Appendix C: Noise Impact Assessment

Wisconsin Power and Light Company
Docket No. IP7145/WS-24-349

NOISE IMPACT ASSESSMENT

Bent Tree North Wind Project

Freeborn County, Minnesota

FEBRUARY 5, 2025

PREPARED FOR:
Wisconsin Power & Light
(Alliant Energy Corporation)

PREPARED BY:
Westwood

Westwood

Noise Impact Assessment

Bent Tree North Wind Project

Freeborn County, Minnesota

Prepared For:
Wisconsin Power & Light (Alliant Energy Corporation)
4902 N. Biltmore Lane
Madison, WI 53718

Prepared By:
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Project Number: R0035761.00
Date: February 5, 2025

Executive Summary

Westwood Professional Services, Inc. (Westwood) was contracted to conduct an operational noise impact evaluation for the Bent Tree North Wind Project (Project) located in Freeborn County, MN. The Project is a 153-Megawatt (MW) wind power generation project proposed to consist of 34 Vestas V136-4.5 wind turbines. Two layouts are proposed; one with a turbine hub height of 112 meters (Layout A) and another with a turbine hub height of 120 meters (Layout B). Some turbine coordinates differ between layouts to meet setbacks. The Project includes 4 alternate locations.

An operational noise impact evaluation of the Project was conducted, and a noise propagation model was run for the proposed Project layouts. Noise propagation for each turbine was modeled using manufacturer noise data. The noise propagation model was then used to predict levels at all noise sensitive receptors within 2 km of proposed Project infrastructure.
A hypothetical scenario was modeled including the primary 34 and all 4 alternate turbine locations. In reality, if an alternate location is used, a corresponding primary location would be removed from the array, so this 38-turbine scenario is conservative. The hypothetical 38-turbine layout resulted in a maximum project generated noise level of 45.5 dBA for Layout A and 45.4 dBA for Layout B. As predicted Project noise levels for the hypothetical 38-turbine layout (including 4 alternates) do not exceed the maximum turbine-only noise level contribution of 47 dBA, a final layout including any combination of alternates and primary turbine locations is expected to have similar or lower turbine-only noise level contributions. No further modeling is required.

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Tables

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Appendices

1.0 Site Description

The proposed Project is located in Freeborn County, Minnesota (**Figure 1**). The Project Area consists of agricultural and residential land uses.

Figure 1: Project Overview

2.0 Regulatory Setting & Noise Level Requirements

State and local noise regulations were reviewed. Minn. R. 7030.0040 sets forth noise level limits according to different land uses. The most noise sensitive areas in the Project Area are occupied residential homes. Occupied residences are classified as Noise Area Classification (NAC) 1 per MN Rules 7030.0050, Subp. 2. NAC 1 has the lowest (most restrictive) noise limits of the three NACs. Agricultural land is classified as NAC-3, which has the highest noise limits of the three NACs. As the noise level limits for NAC-1 are the most restrictive, they are listed in **Table 1** below and are used throughout to confirm compliance with Minn. R. 7030.0040.

Table 1 Minnesota Rules Chapter 7030 NAC 1 Noise Level Limits

Noise Level Metric	Daytime Limit (dBA)	Nighttime Limit (dBA)
L_{50}	60	50
L_{10}	65	55

These limits are expressed as L_{50} and L_{10}, which are statistical noise level metrics representing the noise level that is exceeded 50% and 10% of the measurement period, respectively. However, noise modeling most accurately predicts L_{eq} levels, which is the equivalent continuous noise level or the overall average noise level over the measurement period. L_{10} levels are, on average, 3 dBA higher than L_{eq} levels, while L_{50} levels are typically below L_{eq} levels. As such, modelled L_{eq} levels can be used as a conservative metric for ensuring compliance with the L_{50} levels specified in Minn. R. 7030.0040. Therefore, if L_{eq} limits are assumed to be the same as the L_{50} limits, any modeled noise level below the L_{eq} limits would be below the L_{50} limits prescribed by Minn. R. 7030.0040.

