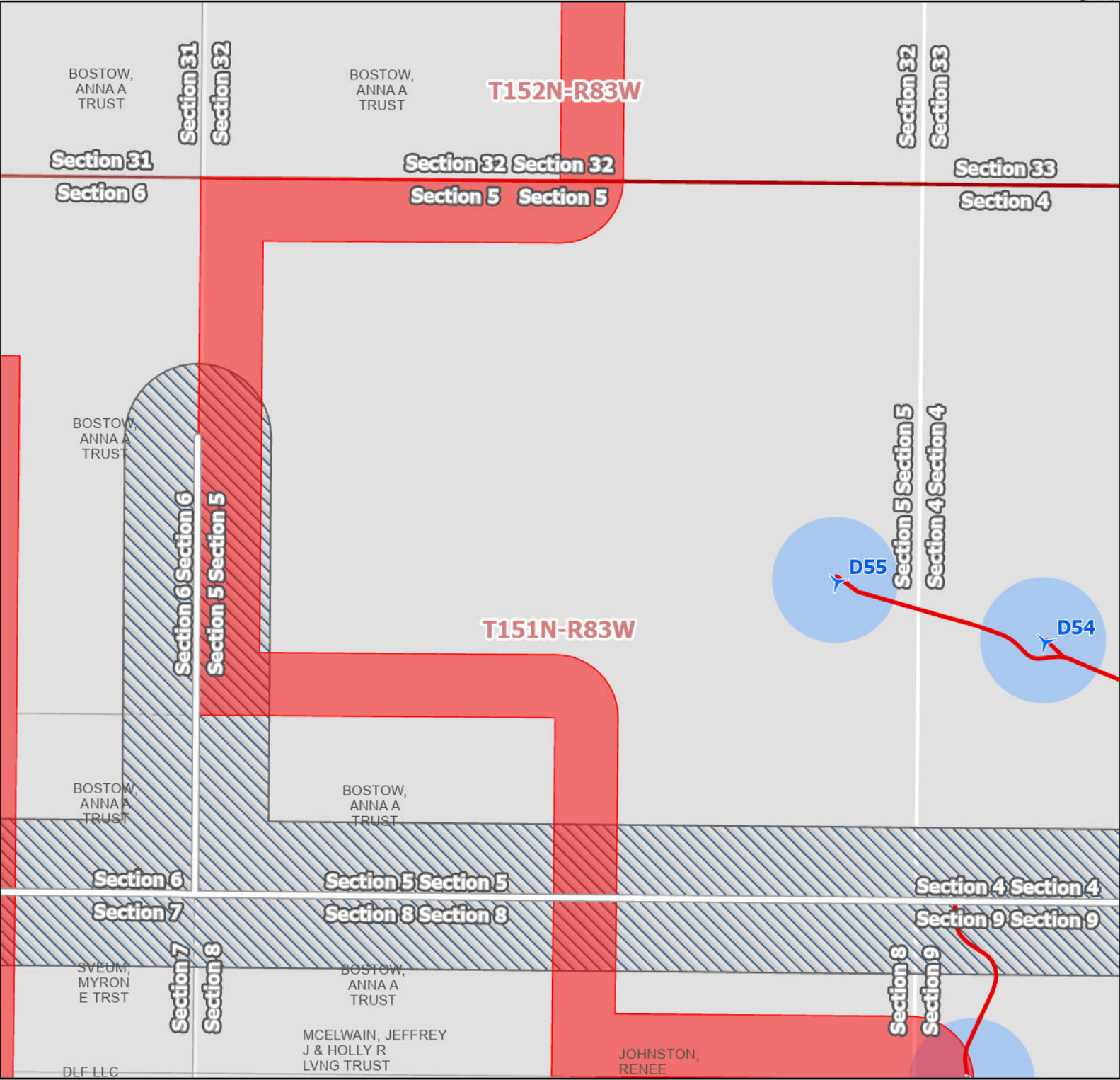




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Map Features

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Gravel

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Existing 115-kV Transmission
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1.1x Turbine Height Setback

State and Federal Highway Setback

City and County Maintained Roads Setback
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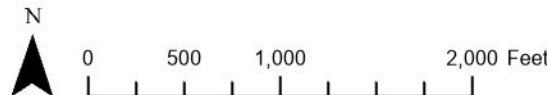
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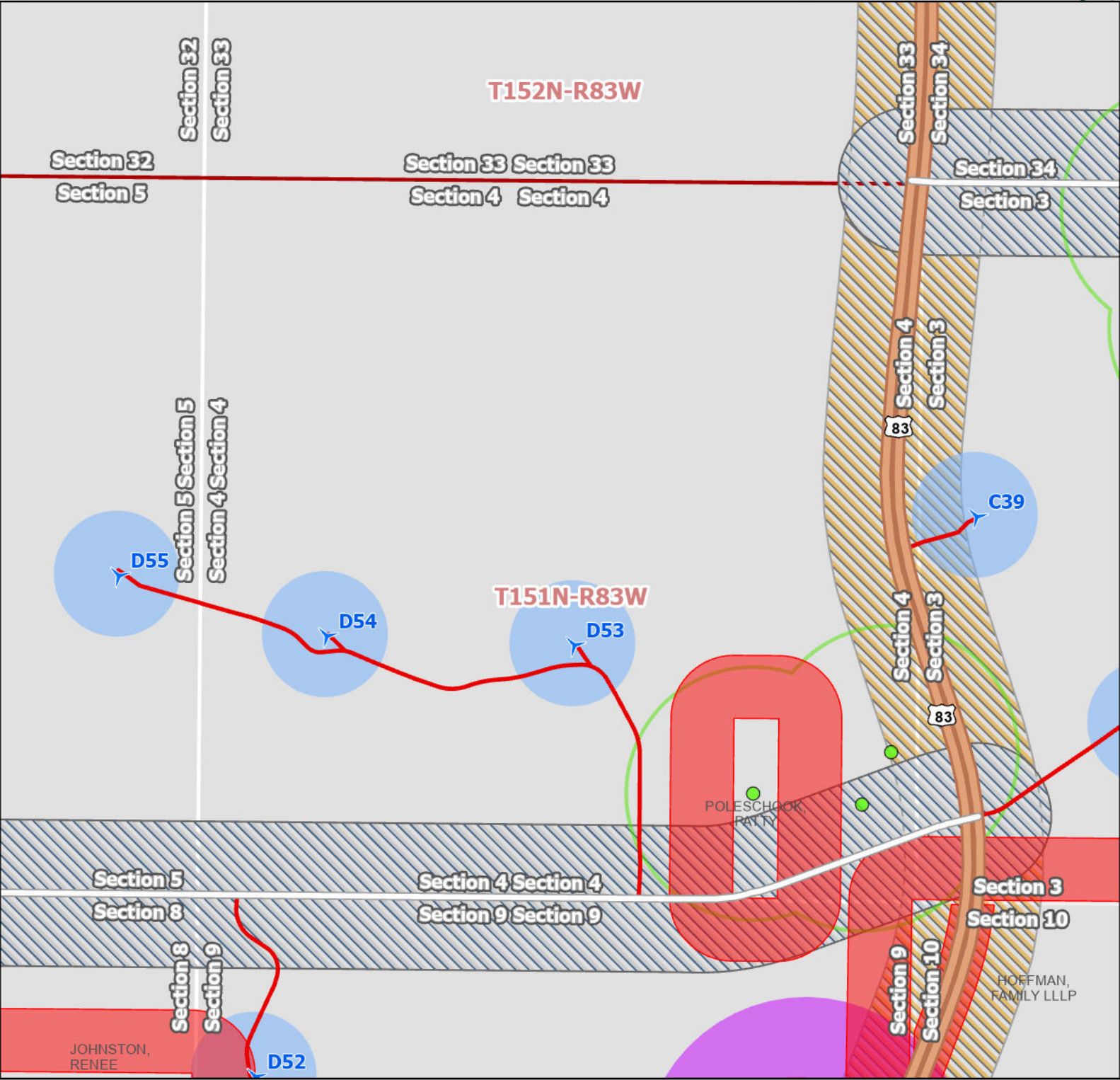
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Participating Landowners

Townships

Sections





Map Features

- Turbine Locations

Occupied Residence

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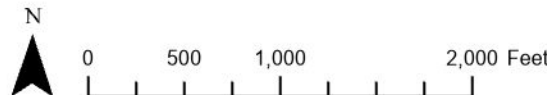
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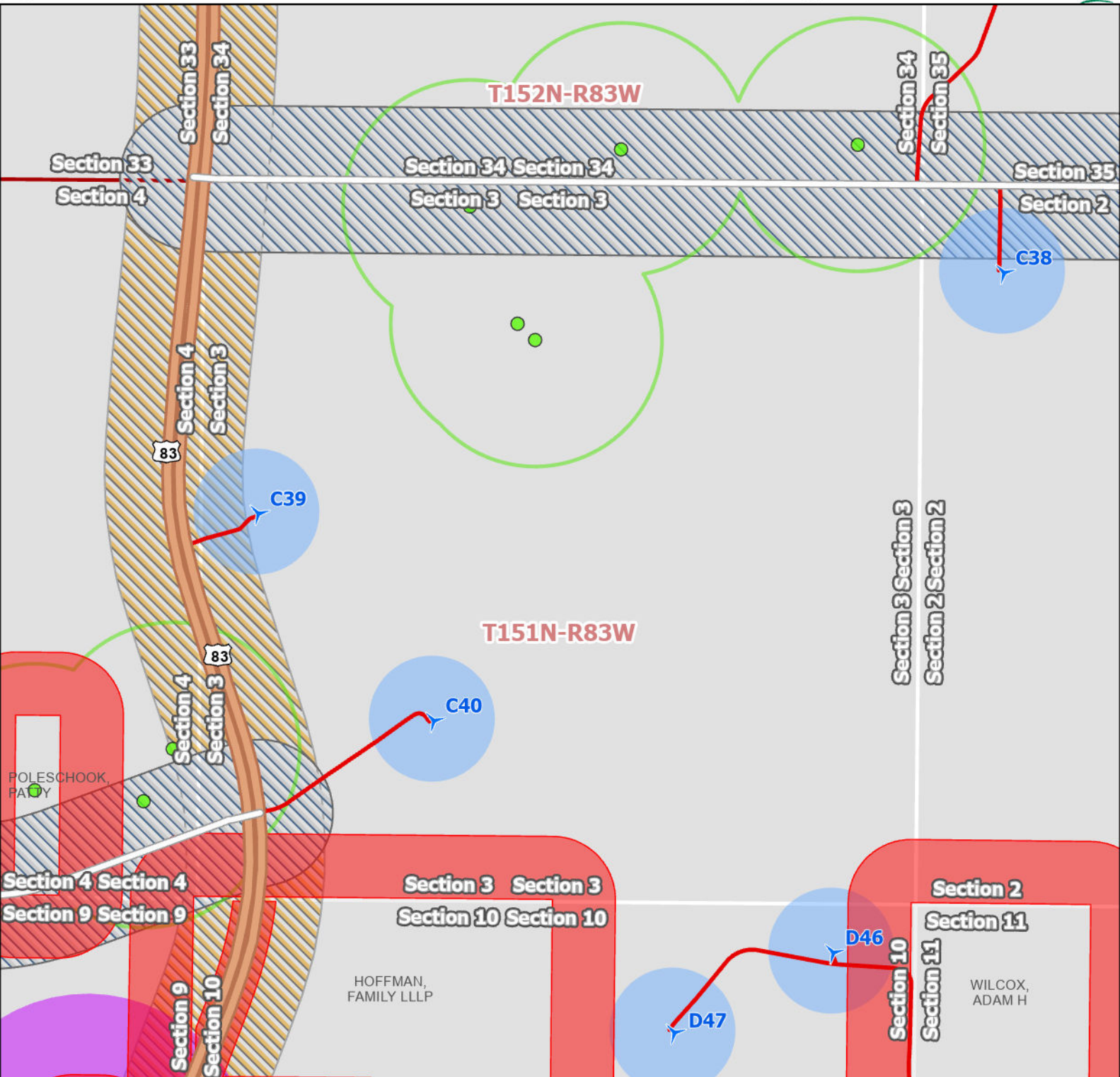
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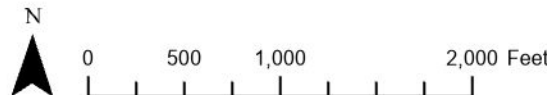
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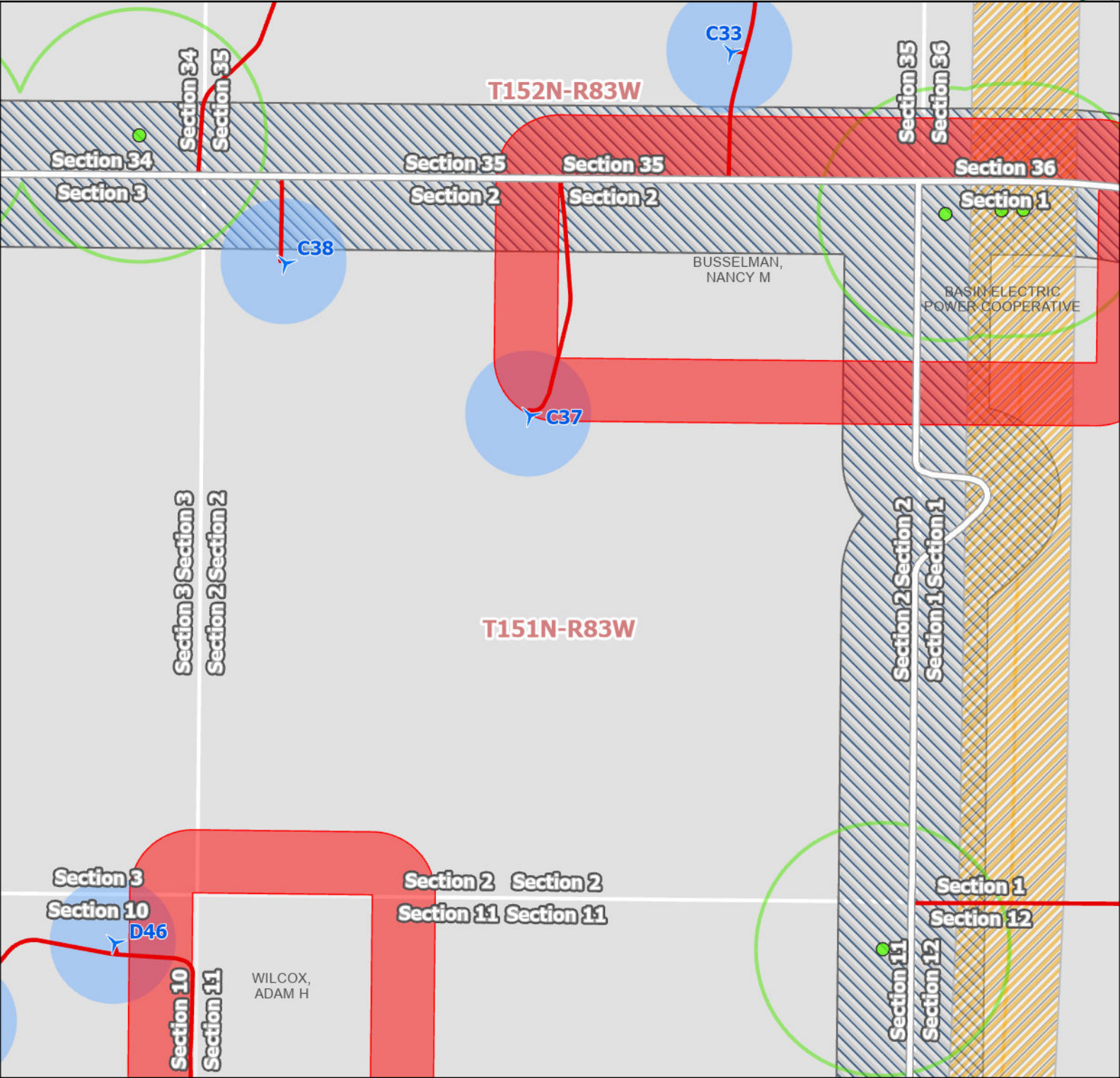




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Map Features

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Occupied Residence

ICBM Sites

Graded & Drained

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Existing 115-kV Transmission
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1200' ICBM Site Buffer