Table 2 Minnesota Rules Chapter 7030 L_{50} Noise Level Limits Expressed as L_{eq}

Noise Level Metric	Daytime Limit (dBA)	Nighttime Limit (dBA)
L_{eq}	60	50

The above limits refer to total noise level, which includes both ambient noise and Project noise. The Minnesota Commerce Department's Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota states that "if background sound levels are equal to or greater than the applicable state standard at the nearby receptors, the windfarm should not contribute more than 47 dBA to total sound levels at nearby receptors." This ensures that Project (turbine-only) noise does not cause or significantly contribute to an exceedance. As nighttime ambient levels of 50 dBA and above were measured in the Project vicinity, a maximum-turbine only contribution of 47 dBA is the applicable Project noise level limit to show compliance with Minn. R. 7030.

3.0 Modeling Methodology

A noise propagation model was developed and run for the Project. WindPRO was used to calculate cumulative Project noise at all occupied residences within 2 km of proposed Project infrastructure. A total of 250 residences were identified and included as receptors in the model.

Model parameters were as follows, per ANSI/ACP 111-1-2022 *Wind Turbine Sound Modeling*, Section 2.1.1 Option 2:

- Ground absorption factor of G=0.5
- Receptor height of 4 m above ground level
- Uncertainty margin of + 2 dB
- Turbine modeled at hub height using vendors apparent downwind Sound Power Level specified consistent with IEC 61400-11
- No other model adjustments.
- Meteorological conditions of 10°C and 70% humidity were assumed.

The proposed Project wind turbines and adjacent existing wind turbines were modeled as point sources, with sound source data taken from manufacturer cut sheets and NEMA (National Electrical Manufacturers Association) standards. The model assumed all equipment to be operating at the loudest noise emission levels, which, in combination with the other parameters, ensures a conservative scenario.

Project equipment and layout configuration details are shown below in **Table 3.** Non-Project turbines from neighboring wind farms were modeled as well and configuration details are shown. Unweighted octave-band sound power levels for both Project turbines and non-Project wind turbines are listed in **Table 4** along with overall A-weighted sound power levels. Levels represent the maximum sound output for Project components.

Table 3 Project & Non-Project Equipment & Layout Configurations

Noise Source	# of Units	Equipment Model/Reference	Source Height (Hub Height) AGL
Layout A Project Wind Turbine	38	Vestas V136-4.5 with STE	112 m
Layout B Project Wind Turbine	38	Vestas V136-4.5 with STE	120 m
Non-Project Wind Turbine	122	Vestas V82-1.65	80 m

Table 4 Project & Non-Project Equipment Spectral & Overall Data

Noise Source	Unweighted Octave Band (Hz) Sound Power Levels (dB L_w)								Broadband Sound Power Level (Single Unit)
	63	125	250	500	1000	2000	4000	8000	
Project Wind Turbine	83.2	91.4	96.7	99.0	98.3	94.6	88.0	78.4	103.9 dBA
Non-Project Wind Turbine	84.9	91.9	95.3	97.9	97.7	94.8	90.0	80.5	103.3 dBA