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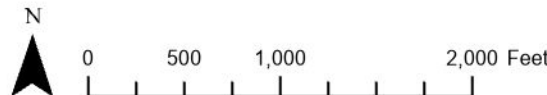
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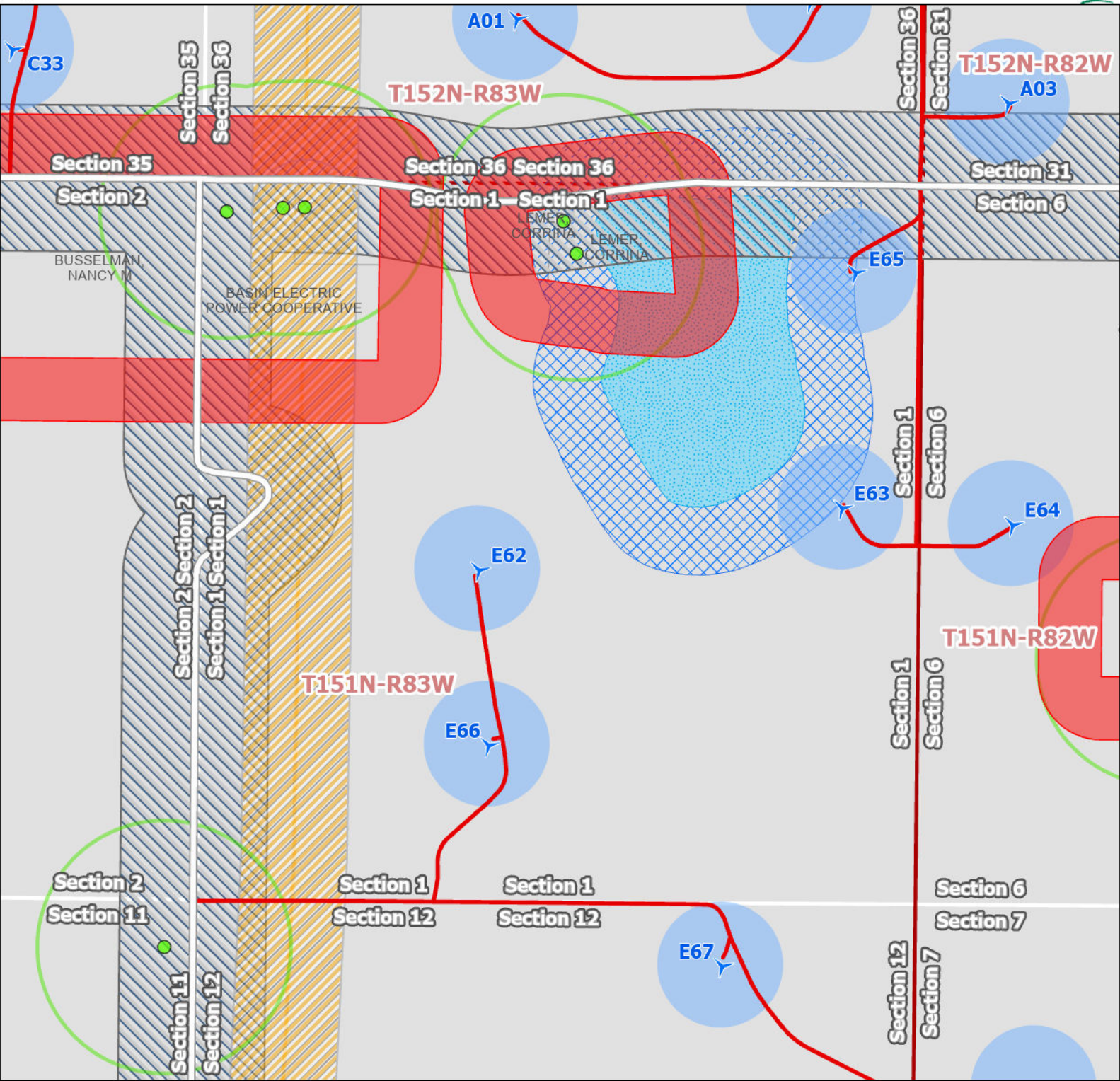
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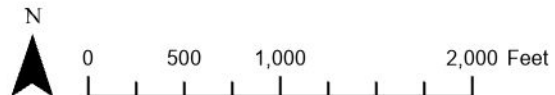
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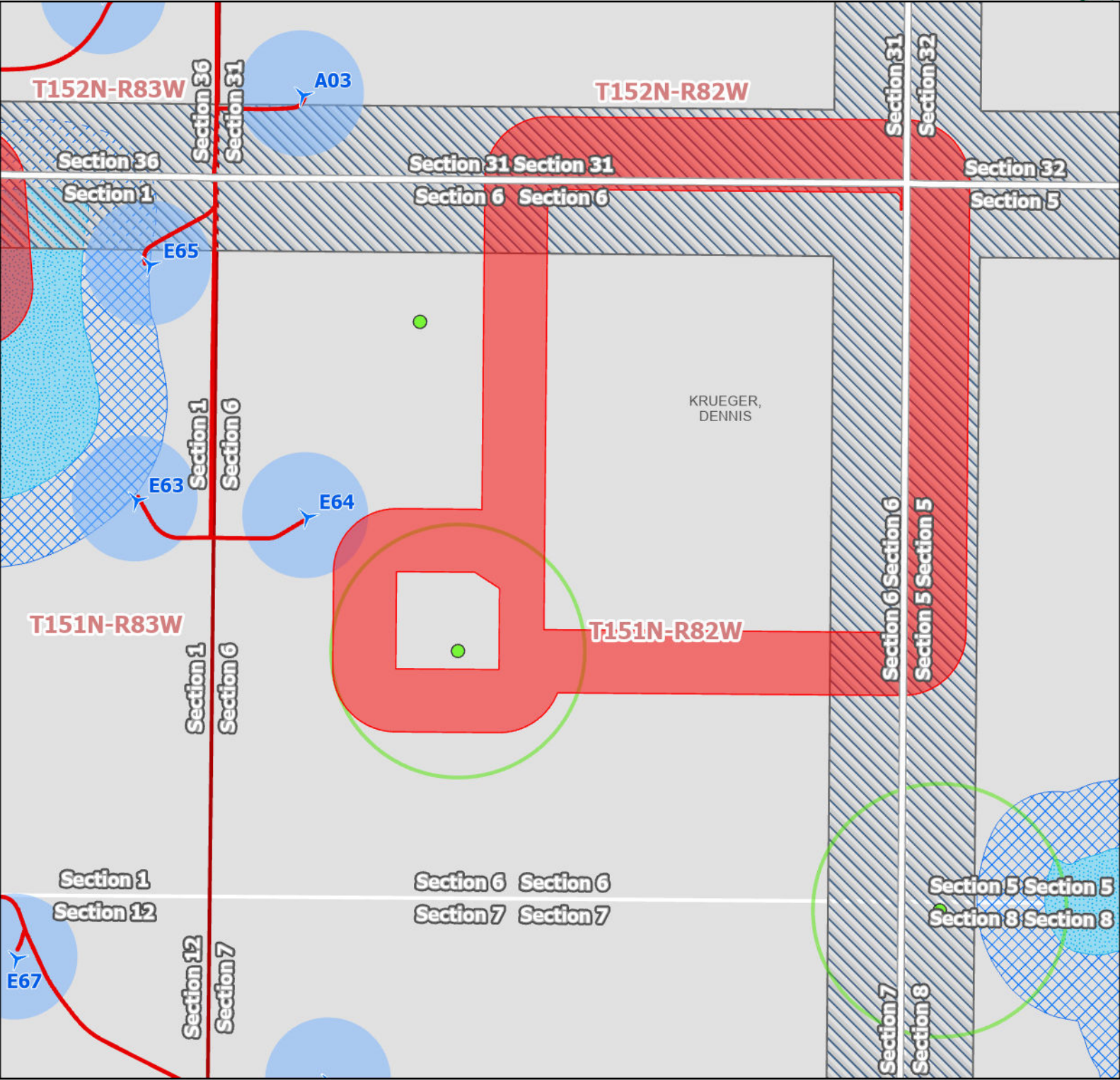




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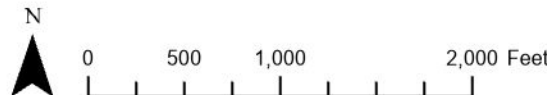
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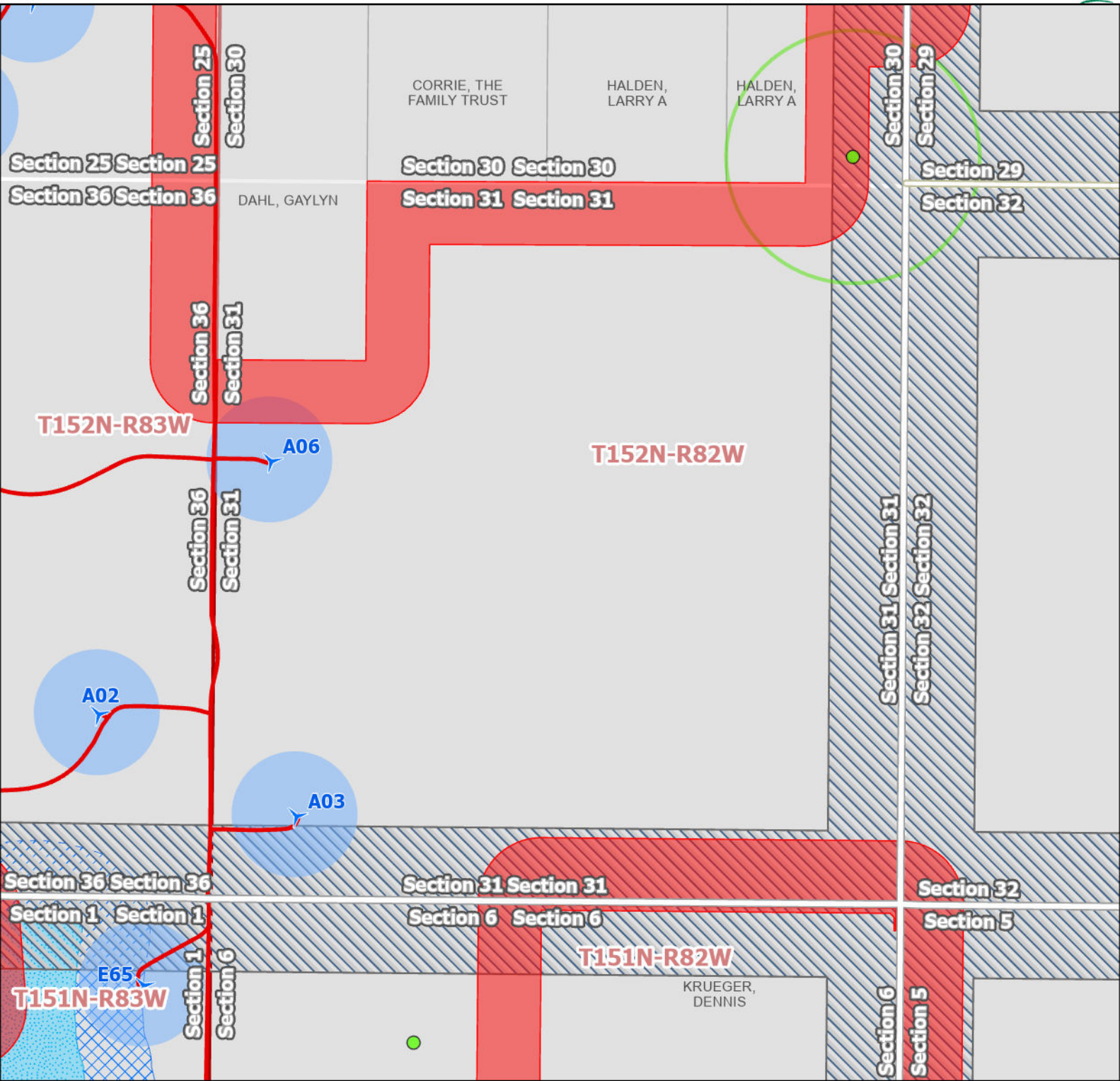




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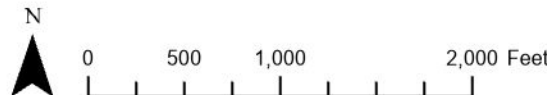
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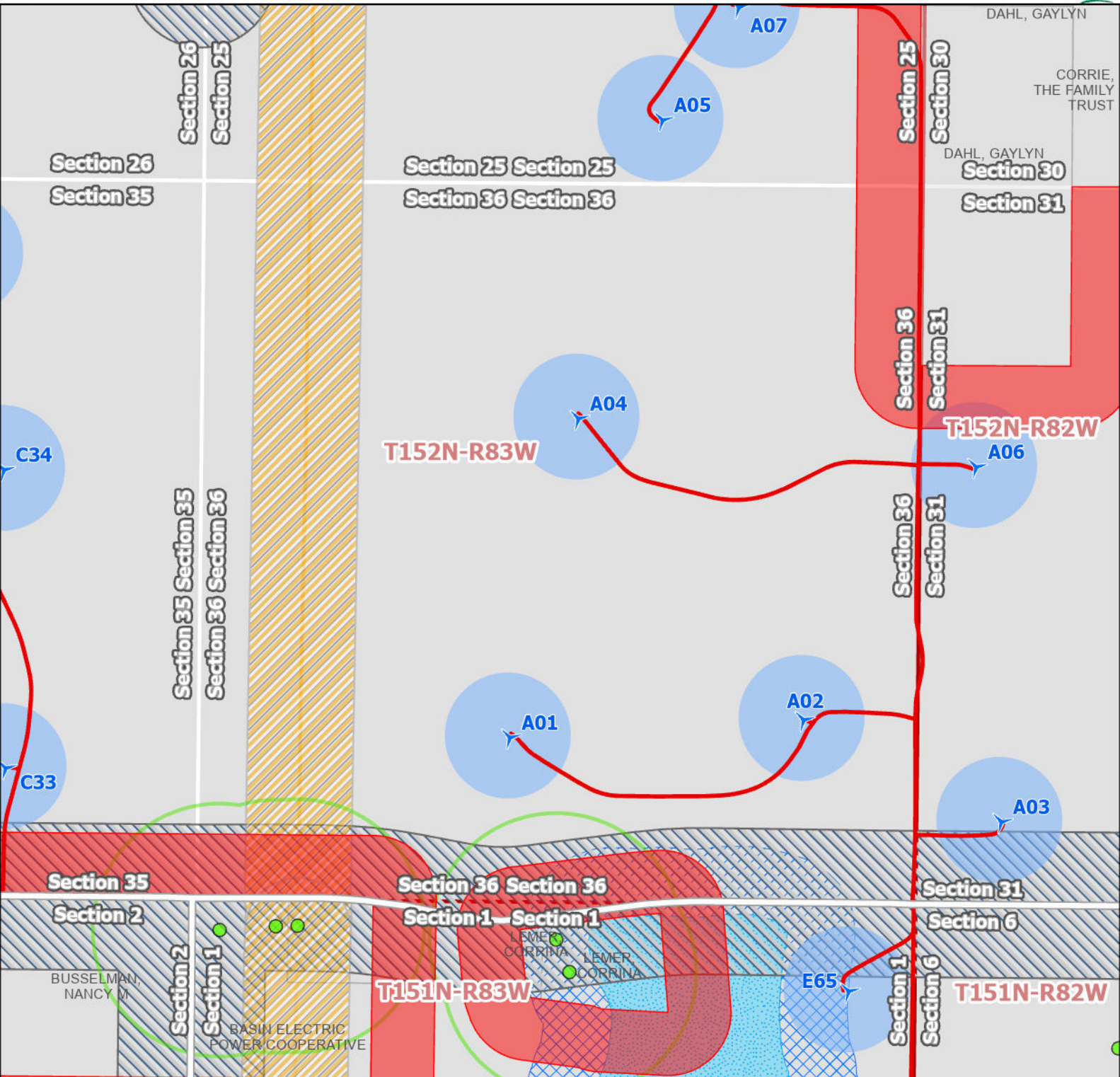