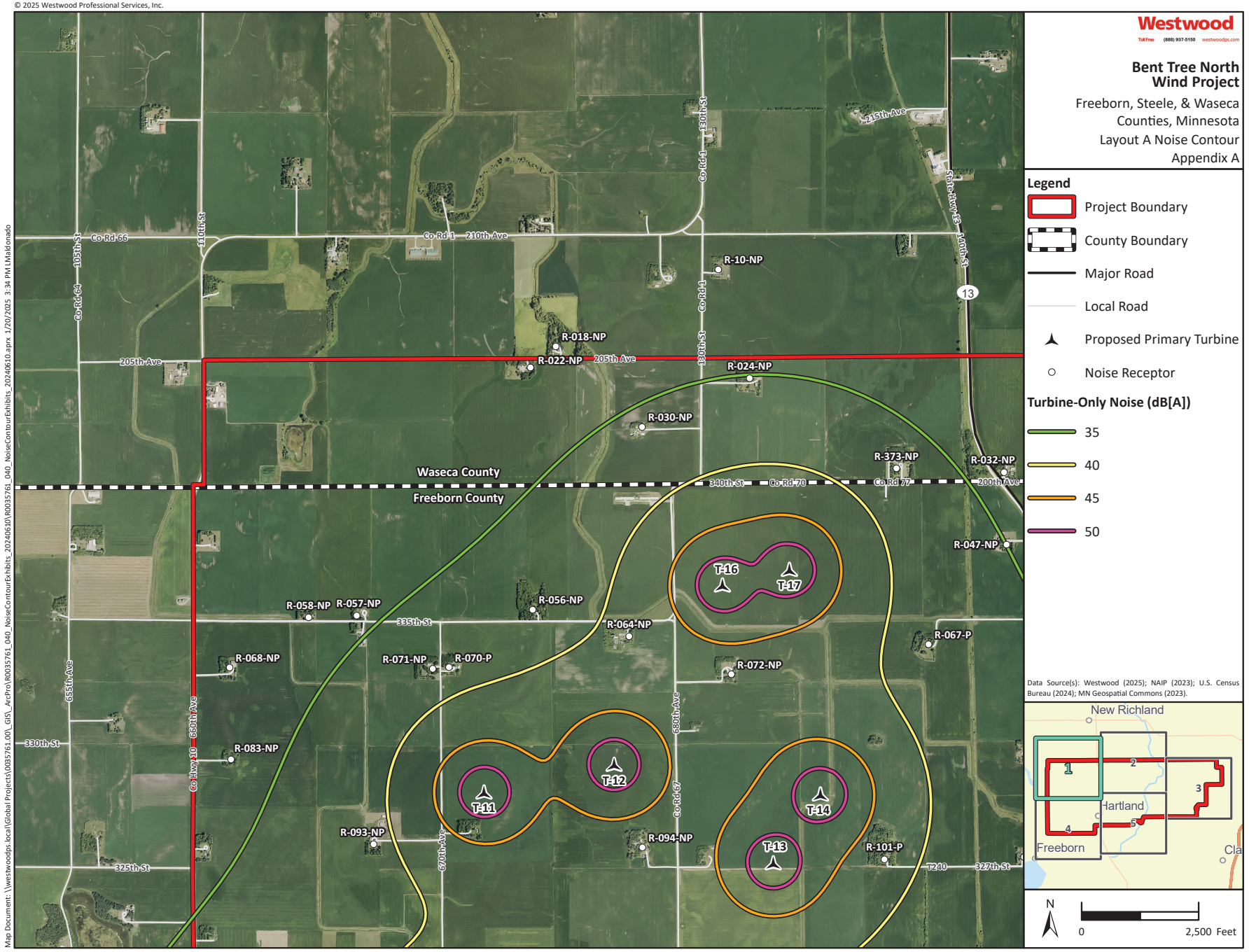
4.0 Impact Assessment

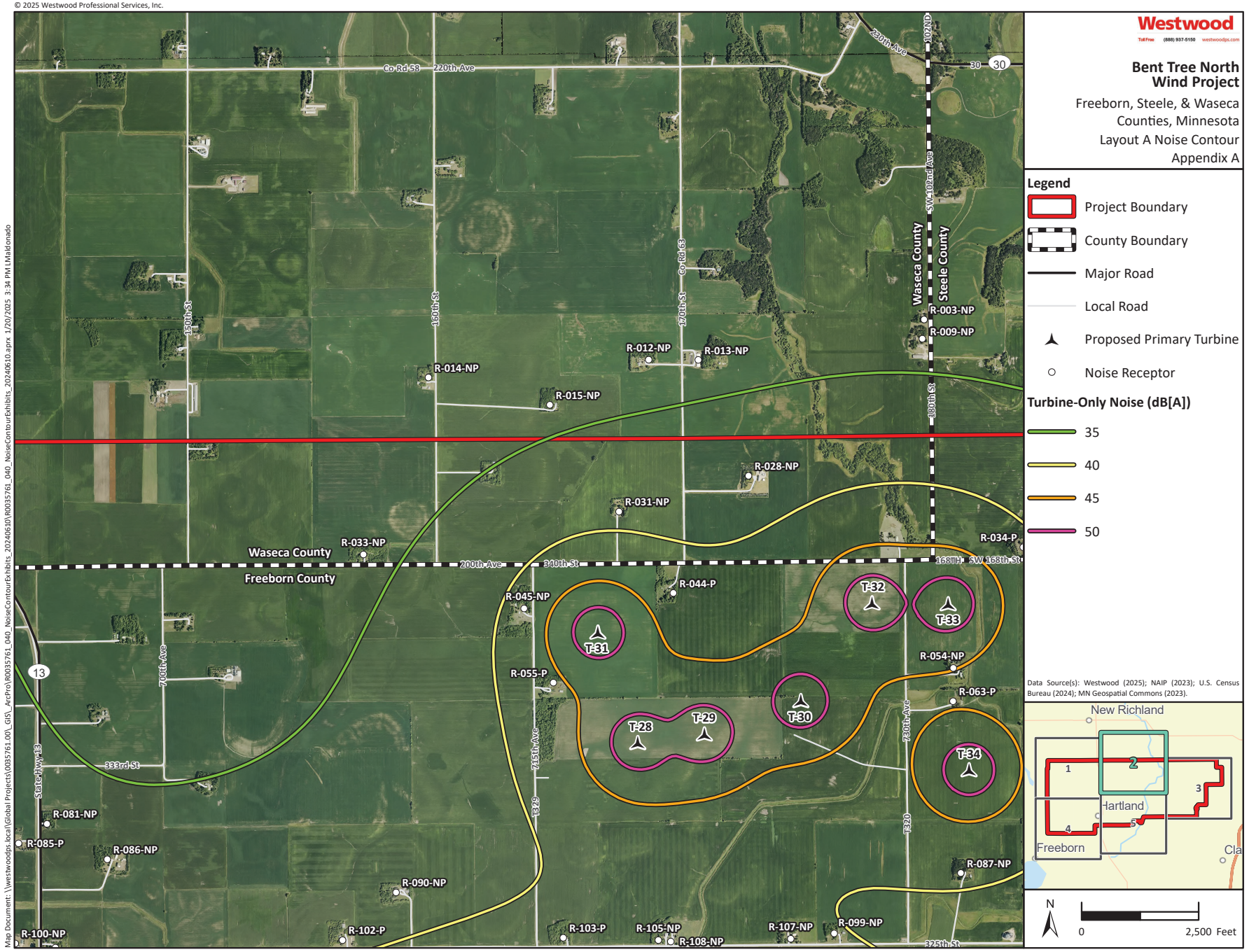
A predictive model was run using the inputs above to predict Project generated noise. The model assumed turbines to be located in all 34 proposed turbine locations and all 4 alternate turbine locations, for a hypothetical 38-turbine layout. These levels represent the predicted Project noise level at each occupied residential receptor. Results show that for both Layout A and Layout B, all receptors modeled are at or below the nighttime Project noise level limit of 47 dBA. Modeling results indicated the highest predicted Project noise contribution is 45.5dBA for Layout A and 45.4 dBA for Layout B. Therefore, no noise reduction mitigation measures are needed.

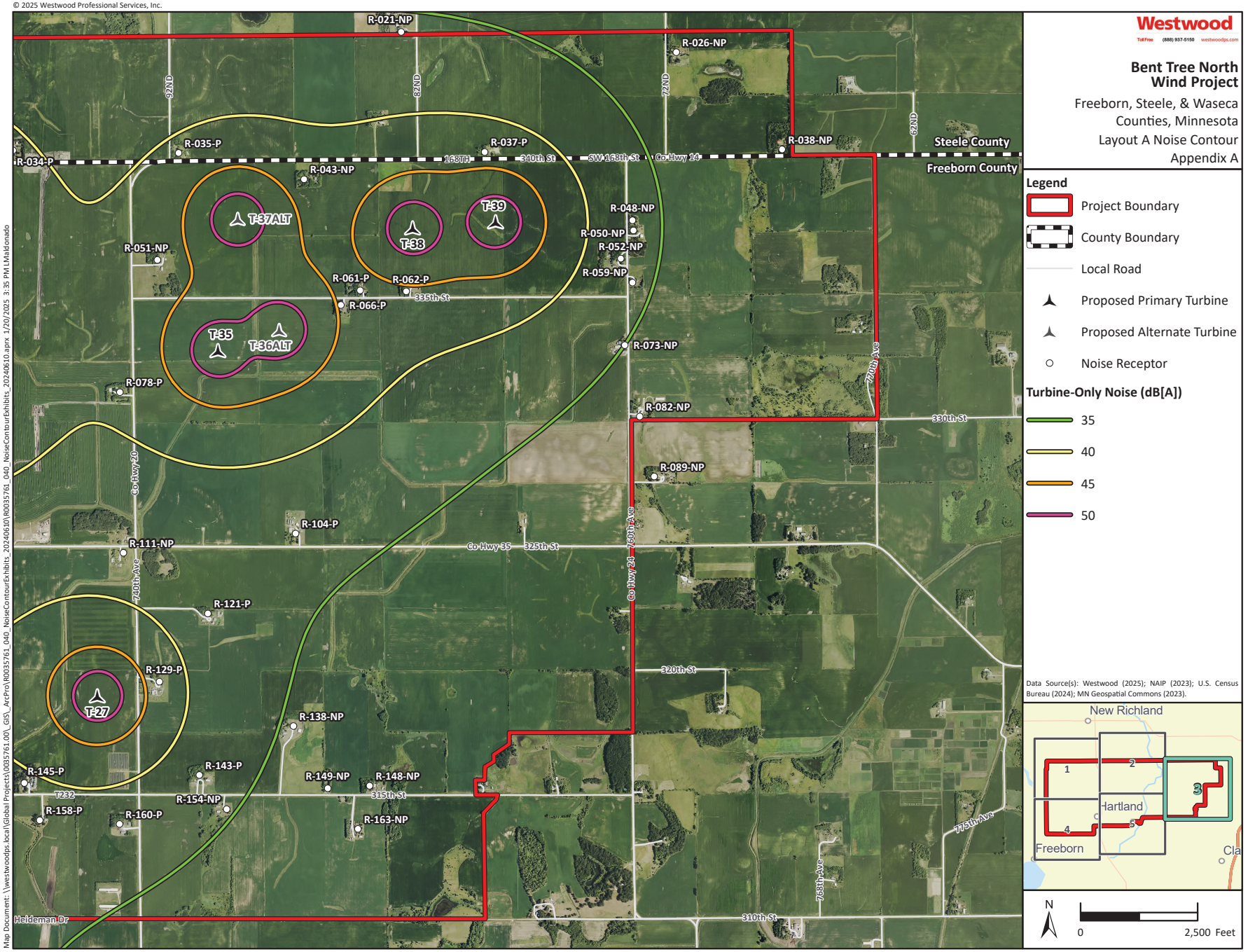
The hypothetical 38-turbine layout resulted in a maximum project generated noise level of 45.5 dBA for Layout A and 45.4 dBA for Layout B. As predicted Project noise levels for the hypothetical 38-turbine layout (including 4 alternates) do not exceed the maximum turbine-only noise level contribution of 47 dBA, a final layout including any combination of alternates and primary turbine locations is expected to have similar or lower turbine-only noise level contributions. No further modeling is required.

Project noise contour maps can be found in **Appendix A** and **B**. Detailed model results can be found in **Appendix C** and **D**.