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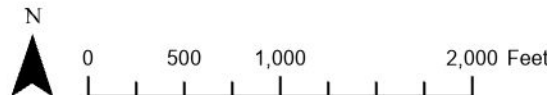
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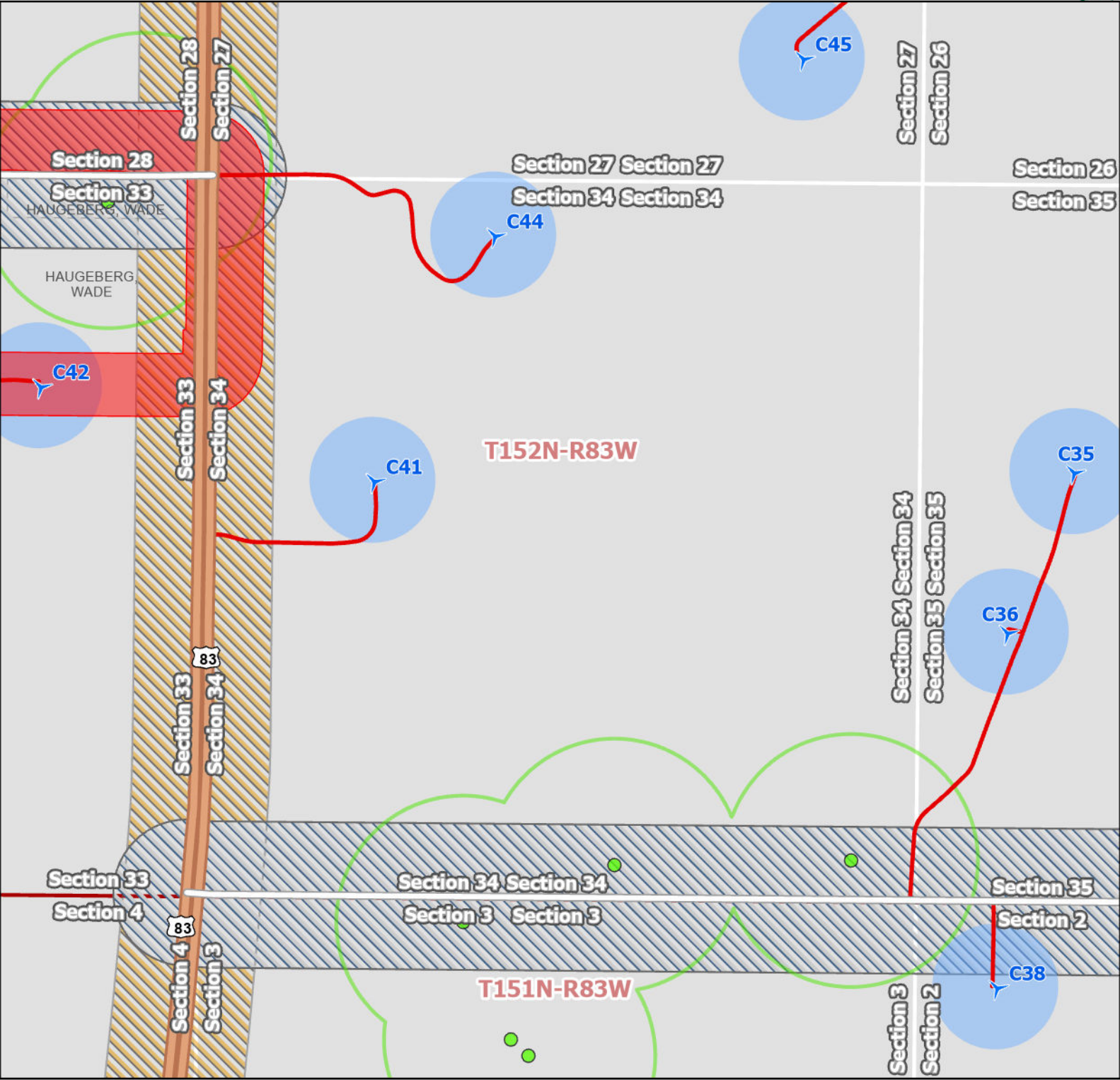
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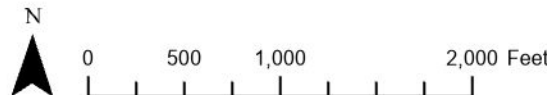


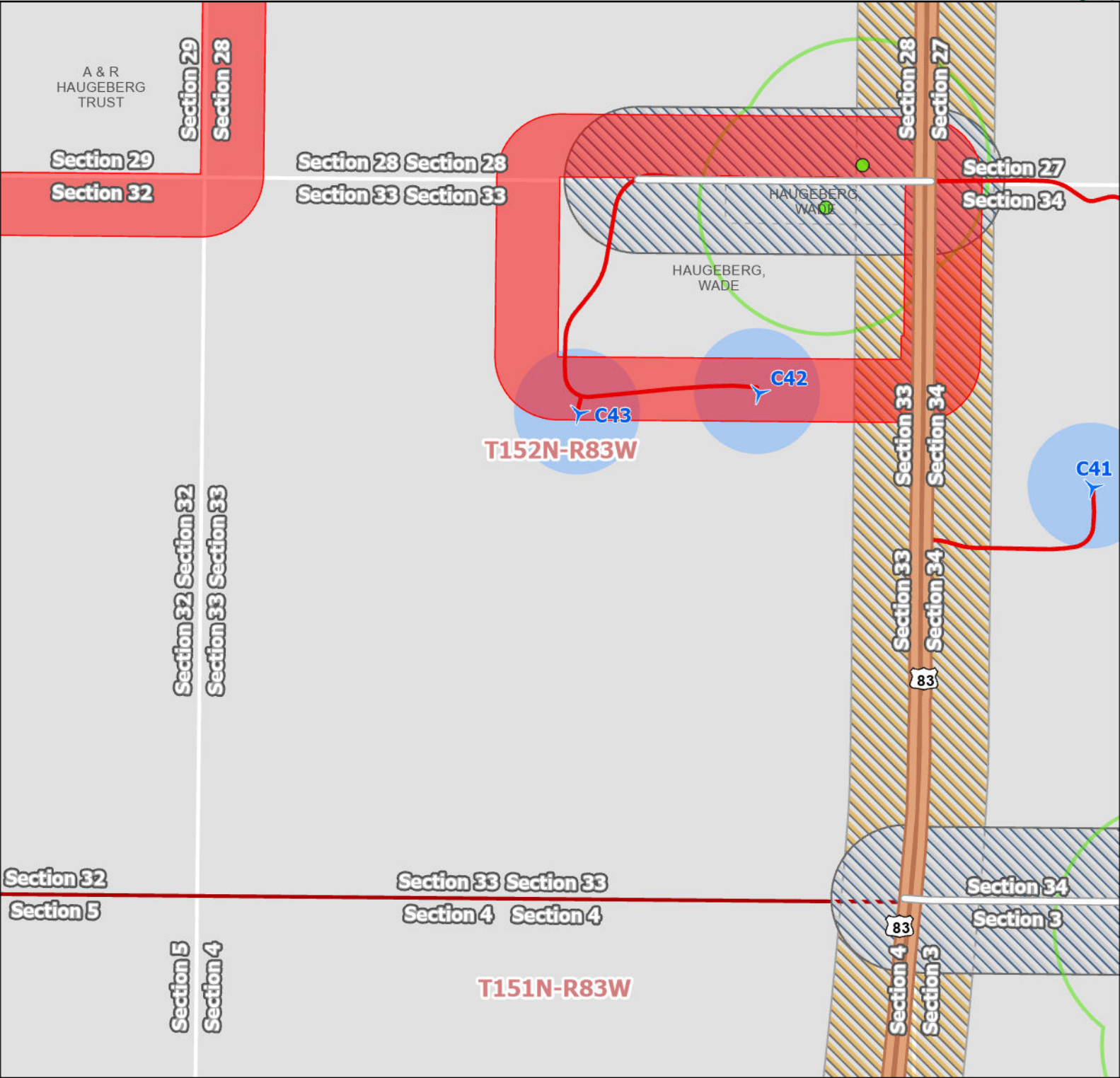
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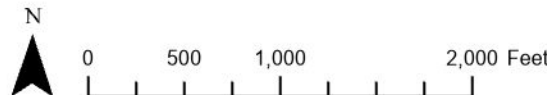
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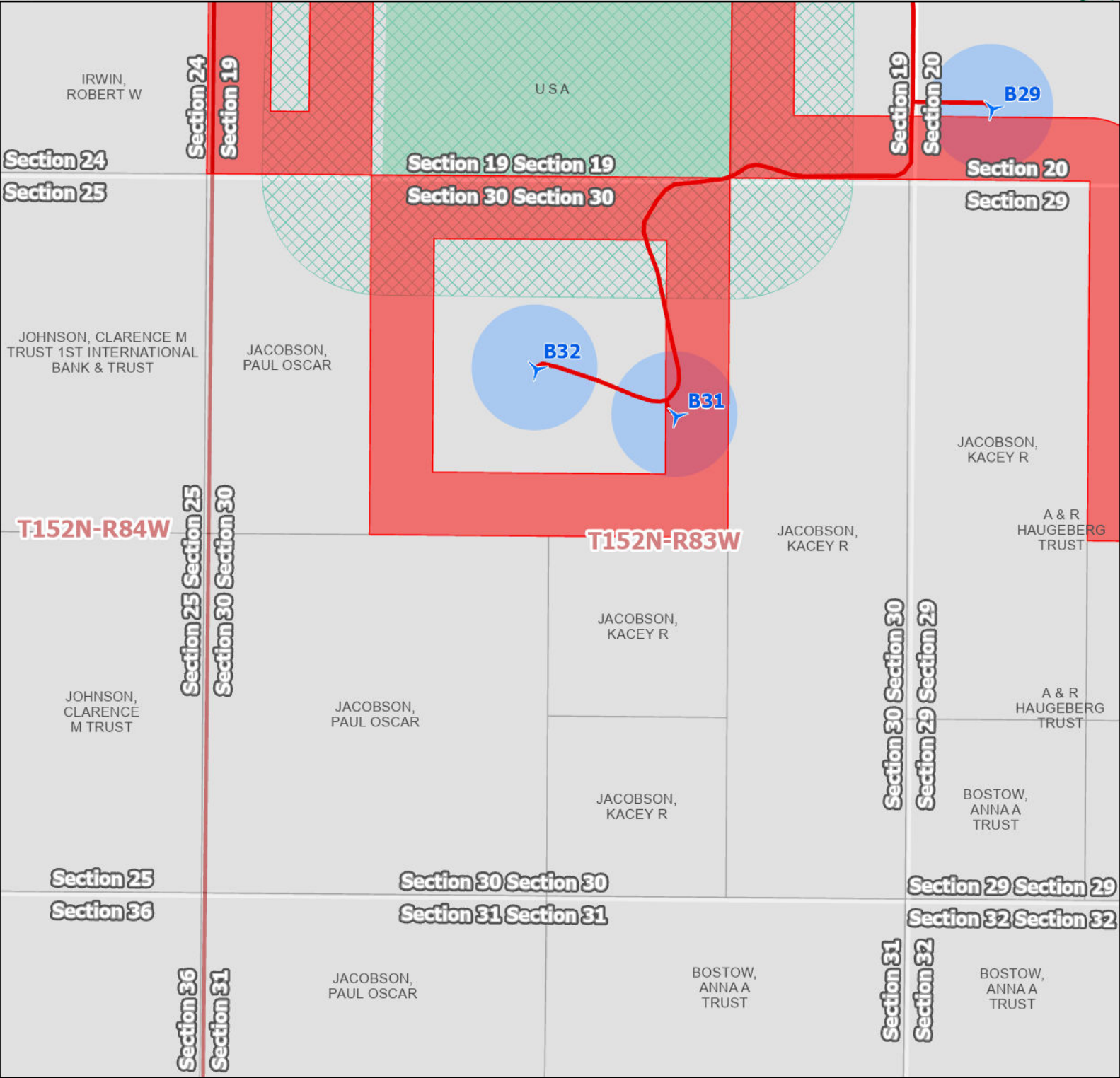




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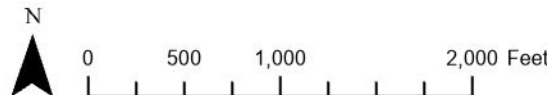
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| Occupied Residence | U.S. Highway | Non-Participating Landowner Property Line Setback | Fish and Wildlife Service | Participating Landowners |
| ICBM Sites | State Highway | 1200' ICBM Site Buffer | Fish and Wildlife Service Setback (WPA) | Townships |
| Graded & Drained | Access Roads | 1.1x Turbine Height Setback | ≥ 50 acres Wetlands | Sections |
| Gravel | Existing 115-kV Transmission | State and Federal Highway Setback | ≥ 50 acres Wetlands Setback | |
| Paved | | City and County Maintained Roads Setback | | |

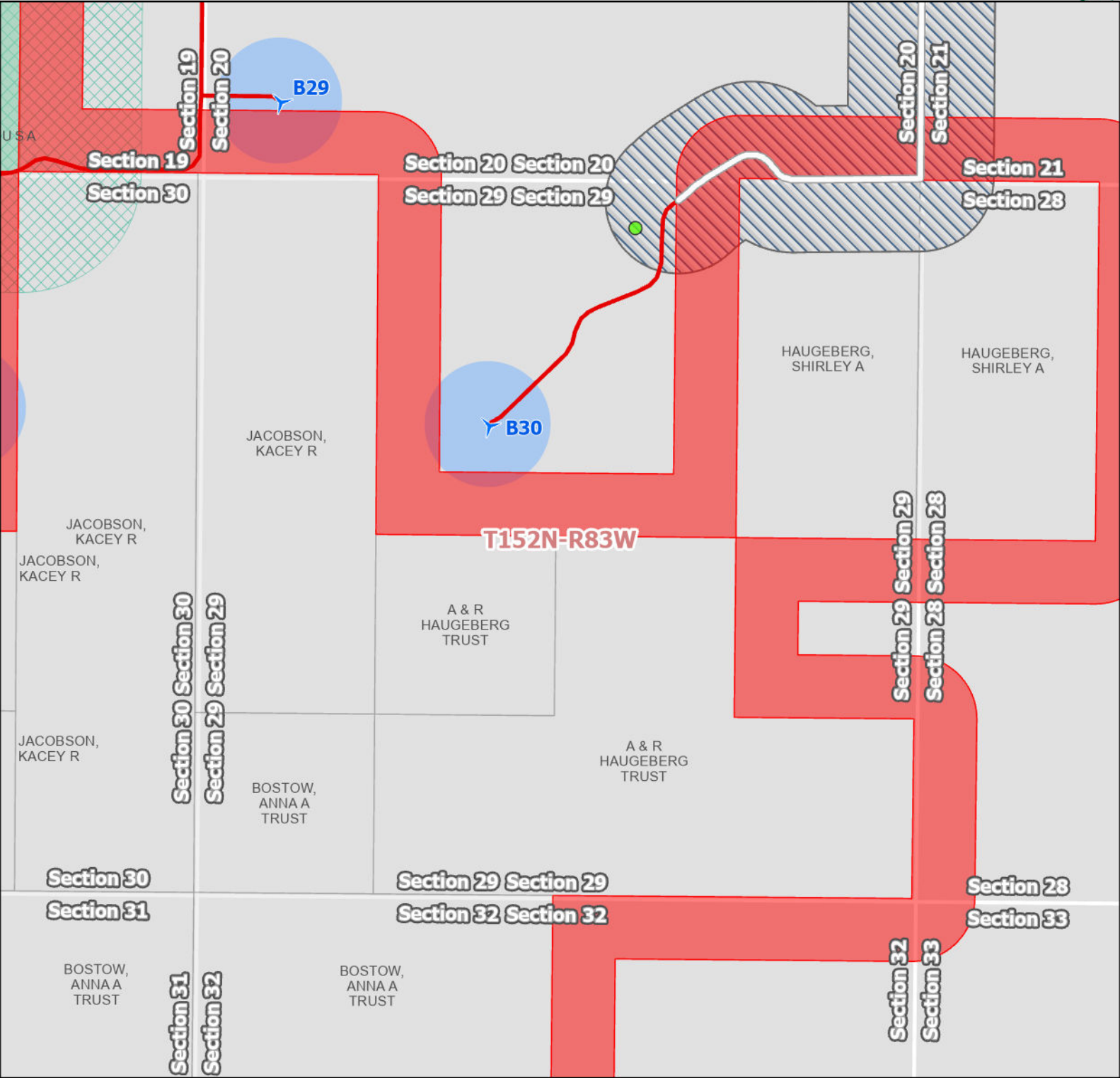




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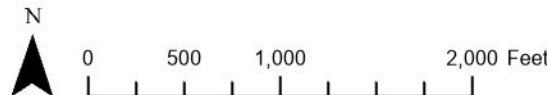
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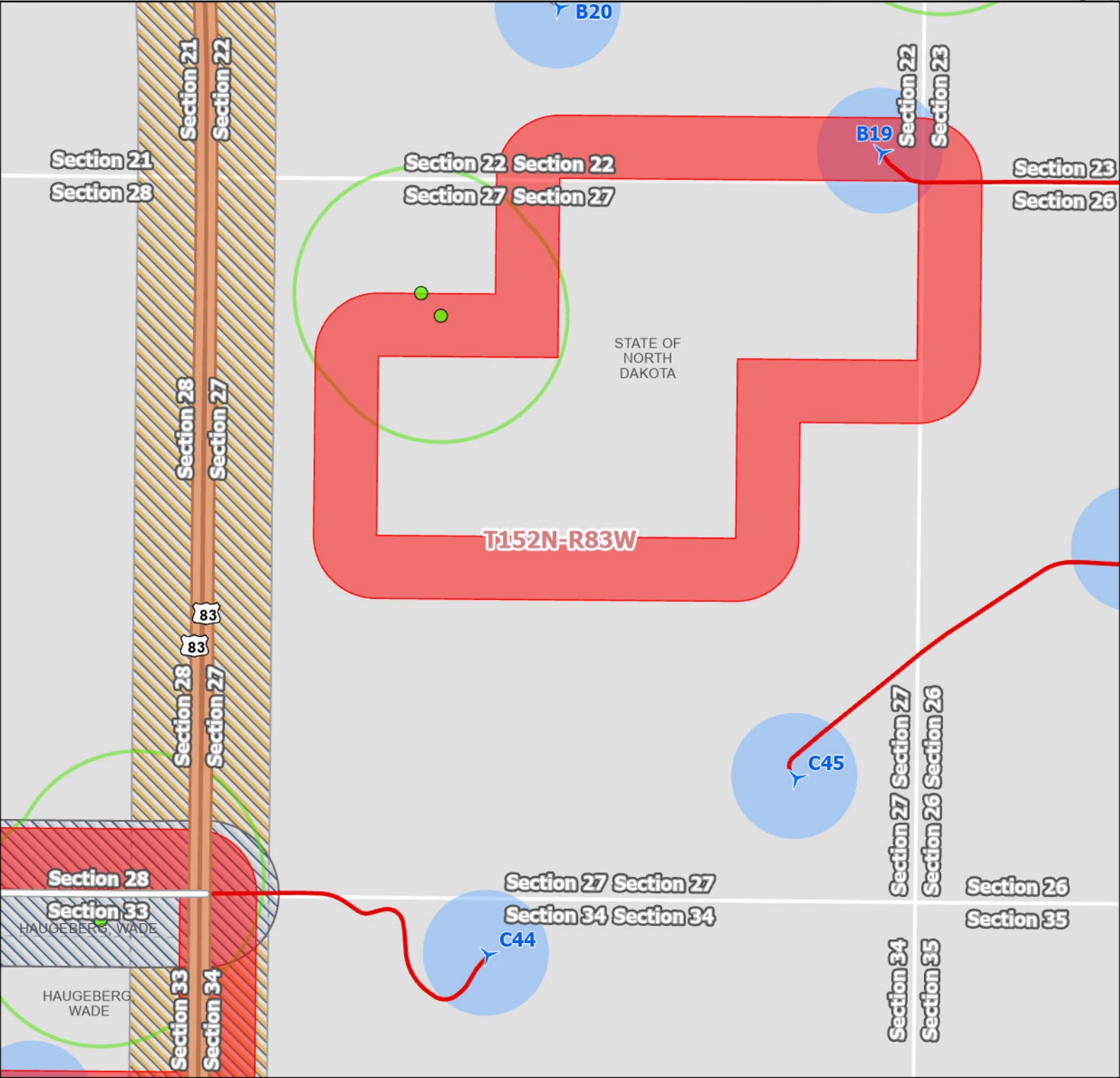




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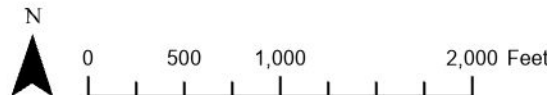
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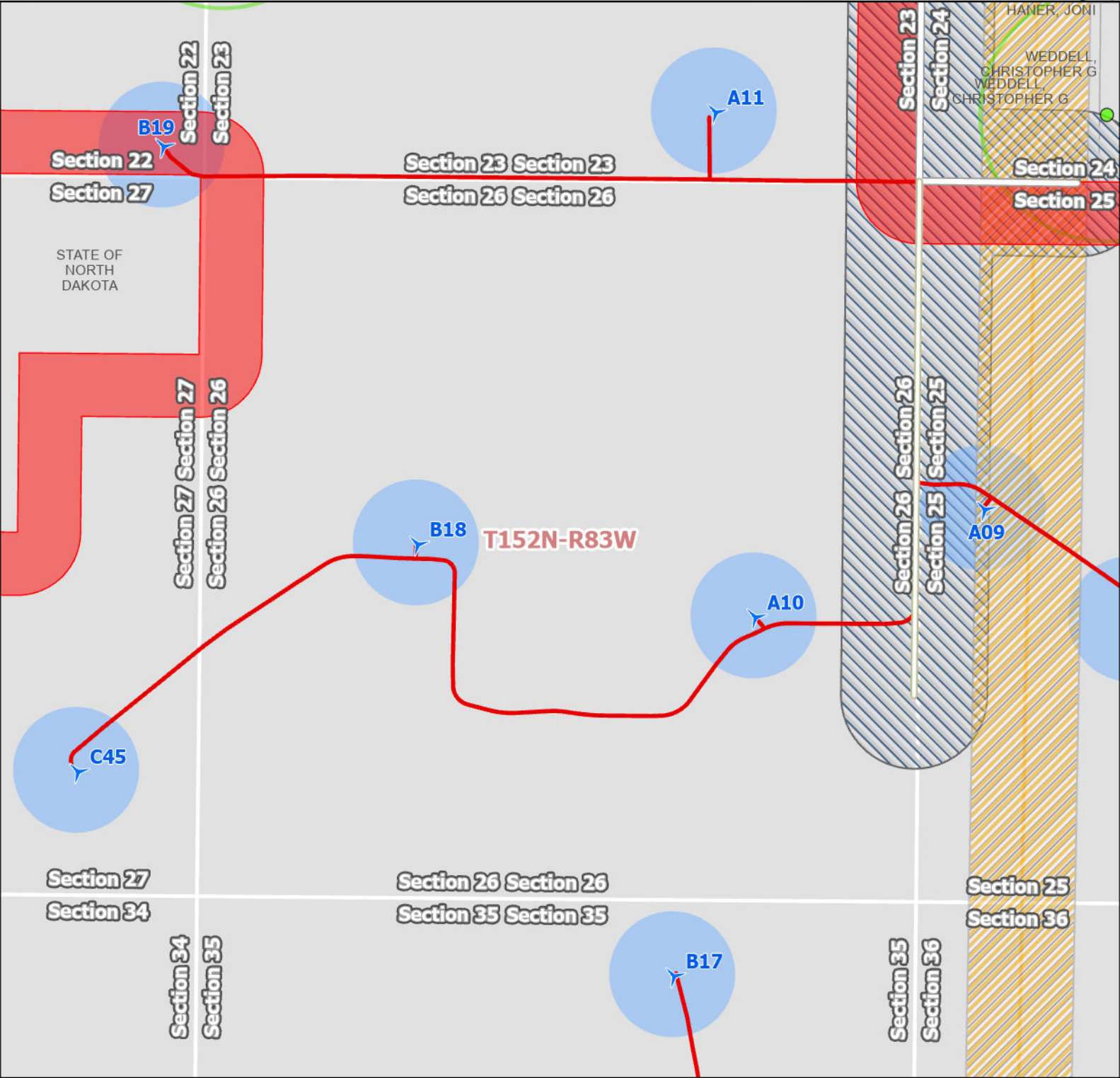




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| Paved | | City and County Maintained Roads Setback | | |





Map Features

- Turbine Locations

Occupied Residence

ICBM Sites

Graded & Drained

Gravel

Paved
- Interstate

U.S. Highway

State Highway

Access Roads

Existing 115-kV Transmission
- 3x Turbine Height Rural Residences Setback

Non-Participating Landowner Property Line Setback

1200' ICBM Site Buffer

1.1x Turbine Height Setback

State and Federal Highway Setback

City and County Maintained Roads Setback
- Existing 115-kV Transmission Line ROW (100ft)

Fish and Wildlife Service

Fish and Wildlife Service Setback (WPA)

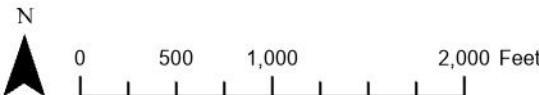
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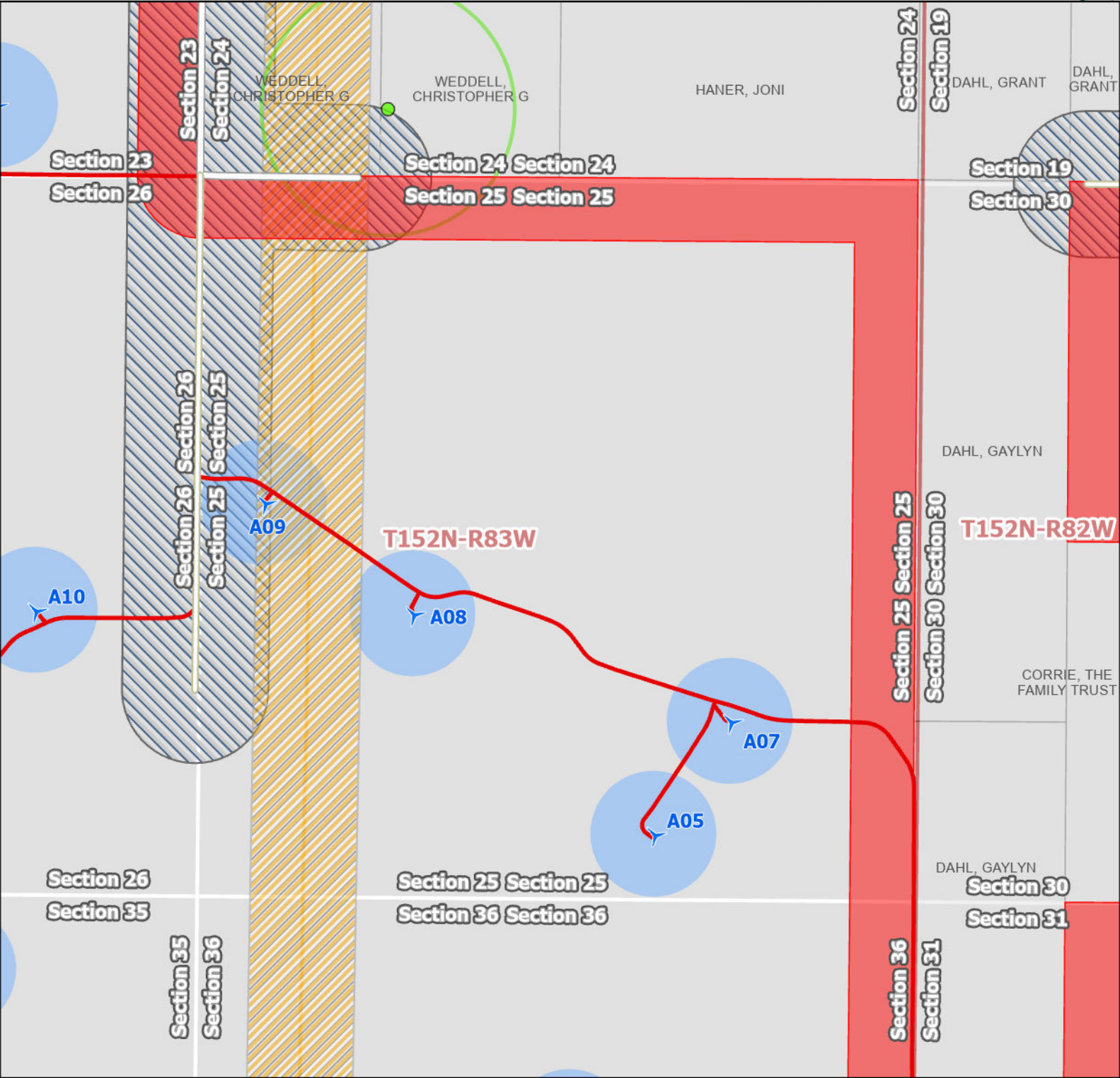
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- Non-Participating Landowners

Participating Landowners

Townships

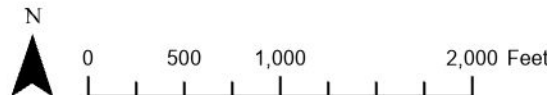
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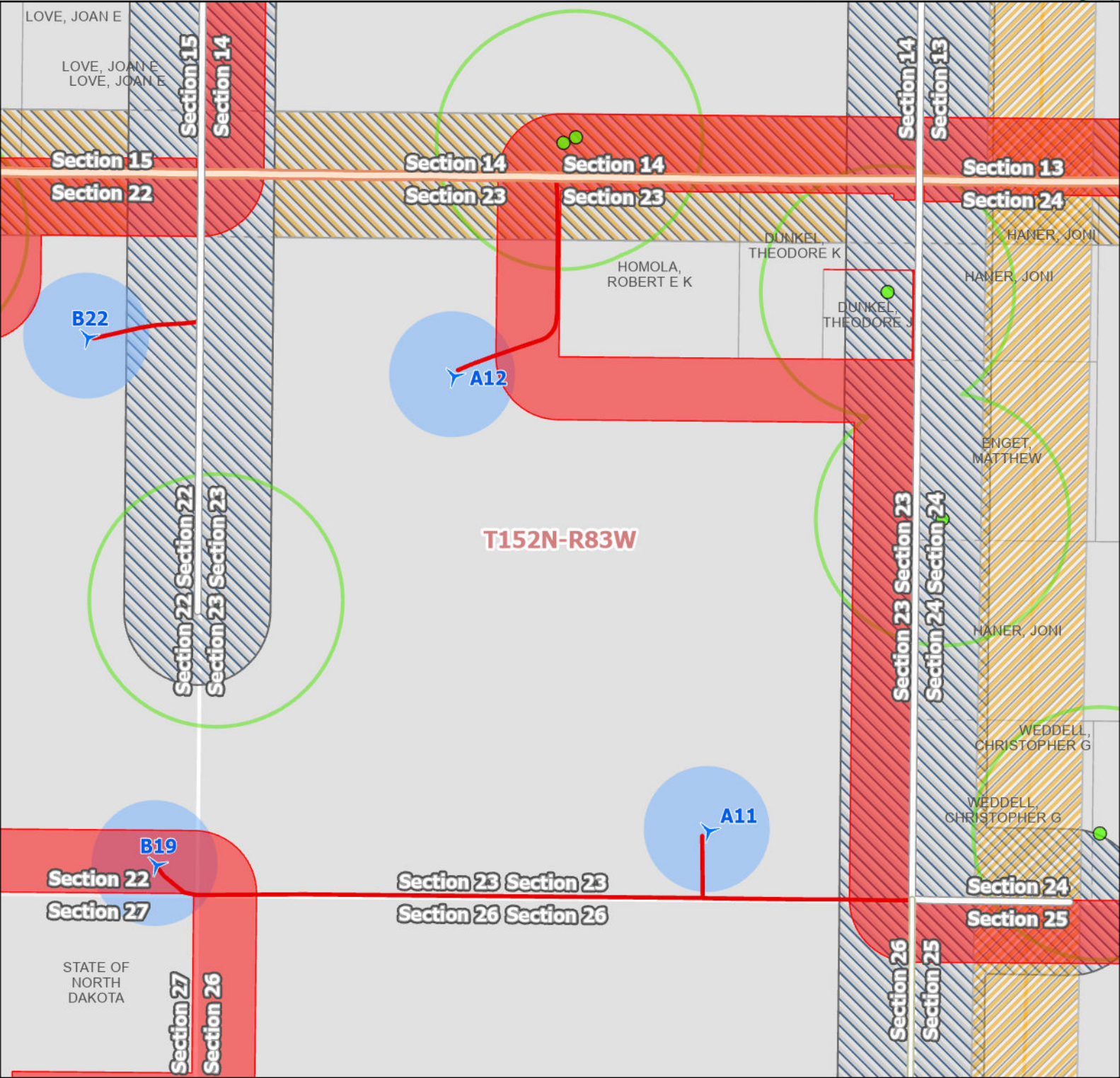




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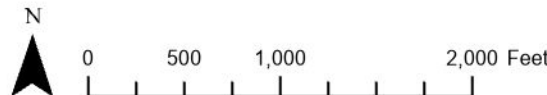
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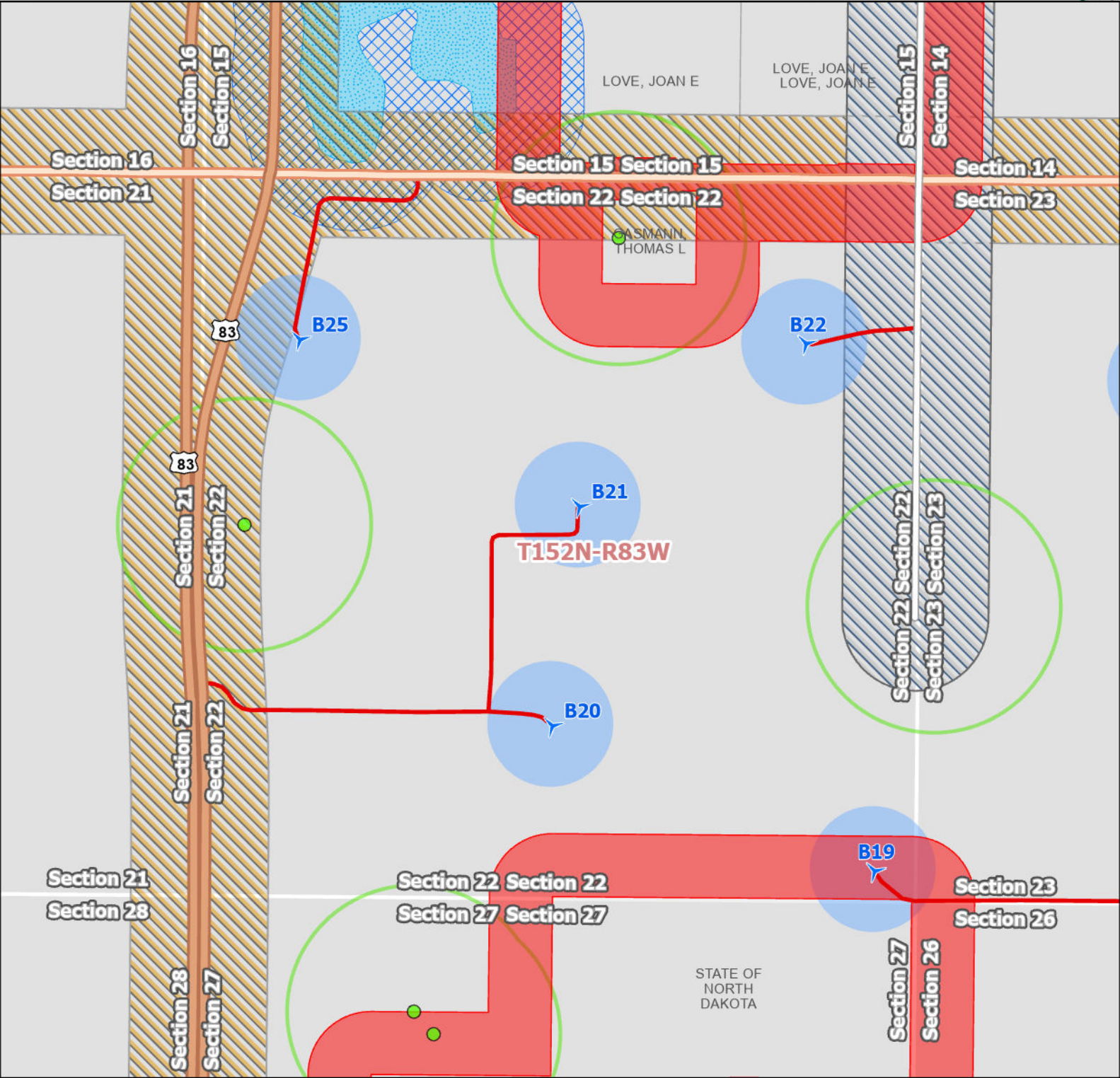