Appendix A
Layout A - Project Noise Contour Map







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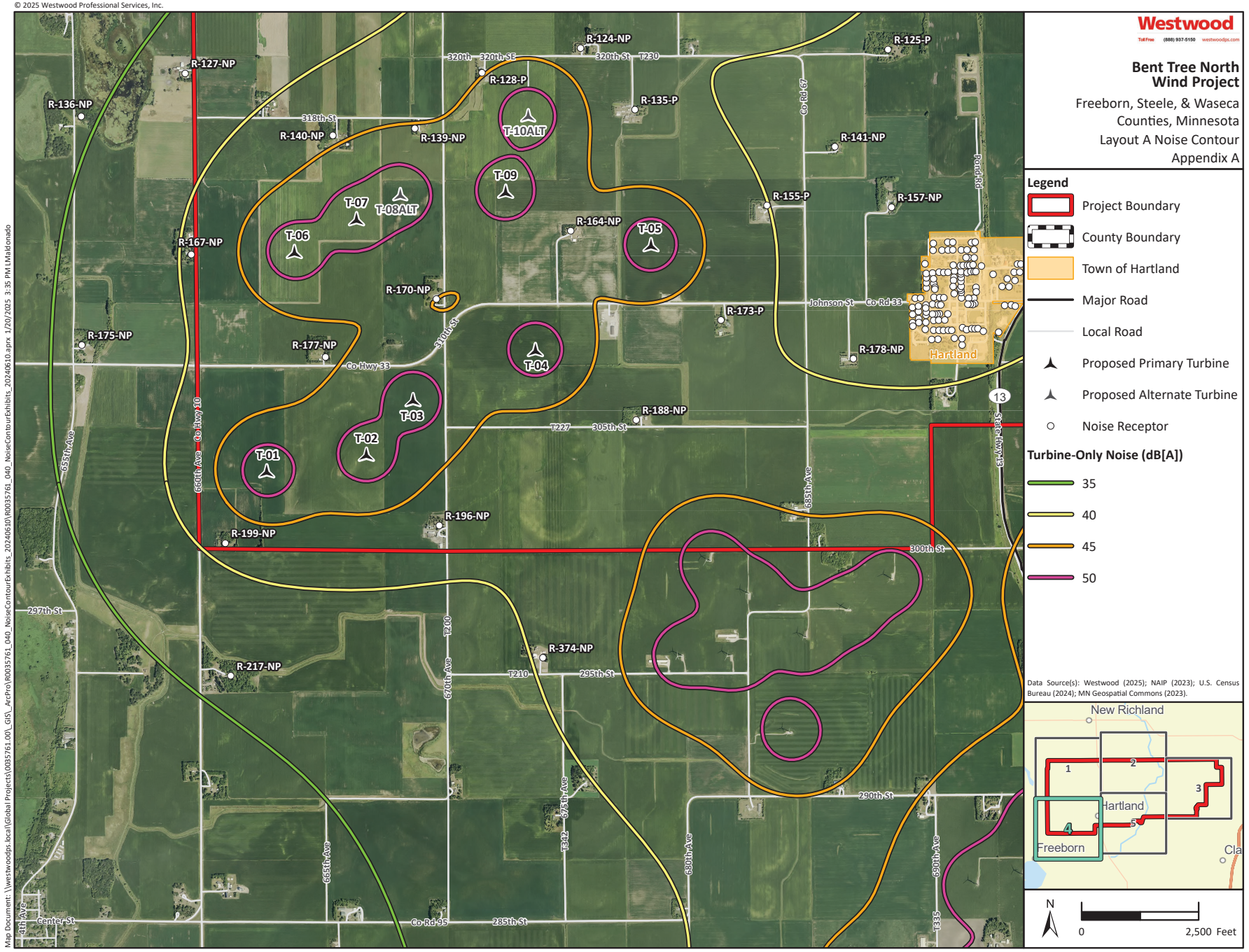
Bent Tree North Wind Project
Freeborn, Steele, & Waseca Counties, Minnesota
Layout A Noise Contour
Appendix A

Legend
- Project Boundary
- County Boundary
- Local Road
- Proposed Primary Turbine
- Proposed Alternate Turbine
- Noise Receptor

Turbine-Only Noise (dB[A])
- 35
- 40
- 45
- 50

Data Source(s): Westwood (2025); NAIP (2023); U.S. Census Bureau (2024); MN Geospatial Commons (2023).