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| Paved | | City and County Maintained Roads Setback | | |





Map Features

- Turbine Locations

Occupied Residence

ICBM Sites

Graded & Drained

Gravel

Paved
- Interstate

U.S. Highway

State Highway

Access Roads

Existing 115-kV Transmission
- 3x Turbine Height Rural Residences Setback

Non-Participating Landowner Property Line Setback

1200' ICBM Site Buffer

1.1x Turbine Height Setback

State and Federal Highway Setback

City and County Maintained Roads Setback
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Fish and Wildlife Service Setback (WPA)

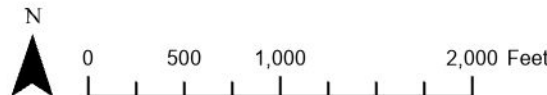
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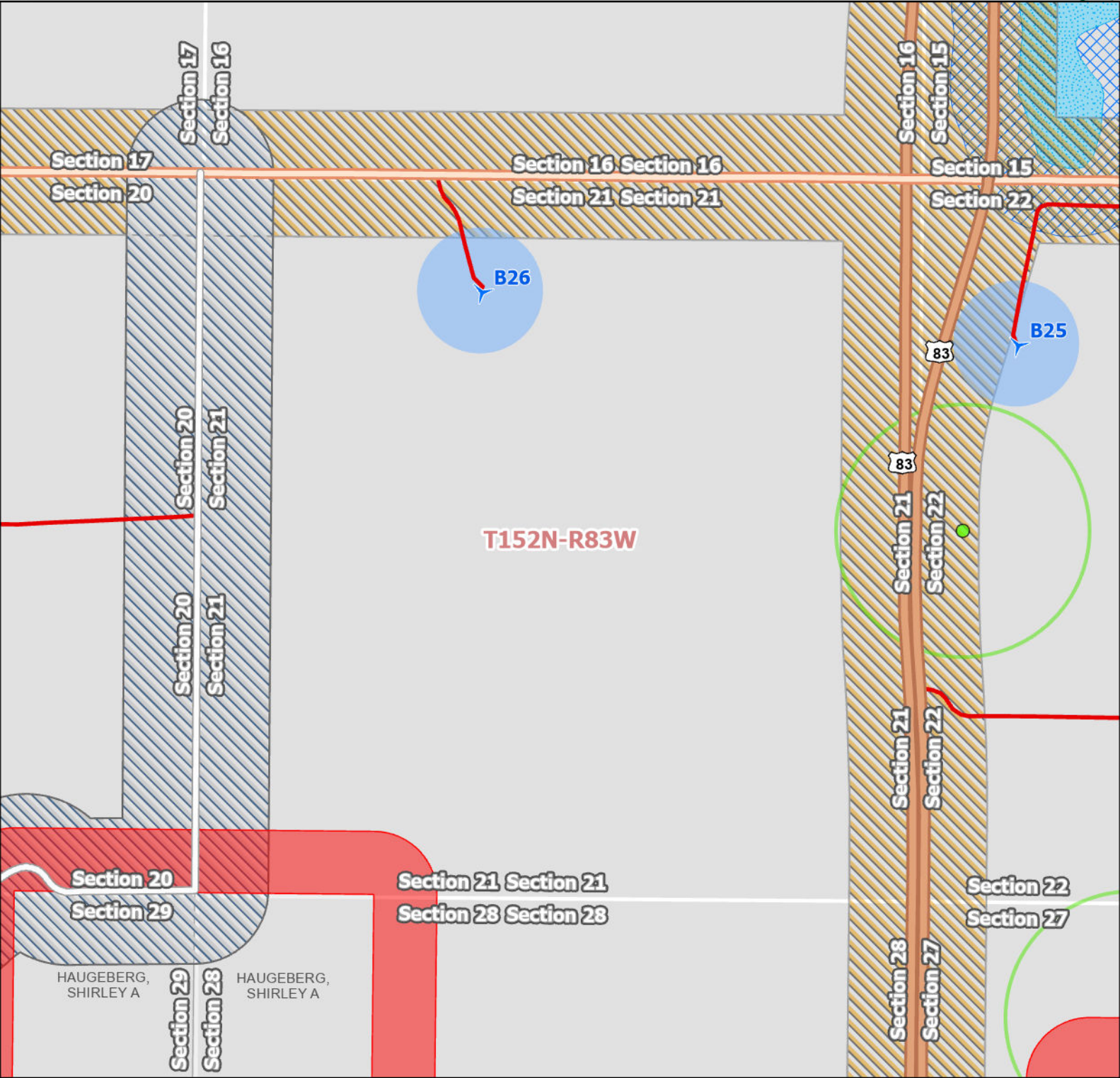
≥ 50 acres Wetlands Setback
- Non-Participating Landowners

Participating Landowners

Townships

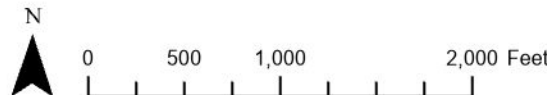
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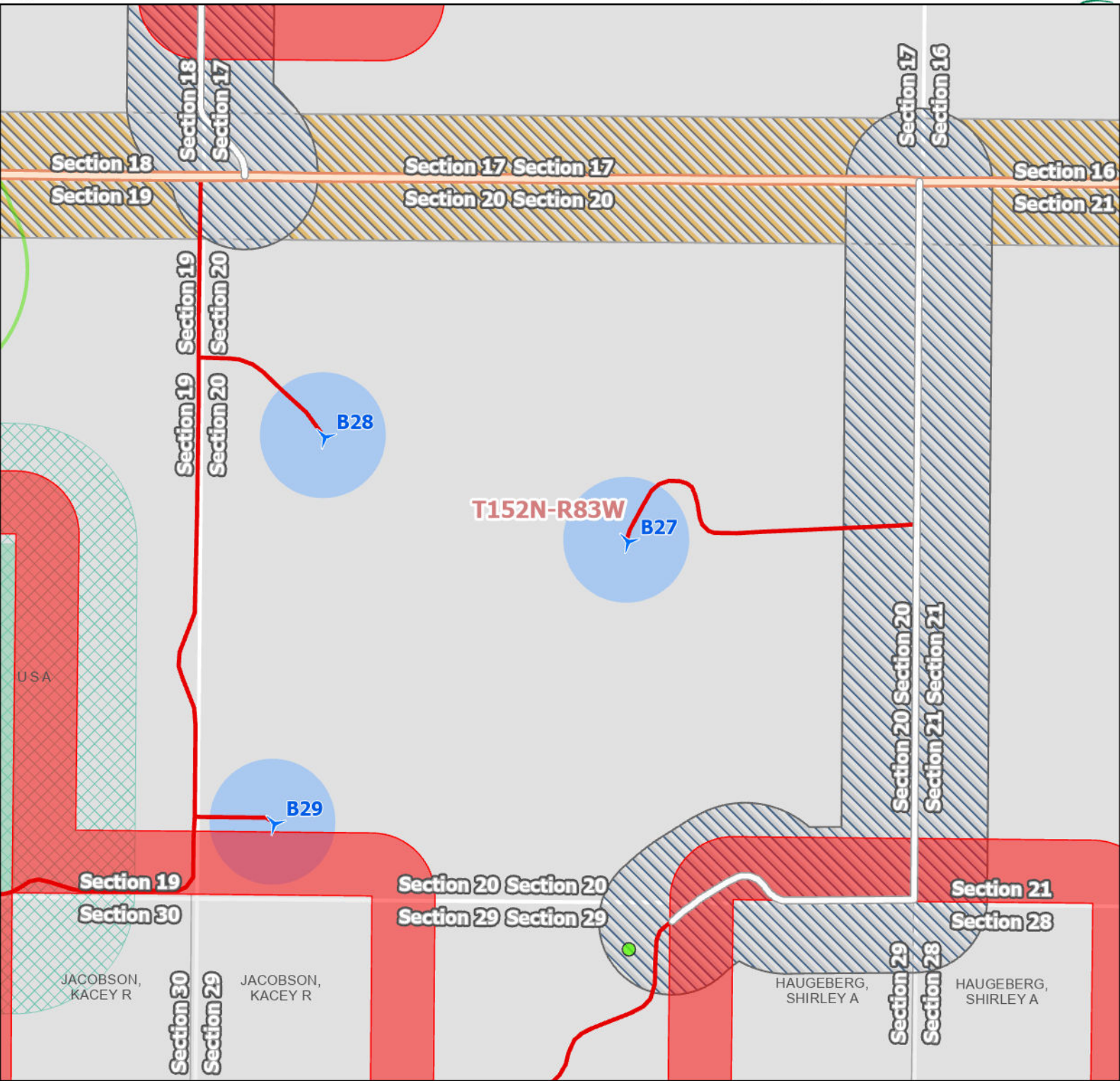




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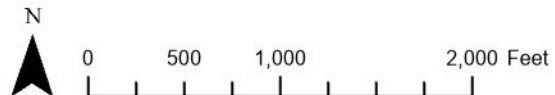
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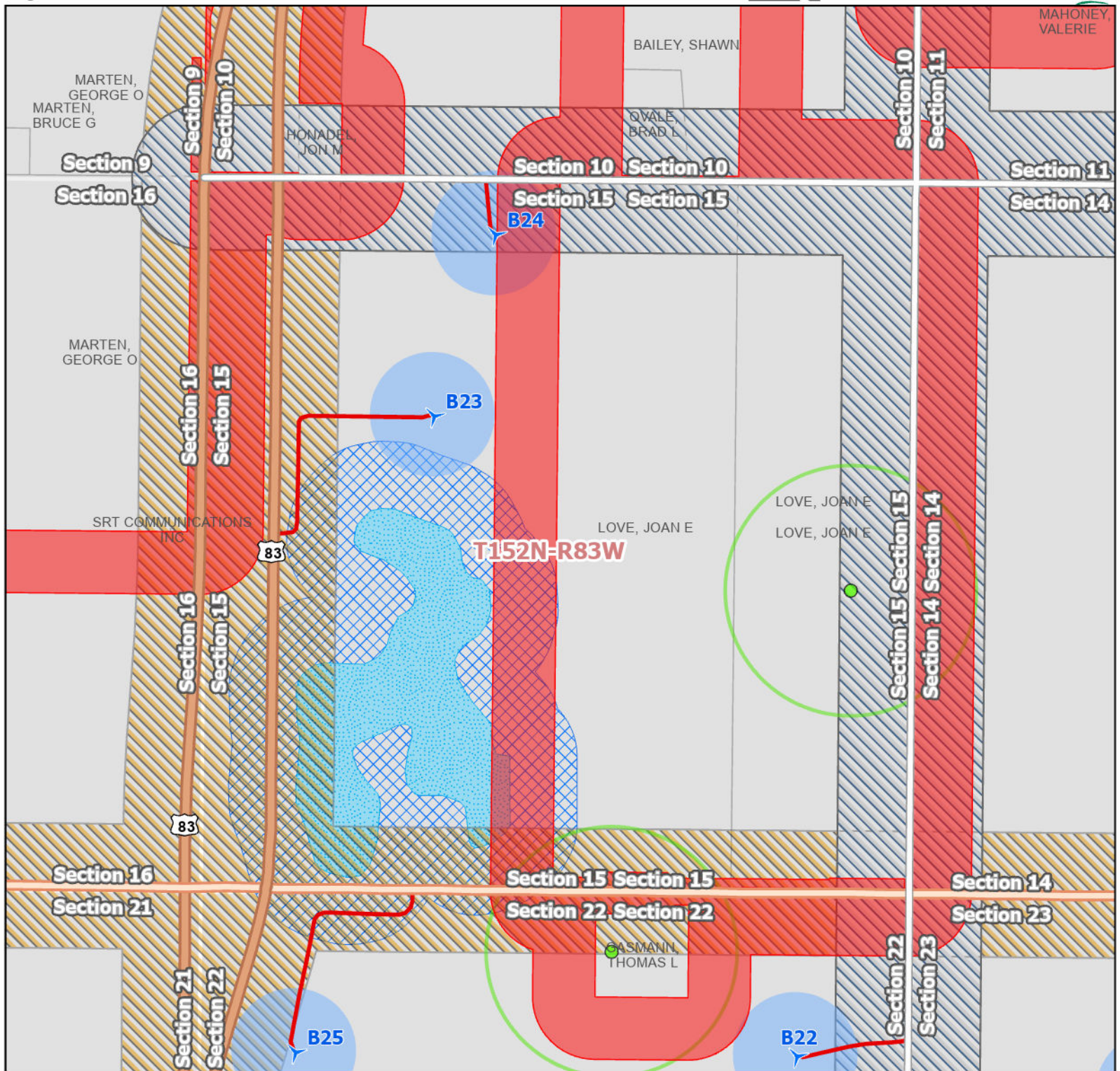




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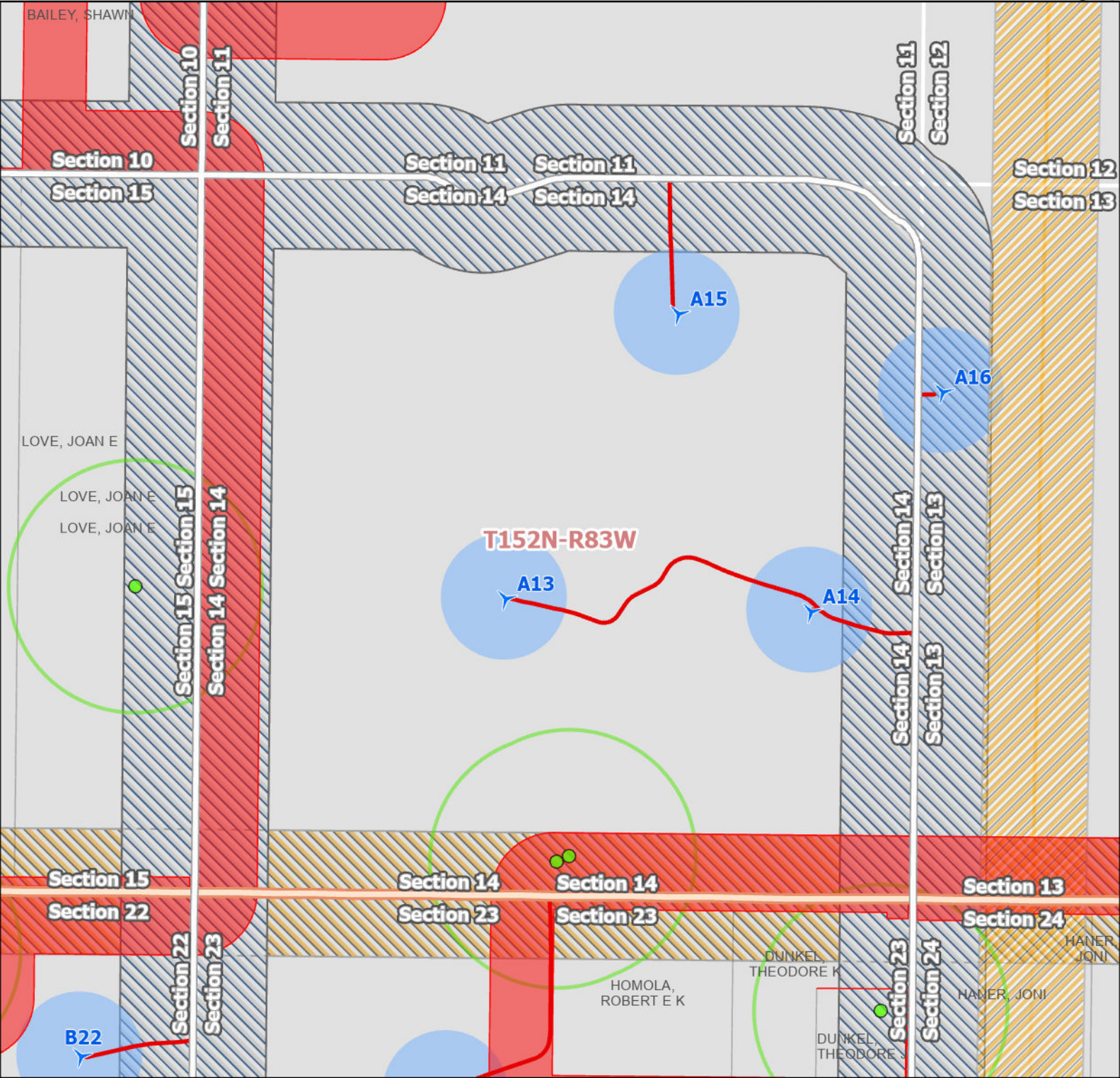


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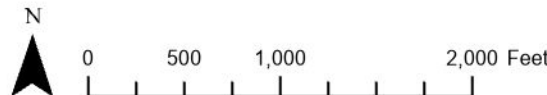
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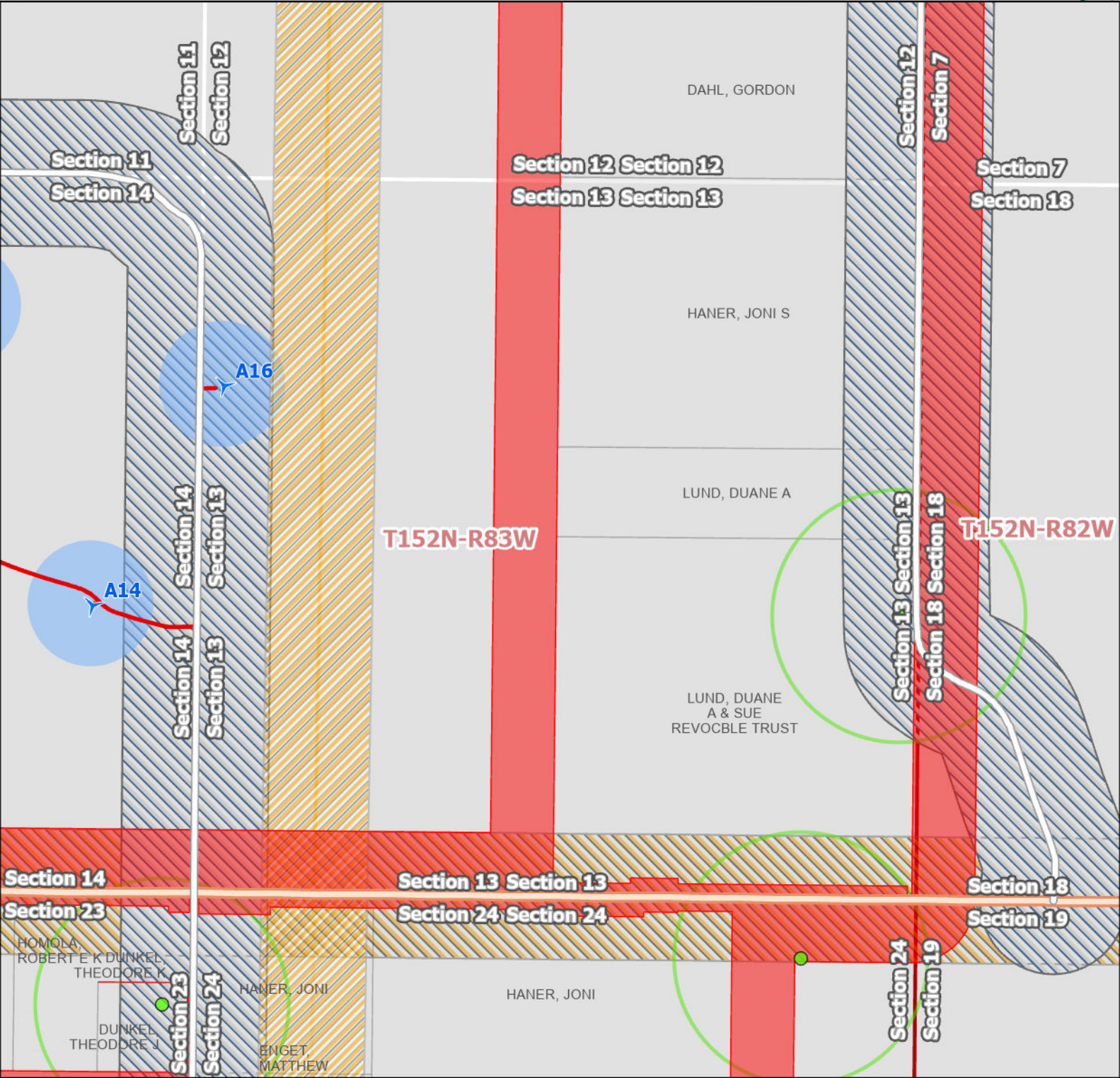
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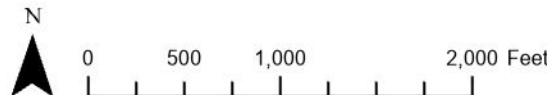
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Appendix A



BASIN ELECTRIC POWER COOPERATIVE

Sound Study

Basin Prairie Winds Project – North Dakota

Project No. 195615

Revision 2

April 16, 2026



Contents

Disclaimer	i
1.0 Introduction.....	1-1
2.0 Background Information.....	2-1
2.1 Acoustic Terminology.....	2-1
2.2 Wind Turbine Sound Characteristics	2-2
3.0 Sound Modeling.....	3-1
3.1 Model Inputs and Settings	3-1
3.1.1 Project Layout	3-1
3.1.2 Receptors	3-1
3.1.3 ANSI / ACP 111-1 (2022).....	3-1
3.1.4 Terrain	3-2
3.1.5 Sound Propagation and Directivity.....	3-2
3.1.6 Atmospheric Conditions	3-2
3.1.7 Wind Turbine Sound Emission Data	3-3
3.2 Acoustic Modeling Results	3-3
4.0 Conclusion.....	4-1
Appendix A – Turbine Locations	
Appendix B – Sound Level Results by Receptor	
Appendix C – Modeled Sound Contours	

Tables

Table 1-1: Wind Turbine Generator Properties.....	1-1
Table 2-1: Typical Sound Pressure Levels Associated with Common Sound Sources.....	2-2
Table 3-1: ANSI / ACP 111-1 (2022) Modeling Parameters	3-2
Table 3-2: Maximum Wind Turbine Sound Power Levels (L _{WA})	3-3



List of Abbreviations

Abbreviation	Term/Phrase/Name
ACP	American Clean Power Association
ANSI	American National Standards Institute
CadnaA	Computer Aided Noise Abatement
dB	decibel
dBA	A-weighted decibels
Developer	Basin Electric Power Cooperative
GE	General Electric
Hz	hertz
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
L _{eq}	equivalent sound level
Project	Basin Prairie Wind Project
Sound Study	acoustic analysis for the Project
WTG	Wind Turbine Generator

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1.0 Introduction

Burns & McDonnell was retained by Basin Electric Power Cooperative (“Developer”) to conduct an acoustic analysis (“Sound Study”) for the Basin Prairie Wind Project (“Project”) wind turbine repowering. The Project is in Ward County, North Dakota, south of Minot. The existing wind farm includes 80 General Electric (“GE”) 1.5 SL/SLE wind turbine generators (“WTG”). This wind farm is proposed to be repowered with GE 1.6-97 WTGs. The wind turbine properties are shown in Table 1-1.

Table 1-1: Wind Turbine Generator Properties

Project	Turbine Generator Manufacturer	Turbine Generator Model	Rotor Diameter (meters)	Hub Height (meters)	Turbine Abbreviation in Report
Existing	GE	1.5 SL/SLE	77	80	GE 1.5 SL/SLE
Repower	GE	1.6-97	97	80	GE 1.6-97

The objective of this Sound Study is to compare the expected sound impacts generated by the existing and repowered Project wind turbine configurations on neighboring residences. The following sections describe the Sound Study completed for the Project.

2.0 Background Information

2.1 Acoustic Terminology

The term “sound level” is often used to describe two different sound characteristics: sound power and sound pressure. Every source that produces sound has a sound power level. The sound power level is the acoustic energy emitted by a sound source and is an absolute number that is not affected by the surrounding environment. The acoustic energy produced by a source propagates through media as pressure fluctuations. These pressure fluctuations, also called sound pressure, are what human ears hear and microphones measure.

Sound is physically characterized by amplitude and frequency. The amplitude of sound is measured in decibels (“dB”) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 microPascals). The reference sound pressure corresponds to the typical threshold of human hearing. To the average listener, a 3-dB change in a continuous broadband sound is generally considered “just barely perceptible”; a 5-dB change is generally considered “clearly noticeable”; and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

Sound waves can occur at many different frequencies, which correspond to the sound’s wavelength. Frequency is measured in hertz (“Hz”), which is the number of wave cycles per second that occur. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the lower and higher frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels, or dBA. For reference, the A-weighted sound pressure level and subjective loudness associated with some common sound sources are listed in Table 2-1.

Sound in the environment is constantly fluctuating, as when a car drives by, a dog barks, or a plane passes overhead. Therefore, sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound level. The exceedance sound level is the sound level exceeded during “x” percent of the sampling period and is also referred to as a statistical sound level. The equivalent-continuous sound level (“ L_{eq} ”) is the logarithmic average of the varying sound over a given period and is the most common metric used to describe sound.

Table 2-1: Typical Sound Pressure Levels Associated with Common Sound Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment
140	Deafening	Jet aircraft at 75 feet
130	Threshold of pain	Jet aircraft during takeoff at 300 feet
120	Threshold of feeling	Elevated train
110	Very loud	Jet flyover at 1,000 feet
100		Motorcycle at 25 feet
90	Moderately loud	Propeller plane flyover at 1,000 feet
80		Diesel truck (40 mph) at 50 feet
70	Loud	B-757 cabin during flight
60	Moderate	Air-conditioner condenser at 15 feet
50	Quiet	Private office
40		Farm field with light breeze, birdcalls
30	Very quiet	Quiet residential neighborhood
20		Rustling leaves
10	Just audible	--
0	Threshold of hearing	--

Source: Adapted from *Architectural Acoustics*, M. David Egan, 1988, and *Architectural Graphic Standards*, Ramsey and Sleeper, 1994.

2.2 Wind Turbine Sound Characteristics

The sound commonly associated with a wind turbine is described as a rhythmic “whoosh” caused by aerodynamic processes. This sound is created as air flow interacts with the surface of rotor blades. As air flows over the rotor blade, turbulent eddies form in the surface boundary layer and wake of the blade. These eddies are where most of the “whooshing” sound is formed. Additional sound is generated from vortex shedding produced by the tip of the rotor blade. Air flowing past the rotor tip creates alternating low-pressure vortices on the downstream side of the tip causing sound generation to occur. Older wind turbines, built with rotors which operate downwind of the tower (downwind turbines), often have higher aerodynamic impulse sound levels. This is caused by the interaction between the aerodynamic lift created on the rotor blades and the turbulent wake vortices produced by the tower. Modern wind turbine rotors are mostly built to operate upwind of the tower (upwind turbines). Upwind turbines are not impacted by wake vortices generated by the tower and, therefore, overall sound levels can be as much as 10 dBA less for similarly sized turbines. The rhythmic fluctuations of the overall sound level are less perceivable farther from the turbine. Additionally, multiple turbines operating at the same time will create the whooshing sound at different times. These non-synchronized sounds will blend to create a more constant sound to an observer at most distances from the turbines. Another phenomenon that reduces perceivable noise from turbines is the wind itself. Higher wind speed produces noise that tends to mask (or drown out) the sounds created by wind turbines.

Advancement in wind turbine technology has reduced pure tonal emissions of modern wind turbines. Manufacturers have reduced distinct tonal sounds by reshaping turbine blades and adjusting the angle at which air contacts the blade. Pitching technology allows the angle of the blade to adjust when the maximum rotational speed is achieved, which allows the turbine to maintain a constant rotational velocity. Therefore, sound emission levels remain constant as the velocity remains the same.

Wind turbines can create noise in other ways as well. Wind turbines have a nacelle where the mechanical portions of the turbine are housed. The current generation of wind turbines use multiple techniques to reduce the noise from this portion of the turbine: vibration isolating mounts, special gears, and acoustic insulation. In general, all moving parts and the housing of the current generation wind turbines have been designed to minimize the noise they generate.

3.0 Sound Modeling

Industry-accepted sound modeling software, CadnaA (Version 2026, published by DataKustik, Ltd., Munich, Germany) was used to estimate expected sound pressure levels from the Project. The model inputs and assumptions are described in this section.

3.1 Model Inputs and Settings

The CadnaA program is a scaled, three-dimensional program that considers air absorption, terrain, ground absorption, and ground reflection for each piece of noise-emitting equipment and predicts downwind sound pressure levels. The model calculates sound propagation based on International Organization for Standardization (“ISO”) 9613-2:2024, General Method of Calculation. ISO 9613, and therefore CadnaA, assesses the sound pressure levels based on the octave-band center-frequency range from 31.5 to 8,000 Hz. Predicted compliance with the regulations for all turbines operating implies predicted compliance for any combination of the turbines operating.

3.1.1 Project Layout

The Project will retain the location of the 80 existing GE 1.5 SL/SLE turbines. The turbine locations for the Project layout are listed in Table A-1 of Appendix A.

3.1.2 Receptors

A quantity of 248 receptors were modeled surrounding the Project. The Developer-provided coordinates of each receptor are provided in Table B-1 of Appendix B. Burns & McDonnell did not provide an independent verification of the location or occupied status of these receptors.

3.1.3 ANSI / ACP 111-1 (2022)

To standardize the calculation methodology for wind turbine sound levels, the American Clean Power Association (“ACP”) developed a standard, recognized by the American National Standards Institute (“ANSI”), which outlines preferred modeling methods for predicting future sound levels from wind turbine generating projects. These methods, along with the wind turbine model-specific sound power levels (determined in accordance with International Electrotechnical Commission, IEC 61400-11), are to be used with ISO 9613 calculations and are expected to yield a conservative, worst-case condition with wind turbines operating at their highest rated sound power levels.

The standard, ANSI / ACP 111-1-2022, provides two options for modeling parameters which are to be implemented into the modeling software/calculations. Both options are expected to yield nearly identical results, per the standard. For this study, Option 1 modeling parameters have been selected as provided in Table 3-1.

Table 3-1: ANSI / ACP 111-1 (2022) Modeling Parameters

Model Parameter	Value
Ground Factor (G)	0
Reflections	2
Receptor Height	1.5 meters
Turbine Source Height	Vendor Provided Hub-height
Model Adjustments	None
Temperature	50 °F
Humidity	70%

A point source located at the specific hub height of each proposed turbine location was used to model sound emissions from each of the wind turbines, per direction of ANSI / ACP 111-1. The sound levels shown in the table above were applied, as appropriate, to each point source. Each residence was modeled as a receiver at a height of 1.5 meters (5 feet) above ground level.

3.1.4 Terrain

Terrain and attenuation from ground absorption can have a significant impact on sound transmission. U.S. Geological Survey Digital Elevation Model contours were imported into the model to account for topographic variations around the Project. The contours were overlaid onto high-resolution, digital ortho imagery obtained from the U.S. Department of Agriculture to visually confirm proper contour positioning. The terrain around the proposed Project is mostly rural with few minor changes in elevation.

3.1.5 Sound Propagation and Directivity

CadnaA calculates downwind sound propagation using ISO 9613 standards, which use omni-directional downwind sound propagation and worst-case directivity factors. Essentially, the model assumes that each turbine always propagates its maximum sound level in all directions. This will likely over-predict upwind sound levels.

3.1.6 Atmospheric Conditions

Atmospheric conditions were based on program defaults. Layers in the atmosphere often form where temperature increases with height (temperature inversions). Sound waves refract due to the temperature inversion causing sound to bend toward the surface of the earth. This process can increase sound levels at the surface, especially if the height of the inversion begins near the surface of the earth. Temperature inversions tend to occur mainly at night when winds are light or calm, usually when wind turbines are not operating. ISO 9613-2, and therefore CadnaA, calculates the downwind sound in a manner which is favorable for propagation (worst-case scenario) by assuming a well-developed, moderate ground-based temperature inversion that can occur at night. Therefore, predicted sound levels tend to be higher than would likely occur.

The atmosphere does not flow smoothly and tends to have swirls and eddies, also known as turbulence. Turbulence is generally formed by two processes: thermal turbulence and mechanical turbulence. Thermal turbulence is caused by the interaction of heated air rapidly rising from the heated earth's surface with cooler air descending from the atmosphere. Mechanical turbulence is caused by moving air interacting with objects such as trees, buildings, and wind turbines. Turbulent eddies generated by wind turbines and other objects

can cause sound waves to scatter, which in turn, provides sound attenuation between the wind turbine and the receiver. The acoustic model assumes laminar air flow, which minimizes sound attenuation that would occur in a realistic nonhomogeneous atmosphere. This assumption also causes the predicted sound levels to be higher than would likely occur.

3.1.7 Wind Turbine Sound Emission Data

Modeling was completed for the Project using wind turbine heights and acoustic emissions for each respective turbine type. The expected loudest sound power levels were provided by the turbine vendor. The sound emissions data supplied was developed using the International Electrotechnical Commission (“IEC”) 61400-11 acoustic measurement standards. IEC 61400-11 is used to determine the max sound power level of the overall turbine assembly. Sound power levels were provided by the manufacturer at various wind speeds for a height of 10 meters (32.8 feet) above grade. The apparent sound power levels provided by the vendors are mean values of representative batches of turbines evaluated. The sound power levels used in the model are displayed in Table 3-2.

Table 3-2: Maximum Wind Turbine Sound Power Levels (L_{wA})

Equipment	Sound Level by Octave Band Frequency (Hz) (dBA)									Total Sound Level (dBA)
	31.5	63	125	250	500	1000	2000	4000	8000	
GE 1.5 SL/SLE	76	80	87	92	94	93	90	82.2	71	104
GE 1.6-97	72	82	89	92	96	99	98	91	72	108

A point source located at the specific hub height of each proposed turbine location was used to model sound emissions from each of the wind turbines. This approach is appropriate for simulating wind turbine noise emissions due to the large distances between the turbines and the receivers as compared to the dimensions of the wind turbines. The sound levels shown in the table above were applied, as appropriate, to each point source.

3.2 Acoustic Modeling Results

Project-generated sound pressure levels were calculated for the identified receivers in the CadnaA noise modeling program using the manufacturer-specified sound power levels at each octave-band frequency and the assumptions listed above. Noise modeling results have been demonstrated in previous studies to conservatively approximate real-life measured noise from a source when extraneous noises are not present.

Wind turbine locations and resulting sound impacts at the nearest identified residential receptors are provided in tabular form in Appendix A and Appendix B, respectively. Per the North Dakota Public Service Commission, there is a requirement that sound levels from wind energy conversion facilities should avoid exceeding 45 dBA within 100 feet of an inhabited residence or a community building. The Commission also notes that this avoidance criteria may be waived in writing by the owner of the occupied residence or the community building. The results provided in Appendix B for the repowered layout include a column identifying receptors that are predicted to exceed this avoidance criteria. Sound level contours for the existing and repowered Project WTGs are also shown in Figures C-1 and C-2 of Appendix C.

The GE 1.6-97 turbine has a higher total sound level than the GE 1.5 SL/SLE due to the higher sound levels in the upper frequencies (above 500 Hz). Each receptor is expected to experience a slight increase in sound from

the repowered configuration compared to the existing turbines. However, the model results for the repower configuration do not exceed a difference over the existing turbines of more than 3 dBA at any residential receptor.

4.0 Conclusion

Burns & McDonnell conducted a sound study for the Basin Prairie Wind Project to analyze the sound level impacts of replacing the existing GE 1.5 SL/SLE wind turbines with GE 1.6-97 turbines. A comparison of existing and repowered sound levels identified the sound level difference at each identified receptor between these two configurations.

Each GE turbine configuration was modeled at a hub height of 80 meters for the 80 WTG locations that currently exist. Sound pressure levels were predicted for the Project area using manufacturer-specified overall sound power levels for the wind turbines and guidance from the ANSI/ACP 111-1 wind turbine modeling standard to provide the loudest predicted sound levels from the modeled turbines to the neighboring identified residences. The model results for the repower configuration do not exceed a difference over the existing turbines of more than 3 dBA at any residential receptor. As noted in Section 2.1, a 3-dB change in a continuous broadband sound is generally considered just barely perceptible.

Appendix A – Turbine Locations

WIND TURBINE COORDINATES

Turbine Name	Easting [m]	Northing [m]	Hub Height [m]
A01	332,657	5,311,916	80
A02	333,316	5,311,942	80
A03	333,756	5,311,705	80
A04	332,824	5,312,628	80
A05	333,026	5,313,294	80
A06	333,715	5,312,502	80
A07	333,202	5,313,544	80
A08	332,495	5,313,799	80
A09	332,167	5,314,055	80
A10	331,647	5,313,824	80
A11	331,580	5,314,958	80
A12	331,029	5,315,990	80
A13	331,182	5,317,101	80
A14	331,866	5,317,059	80
A15	331,582	5,317,733	80
A16	332,171	5,317,546	80
B17	331,449	5,313,022	80
B18	330,893	5,314,002	80
B19	330,340	5,314,906	80
B20	329,623	5,315,246	80
B21	329,694	5,315,737	80
B22	330,210	5,316,093	80
B23	329,416	5,317,558	80
B24	329,563	5,317,966	80
B25	329,074	5,316,124	80
B26	327,873	5,316,266	80
B27	326,578	5,315,752	80
B28	325,902	5,315,999	80
B29	325,772	5,315,134	80
B30	326,226	5,314,399	80
B31	325,050	5,314,459	80
B32	324,738	5,314,570	80
C33	331,524	5,311,869	80
C34	331,534	5,312,538	80
C35	330,710	5,312,567	80
C36	330,554	5,312,210	80
C37	331,057	5,311,062	80
C38	330,515	5,311,415	80
C39	328,832	5,310,907	80
C40	329,216	5,310,435	80
C41	329,140	5,312,578	80
C42	328,396	5,312,805	80
C43	327,991	5,312,767	80
C44	329,421	5,313,123	80
C45	330,121	5,313,507	80
D46	330,102	5,309,897	80
D47	329,742	5,309,725	80
D48	330,080	5,309,241	80
D49	329,541	5,308,614	80
D50	328,408	5,308,620	80
D51	327,506	5,308,898	80
D52	327,189	5,309,683	80
D53	327,923	5,310,637	80
D54	327,368	5,310,668	80
D55	326,904	5,310,812	80
D56	328,015	5,307,450	80
D57	327,383	5,307,054	80
D58	327,989	5,306,569	80
D59	326,733	5,306,290	80
D60	328,721	5,305,526	80

WIND TURBINE COORDINATES

Turbine Name	Easting [m]	Northing [m]	Hub Height [m]
D61	328,849	5,304,557	80
E62	332,548	5,310,681	80
E63	333,365	5,310,804	80
E64	333,747	5,310,759	80
E65	333,406	5,311,332	80
E66	332,561	5,310,287	80
E67	333,076	5,309,781	80
E68	333,773	5,309,490	80
E69	332,858	5,308,773	80
E70	333,698	5,308,948	80
E71	332,634	5,308,605	80
E72	332,304	5,307,911	80
E73	331,529	5,308,104	80
E74	331,727	5,306,920	80
E75	333,227	5,307,662	80
E76	334,047	5,307,336	80
E77	334,749	5,307,236	80
MW101	329,266	5,320,797	80
MW102	329,958	5,321,174	80
MW103	330,660	5,321,580	80

*The GE 1.6-97 turbines will retain the location of the existing GE 1.5 SL/SLE turbines

**Both turbine models will have the same hub height

Appendix B – Sound Level Results by Receptor

TABLE B-1 - NOISE MODELING RESULTS

Receiver ID	Status	UTM Coordinates (Zone 14)		Existing Sound Level (dBA)	Repower Sound Level (dBA)	Sound Level Increase (dBA)	Repower >45 dBA Avoidance Criteria? ¹
		Easting (m)	Northing (m)				
Rec001	Non-Participant	338,241	5,309,174	30	31	1	No
Rec002	Non-Participant	324,530	5,317,965	32	33	1	No
Rec003	Non-Participant	327,059	5,304,940	36	38	2	No
Rec004	Non-Participant	339,507	5,311,129	28	28	1	No
Rec005	Non-Participant	332,178	5,311,498	45	47	2	Yes
Rec006	Non-Participant	329,158	5,322,947	32	33	1	No
Rec007	Non-Participant	340,123	5,319,460	19	20	0	No
Rec008	Non-Participant	328,200	5,306,969	45	48	3	Yes
Rec009	Participant	328,410	5,308,920	47	50	3	Yes
Rec010	Non-Participant	320,917	5,317,449	25	26	1	No
Rec011	Non-Participant	331,750	5,321,357	35	37	2	No
Rec012	Non-Participant	328,771	5,319,071	37	38	2	No
Rec013	Non-Participant	339,920	5,317,893	23	23	0	No
Rec014	Non-Participant	335,038	5,313,156	38	39	1	No
Rec015	Non-Participant	329,036	5,319,254	37	38	2	No
Rec016	Non-Participant	333,650	5,318,816	34	35	1	No
Rec017	Non-Participant	328,856	5,319,028	37	39	2	No
Rec018	Non-Participant	327,083	5,308,708	43	46	3	Yes
Rec019	Non-Participant	320,785	5,317,571	25	25	1	No
Rec020	Non-Participant	328,323	5,310,292	45	47	2	Yes
Rec021	Non-Participant	326,897	5,322,829	28	29	1	No
Rec022	Non-Participant	329,306	5,314,606	43	45	2	No
Rec023	Non-Participant	339,528	5,308,985	27	28	1	No
Rec024	Non-Participant	328,836	5,318,980	37	39	2	No
Rec025	Non-Participant	335,074	5,307,974	40	42	2	No
Rec026	Non-Participant	336,923	5,324,302	19	19	0	No
Rec027	Non-Participant	320,689	5,323,635	15	16	0	No
Rec028	Non-Participant	329,177	5,321,358	41	44	3	No
Rec029	Non-Participant	328,750	5,318,983	37	38	2	No
Rec030	Non-Participant	323,941	5,322,486	24	24	1	No
Rec031	Non-Participant	328,746	5,324,750	26	27	1	No
Rec032	Non-Participant	325,330	5,306,467	35	36	2	No
Rec033	Non-Participant	328,885	5,319,387	36	38	2	No
Rec034	Non-Participant	339,547	5,308,070	27	27	0	No
Rec035	Non-Participant	333,592	5,308,227	44	46	2	Yes
Rec036	Non-Participant	331,319	5,303,855	32	33	1	No
Rec037	Non-Participant	320,760	5,324,526	12	13	0	No
Rec038	Non-Participant	326,397	5,323,807	25	26	1	No
Rec039	Non-Participant	324,939	5,316,451	37	39	2	No
Rec040	Non-Participant	329,349	5,314,555	43	45	2	No
Rec041	Non-Participant	333,288	5,305,378	35	36	1	No
Rec042	Non-Participant	328,935	5,319,313	37	38	2	No
Rec043	Non-Participant	336,379	5,320,801	26	26	0	No
Rec044	Non-Participant	333,759	5,317,001	36	37	1	No
Rec045	Non-Participant	327,997	5,324,573	26	26	1	No
Rec046	Non-Participant	320,731	5,315,746	26	27	1	No
Rec047	Non-Participant	332,129	5,311,498	45	47	2	Yes
Rec048	Non-Participant	334,085	5,310,448	45	48	3	Yes
Rec049	Non-Participant	338,419	5,316,180	28	28	0	No
Rec050	Non-Participant	320,911	5,321,917	20	20	0	No
Rec051	Non-Participant	331,290	5,316,504	45	47	3	Yes
Rec052	Non-Participant	323,278	5,314,012	34	35	1	No
Rec053	Non-Participant	338,521	5,316,447	27	28	1	No
Rec054	Non-Participant	328,824	5,318,981	37	39	2	No
Rec055	Non-Participant	330,331	5,318,622	39	41	2	No
Rec056	Non-Participant	332,003	5,311,492	45	47	2	Yes
Rec057	Non-Participant	332,011	5,316,156	42	44	2	No
Rec058	Non-Participant	328,821	5,318,945	37	39	2	No
Rec059	Non-Participant	338,507	5,316,525	27	27	0	No
Rec060	Non-Participant	329,052	5,319,260	37	38	2	No
Rec061	Non-Participant	327,086	5,306,672	45	48	3	Yes
Rec062	Non-Participant	331,621	5,318,660	39	41	2	No
Rec063	Non-Participant	338,938	5,304,803	25	25	1	No
Rec064	Non-Participant	328,711	5,319,067	37	38	2	No
Rec065	Non-Participant	325,550	5,308,319	35	37	1	No
Rec066	Non-Participant	329,191	5,320,232	41	43	3	No
Rec067	Non-Participant	331,740	5,307,625	45	47	3	Yes
Rec068	Non-Participant	331,162	5,319,726	36	37	1	No
Rec069	Non-Participant	330,357	5,317,141	42	45	2	No
Rec070	Non-Participant	338,904	5,324,383	14	14	0	No
Rec071	Non-Participant	329,129	5,321,216	43	46	3	Yes
Rec072	Non-Participant	328,697	5,318,988	37	38	2	No
Rec073	Non-Participant	326,314	5,305,476	37	39	2	No
Rec074	Non-Participant	320,875	5,307,996	25	25	0	No
Rec075	Non-Participant	328,891	5,318,961	37	39	2	No
Rec076	Non-Participant	328,694	5,319,233	36	38	2	No
Rec077	Non-Participant	336,832	5,318,683	28	28	1	No
Rec078	Non-Participant	328,583	5,321,453	37	39	2	No

TABLE B-1 - NOISE MODELING RESULTS

Receiver ID	Status	UTM Coordinates (Zone 14)		Existing Sound Level (dBA)	Repower Sound Level (dBA)	Sound Level Increase (dBA)	Repower >45 dBA Avoidance Criteria? ¹
		Easting (m)	Northing (m)				
Rec079	Non-Participant	328,435	5,318,152	38	40	2	No
Rec080	Non-Participant	333,446	5,316,231	37	38	1	No
Rec081	Non-Participant	329,062	5,325,043	25	26	1	No
Rec082	Non-Participant	329,323	5,321,341	42	45	3	Yes
Rec083	Non-Participant	339,552	5,312,671	27	28	0	No
Rec084	Non-Participant	330,491	5,315,493	45	48	3	Yes
Rec085	Non-Participant	337,459	5,311,354	32	33	1	No
Rec086	Non-Participant	333,539	5,308,155	44	47	3	Yes
Rec087	Non-Participant	328,671	5,319,052	36	38	2	No
Rec088	Non-Participant	328,835	5,319,069	37	38	2	No
Rec089	Non-Participant	338,624	5,316,564	27	27	0	No
Rec090	Non-Participant	337,041	5,319,464	27	27	1	No
Rec091	Non-Participant	331,675	5,321,927	35	37	2	No
Rec092	Non-Participant	331,863	5,320,912	34	36	2	No
Rec093	Non-Participant	328,784	5,323,910	28	29	1	No
Rec094	Non-Participant	328,635	5,310,379	45	48	3	Yes
Rec095	Non-Participant	338,922	5,313,072	28	29	1	No
Rec096	Non-Participant	328,792	5,318,981	37	39	2	No
Rec097	Non-Participant	340,056	5,310,263	26	27	1	No
Rec098	Non-Participant	328,567	5,310,262	44	47	2	Yes
Rec099	Non-Participant	324,143	5,325,081	19	19	0	No
Rec100	Non-Participant	329,495	5,305,761	39	41	2	No
Rec101	Non-Participant	328,922	5,319,001	37	39	2	No
Rec102	Non-Participant	320,192	5,307,369	23	23	0	No
Rec103	Non-Participant	328,559	5,313,213	45	48	3	Yes
Rec104	Non-Participant	322,337	5,315,173	31	32	1	No
Rec106	Non-Participant	332,463	5,314,931	42	44	2	No
Rec107	Non-Participant	328,798	5,318,945	37	39	2	No
Rec108	Non-Participant	328,819	5,319,174	37	38	2	No
Rec109	Non-Participant	328,643	5,313,307	44	47	2	Yes
Rec110	Non-Participant	333,680	5,316,995	36	37	1	No
Rec112	Non-Participant	328,767	5,319,032	37	38	2	No
Rec113	Non-Participant	325,257	5,307,111	34	36	1	No
Rec114	Non-Participant	336,304	5,311,493	35	36	1	No
Rec115	Non-Participant	331,140	5,324,763	26	27	1	No
Rec116	Non-Participant	324,828	5,320,858	27	28	1	No
Rec117	Non-Participant	329,774	5,324,636	27	28	1	No
Rec118	Non-Participant	333,880	5,324,514	23	24	1	No
Rec119	Non-Participant	339,993	5,314,351	26	26	0	No
Rec120	Non-Participant	329,211	5,308,562	46	49	3	Yes
Rec121	Non-Participant	328,994	5,319,256	37	38	2	No
Rec122	Non-Participant	330,993	5,305,426	35	37	1	No
Rec123	Non-Participant	328,883	5,319,236	37	38	2	No
Rec124	Non-Participant	329,026	5,319,256	37	38	2	No
Rec125	Non-Participant	325,576	5,306,045	35	37	2	No
Rec126	Non-Participant	328,712	5,321,598	37	39	2	No
Rec127	Non-Participant	332,124	5,315,644	41	43	2	No
Rec128	Non-Participant	319,967	5,324,730	11	12	0	No
Rec129	Non-Participant	327,339	5,324,469	25	26	1	No
Rec130	Non-Participant	328,910	5,318,978	37	39	2	No
Rec131	Non-Participant	328,687	5,318,991	37	38	2	No
Rec132	Non-Participant	322,263	5,324,967	15	15	0	No
Rec133	Non-Participant	328,349	5,304,586	42	45	3	No
Rec134	Non-Participant	328,756	5,322,242	34	35	2	No
Rec135	Non-Participant	331,172	5,319,611	36	37	1	No
Rec136	Non-Participant	328,548	5,321,320	37	39	2	No
Rec137	Non-Participant	329,667	5,311,704	43	45	2	Yes
Rec138	Non-Participant	329,205	5,321,495	40	43	3	No
Rec139	Non-Participant	338,607	5,316,570	27	27	0	No
Rec140	Non-Participant	326,287	5,302,728	29	29	1	No
Rec141	Non-Participant	333,880	5,319,834	31	32	1	No
Rec142	Participant	326,567	5,314,833	43	46	3	Yes
Rec143	Non-Participant	324,907	5,320,919	27	28	1	No
Rec144	Non-Participant	330,928	5,308,845	42	44	2	No
Rec145	Non-Participant	328,791	5,319,032	37	38	2	No
Rec146	Non-Participant	331,062	5,319,748	36	37	1	No
Rec147	Non-Participant	335,306	5,314,904	35	36	1	No
Rec148	Non-Participant	329,466	5,311,280	43	46	2	Yes
Rec149	Non-Participant	328,779	5,323,241	30	31	1	No
Rec150	Non-Participant	321,846	5,324,707	15	15	0	No
Rec151	Non-Participant	330,198	5,311,704	46	49	3	Yes
Rec152	Non-Participant	328,795	5,319,071	37	38	2	No
Rec153	Non-Participant	328,835	5,319,027	37	38	2	No
Rec154	Non-Participant	336,982	5,322,834	21	21	0	No
Rec155	Non-Participant	338,538	5,316,550	27	27	0	No
Rec156	Non-Participant	321,126	5,321,316	21	21	0	No
Rec157	Non-Participant	332,122	5,322,865	30	31	1	No
Rec158	Non-Participant	320,859	5,322,670	19	19	0	No

TABLE B-1 - NOISE MODELING RESULTS

Receiver ID	Status	UTM Coordinates (Zone 14)		Existing Sound Level (dBA)	Repower Sound Level (dBA)	Sound Level Increase (dBA)	Repower >45 dBA Avoidance Criteria? ¹
		Easting (m)	Northing (m)				
Rec159	Non-Participant	328,770	5,318,947	37	39	2	No
Rec160	Non-Participant	333,627	5,322,114	28	29	1	No
Rec161	Non-Participant	324,734	5,310,293	34	35	1	No
Rec162	Non-Participant	329,174	5,322,050	36	38	2	No
Rec163	Non-Participant	328,733	5,322,471	33	34	2	No
Rec164	Non-Participant	328,947	5,315,706	45	48	3	Yes
Rec165	Non-Participant	320,669	5,321,608	20	20	0	No
Rec166	Non-Participant	331,617	5,318,567	40	42	2	No
Rec167	Non-Participant	326,146	5,324,846	23	23	1	No
Rec168	Non-Participant	340,000	5,318,422	21	22	0	No
Rec169	Non-Participant	329,060	5,319,263	37	38	2	No
Rec170	Non-Participant	339,690	5,304,037	22	23	1	No
Rec171	Non-Participant	335,069	5,304,252	30	31	1	No
Rec172	Non-Participant	329,117	5,307,318	40	42	2	No
Rec173	Non-Participant	329,799	5,316,333	45	48	3	Yes
Rec174	Non-Participant	329,920	5,318,243	43	46	3	Yes
Rec175	Non-Participant	329,427	5,311,317	43	46	2	Yes
Rec176	Non-Participant	335,437	5,323,079	24	24	1	No
Rec177	Non-Participant	339,451	5,322,591	16	16	0	No
Rec178	Non-Participant	328,747	5,318,946	37	38	2	No
Rec179	Non-Participant	332,758	5,311,456	47	49	3	Yes
Rec180	Non-Participant	328,871	5,318,950	37	39	2	No
Rec181	Non-Participant	328,745	5,319,225	36	38	2	No
Rec182	Non-Participant	325,735	5,311,305	37	39	2	No
Rec183	Non-Participant	320,662	5,309,174	25	25	0	No
Rec184	Non-Participant	338,560	5,316,574	27	27	0	No
Rec185	Non-Participant	333,470	5,321,150	30	31	1	No
Rec186	Non-Participant	320,781	5,305,510	23	23	0	No
Rec187	Non-Participant	328,811	5,319,071	37	38	2	No
Rec188	Non-Participant	325,424	5,324,521	23	23	1	No
Rec189	Participant	334,014	5,311,187	46	49	3	Yes
Rec190	Non-Participant	332,356	5,308,436	48	51	3	Yes
Rec191	Non-Participant	332,786	5,311,383	47	49	3	Yes
Rec192	Non-Participant	322,384	5,303,951	24	25	1	No
Rec193	Non-Participant	333,731	5,321,748	29	29	1	No
Rec194	Non-Participant	328,735	5,319,067	37	38	2	No
Rec195	Non-Participant	339,866	5,323,347	11	11	0	No
Rec196	Non-Participant	324,141	5,325,115	19	19	0	No
Rec197	Non-Participant	328,762	5,323,027	31	32	1	No
Rec198	Non-Participant	328,747	5,319,067	37	38	2	No
Rec199	Non-Participant	335,406	5,309,006	37	39	1	No
Rec200	Non-Participant	328,758	5,318,983	37	38	2	No
Rec201	Non-Participant	321,034	5,323,936	16	16	0	No
Rec202	Non-Participant	333,830	5,324,506	24	24	1	No
Rec203	Non-Participant	328,644	5,305,160	45	48	3	Yes
Rec204	Non-Participant	330,497	5,303,699	33	34	1	No
Rec205	Non-Participant	331,719	5,305,257	35	36	1	No
Rec206	Non-Participant	324,644	5,307,023	32	33	1	No
Rec207	Non-Participant	329,325	5,311,582	43	45	2	Yes
Rec208	Non-Participant	328,703	5,319,068	36	38	2	No
Rec209	Non-Participant	335,710	5,318,454	30	31	1	No
Rec210	Non-Participant	328,878	5,319,068	37	38	2	No
Rec211	Non-Participant	335,364	5,322,232	25	26	1	No
Rec212	Non-Participant	328,879	5,319,027	37	39	2	No
Rec213	Non-Participant	338,174	5,309,289	30	31	1	No
Rec214	Non-Participant	335,154	5,309,845	38	40	2	No
Rec215	Non-Participant	322,380	5,307,095	27	28	1	No
Rec216	Non-Participant	327,274	5,321,745	30	32	1	No
Rec217	Non-Participant	322,345	5,315,024	31	32	1	No
Rec218	Non-Participant	327,044	5,308,669	43	45	3	Yes
Rec219	Non-Participant	335,251	5,323,123	24	25	1	No
Rec220	Non-Participant	325,810	5,311,481	37	39	1	No
Rec221	Non-Participant	323,508	5,311,060	32	32	1	No
Rec222	Non-Participant	325,820	5,317,047	37	39	2	No
Rec223	Non-Participant	339,644	5,312,911	27	27	1	No
Rec224	Non-Participant	328,781	5,318,982	37	38	2	No
Rec225	Non-Participant	338,598	5,316,622	27	27	0	No
Rec226	Non-Participant	324,963	5,316,390	38	40	2	No
Rec227	Non-Participant	328,863	5,318,926	37	39	2	No
Rec228	Non-Participant	320,923	5,324,785	11	11	0	No
Rec229	Non-Participant	328,847	5,318,944	37	39	2	No
Rec230	Non-Participant	331,327	5,318,836	38	40	2	No
Rec231	Non-Participant	329,169	5,318,152	44	47	3	Yes
Rec232	Non-Participant	328,855	5,319,068	37	38	2	No
Rec233	Non-Participant	323,511	5,316,827	32	33	1	No
Rec234	Non-Participant	320,682	5,307,149	24	24	0	No
Rec235	Non-Participant	335,299	5,314,880	35	36	1	No
Rec236	Non-Participant	336,709	5,321,681	24	24	1	No

TABLE B-1 - NOISE MODELING RESULTS

Receiver ID	Status	UTM Coordinates (Zone 14)		Existing Sound Level (dBA)	Repower Sound Level (dBA)	Sound Level Increase (dBA)	Repower >45 dBA Avoidance Criteria? ¹
		Easting (m)	Northing (m)				
Rec237	Non-Participant	328,367	5,318,251	38	39	2	No
Rec238	Non-Participant	329,005	5,319,255	37	38	2	No
Rec239	Non-Participant	331,318	5,316,516	45	47	3	Yes
Rec240	Non-Participant	328,762	5,322,369	33	35	2	No
Rec241	Non-Participant	325,624	5,324,580	23	23	0	No
Rec242	Non-Participant	331,830	5,309,845	43	45	2	No
Rec243	Non-Participant	328,812	5,319,031	37	38	2	No
Rec244	Non-Participant	328,679	5,319,057	36	38	2	No
Rec245	Non-Participant	337,239	5,311,456	32	33	1	No
Rec246	Non-Participant	320,899	5,321,562	20	21	0	No
Rec247	Non-Participant	332,564	5,324,761	25	25	1	No
Rec248	Non-Participant	321,059	5,321,483	21	21	0	No
Rec249	Non-Participant	320,430	5,321,763	19	19	0	No
Rec250	Non-Participant	327,897	5,306,150	44	47	3	Yes
Rec249	Non-Participant	320,430	5,321,763	19	19	0	No
Rec250	Non-Participant	327,897	5,306,150	44	47	3	Yes

Notes:

[1] All coordinates presented in UTM NAD83 Zone 14N (meters)

[2] Turbine coordinates provided by Developer

[3] Receptor coordinates provided by Developer

[4] "Yes" indicates that sound level is above 45.0 dBA at 100 feet from residential structure

Appendix C – Modeled Sound Contours

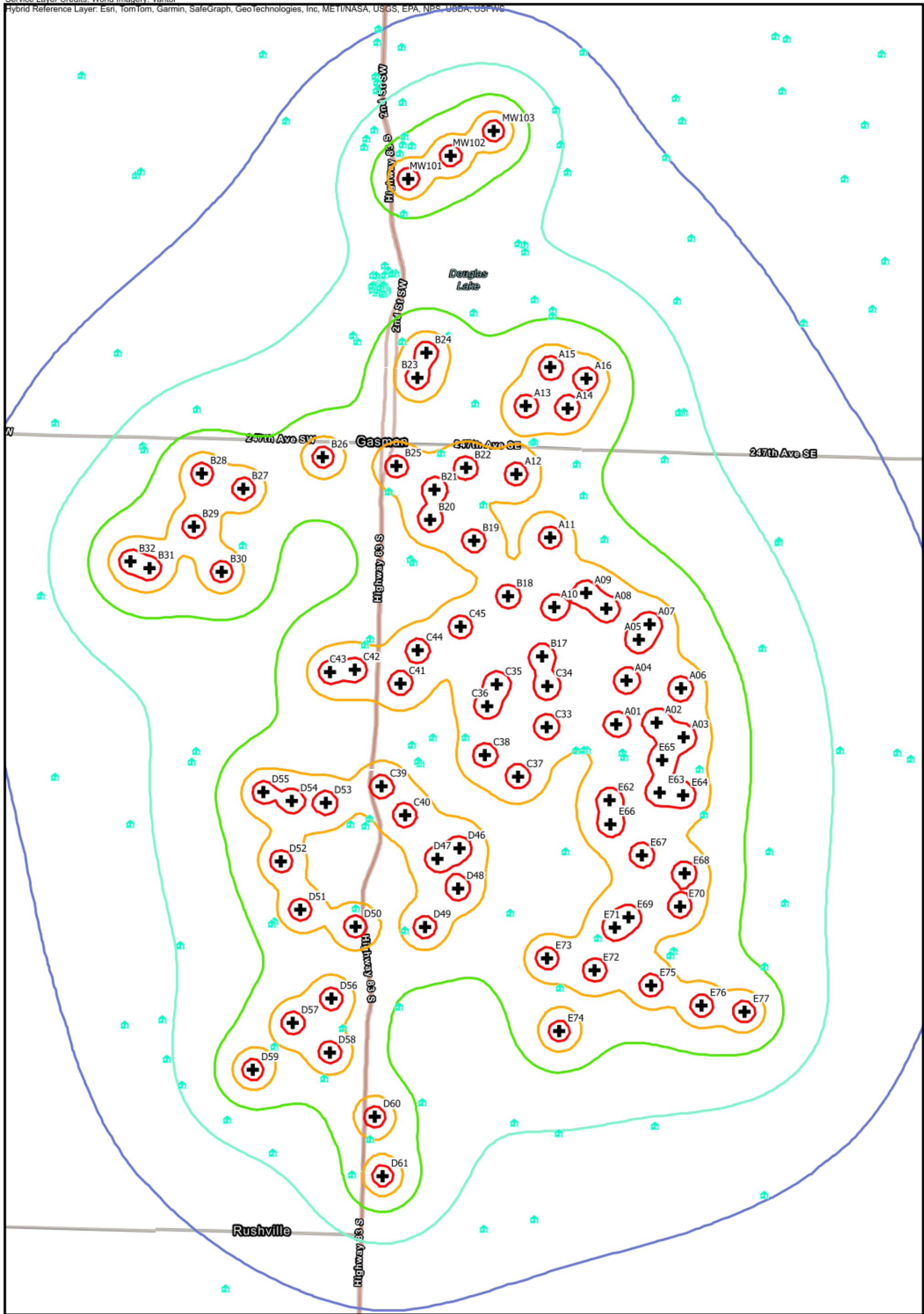
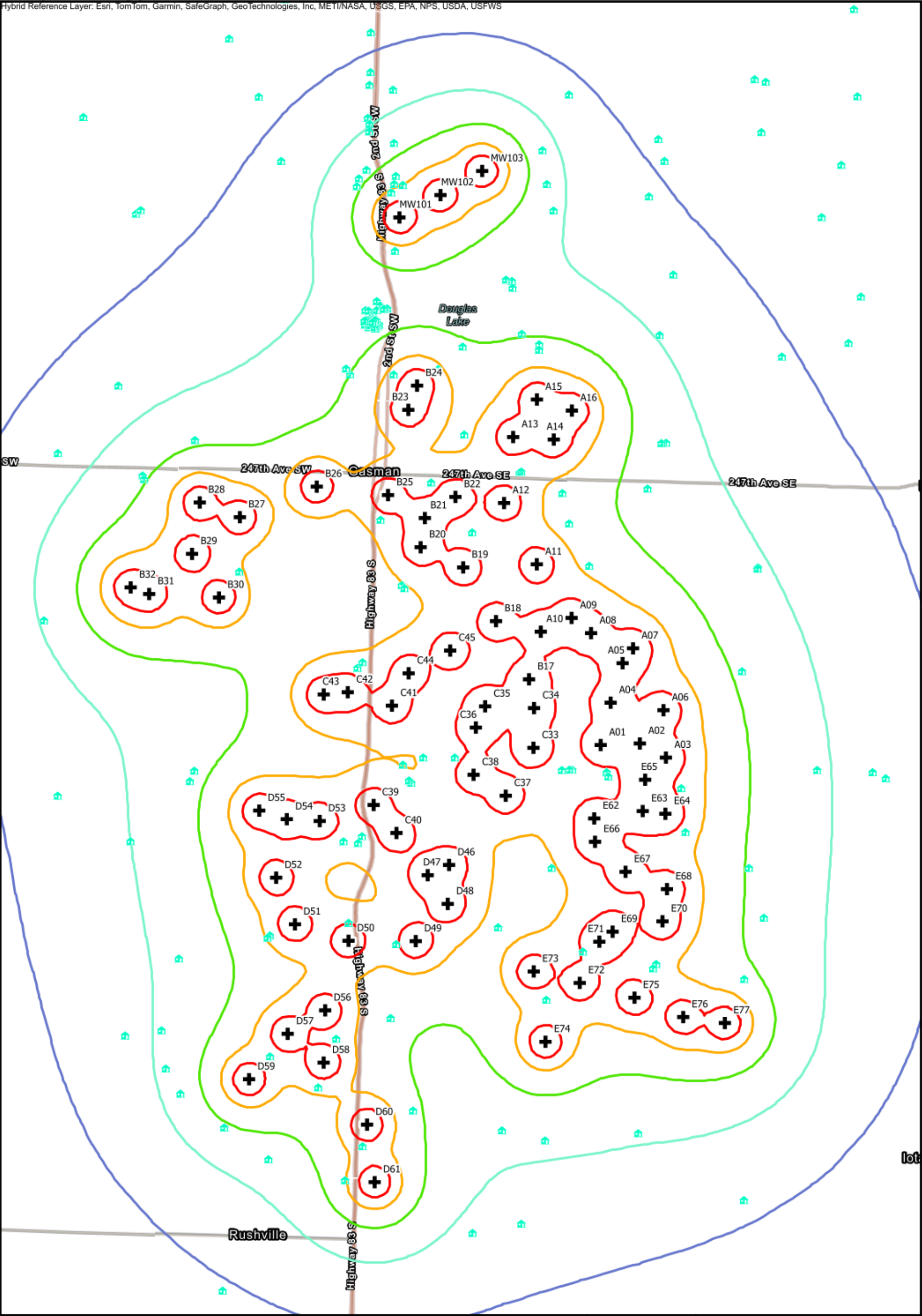
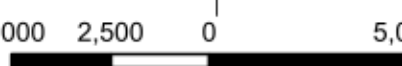


Figure C-1
Basin Prairie Winds
Existing Sound Level Contours



✚ Turbine 🏠 Rec	30 dBA 35 dBA 40 dBA 45 dBA 50 dBA	  Scale in Feet		Figure C-2 Basin Prairie Winds Repower Sound Level Contours
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Appendix B



BASIN ELECTRIC POWER COOPERATIVE

Shadow Flicker Analysis

Basin Prairie Wind Project – North Dakota

Project No. 195615

Revision 1

April 14, 2026