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Bent Tree North Wind Project

Freeborn, Steele, & Waseca Counties, Minnesota

Layout A Noise Contour

Appendix A

Legend

- Project Boundary
- County Boundary
- Town of Hartland
- Major Road
- Local Road
- Proposed Primary Turbine
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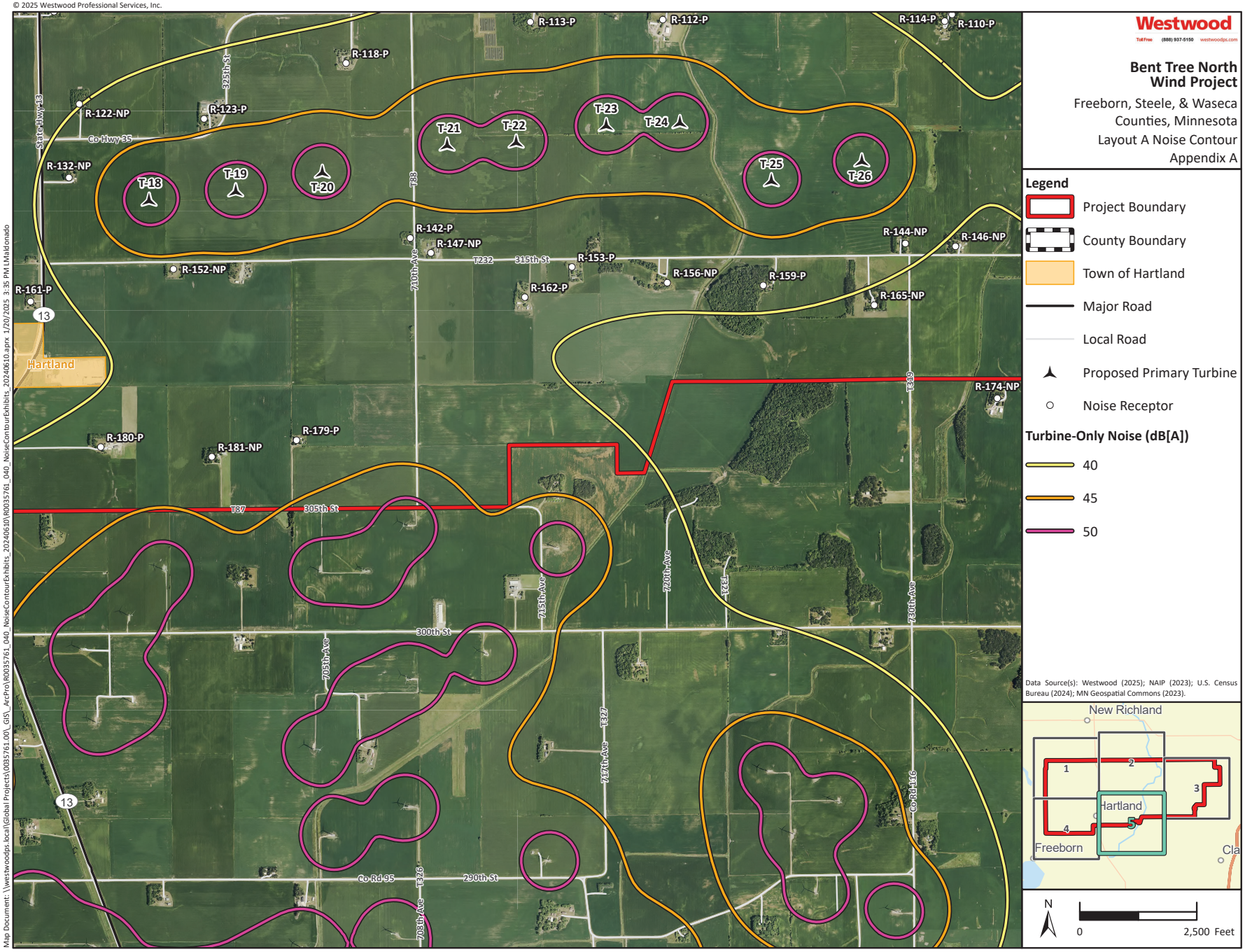
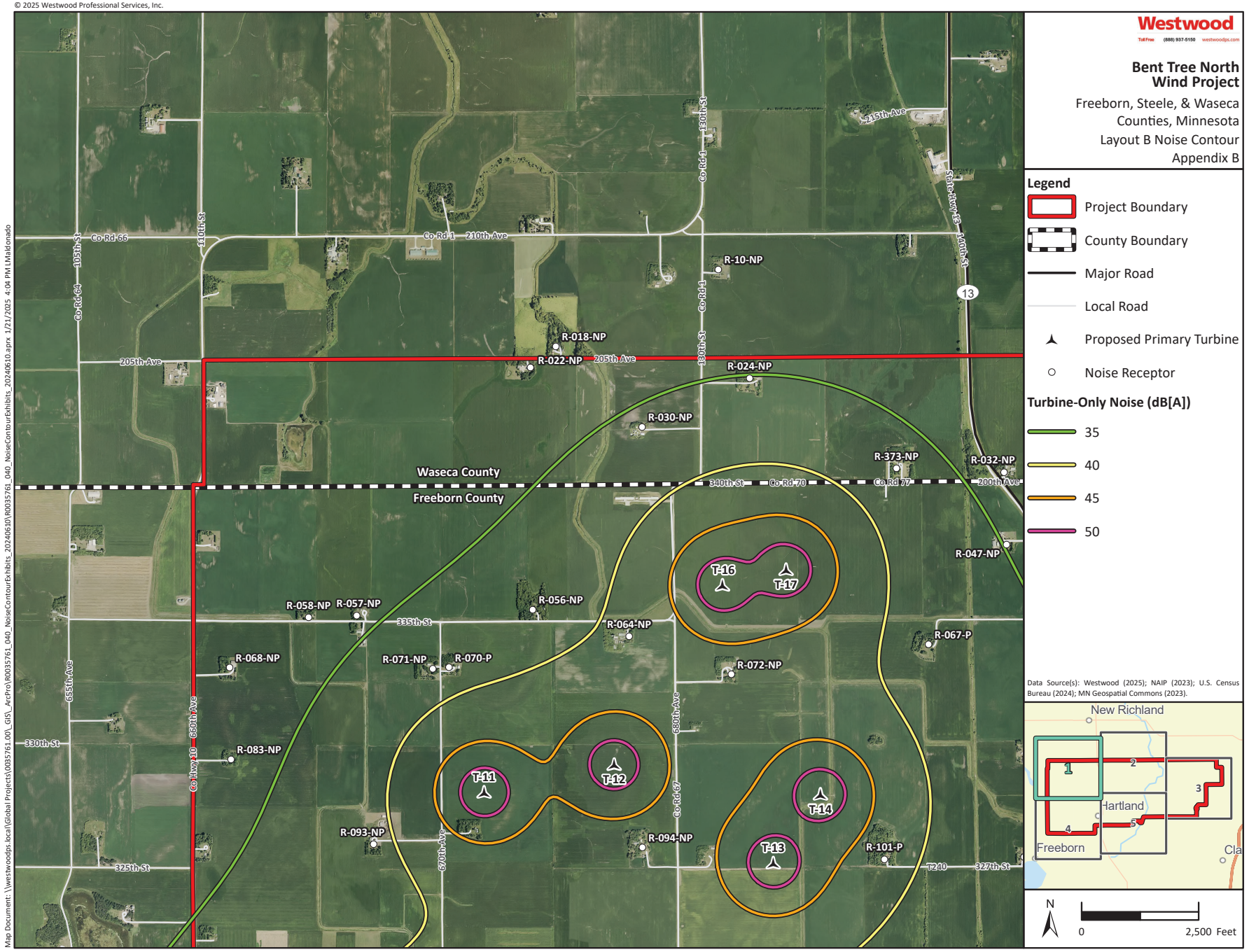
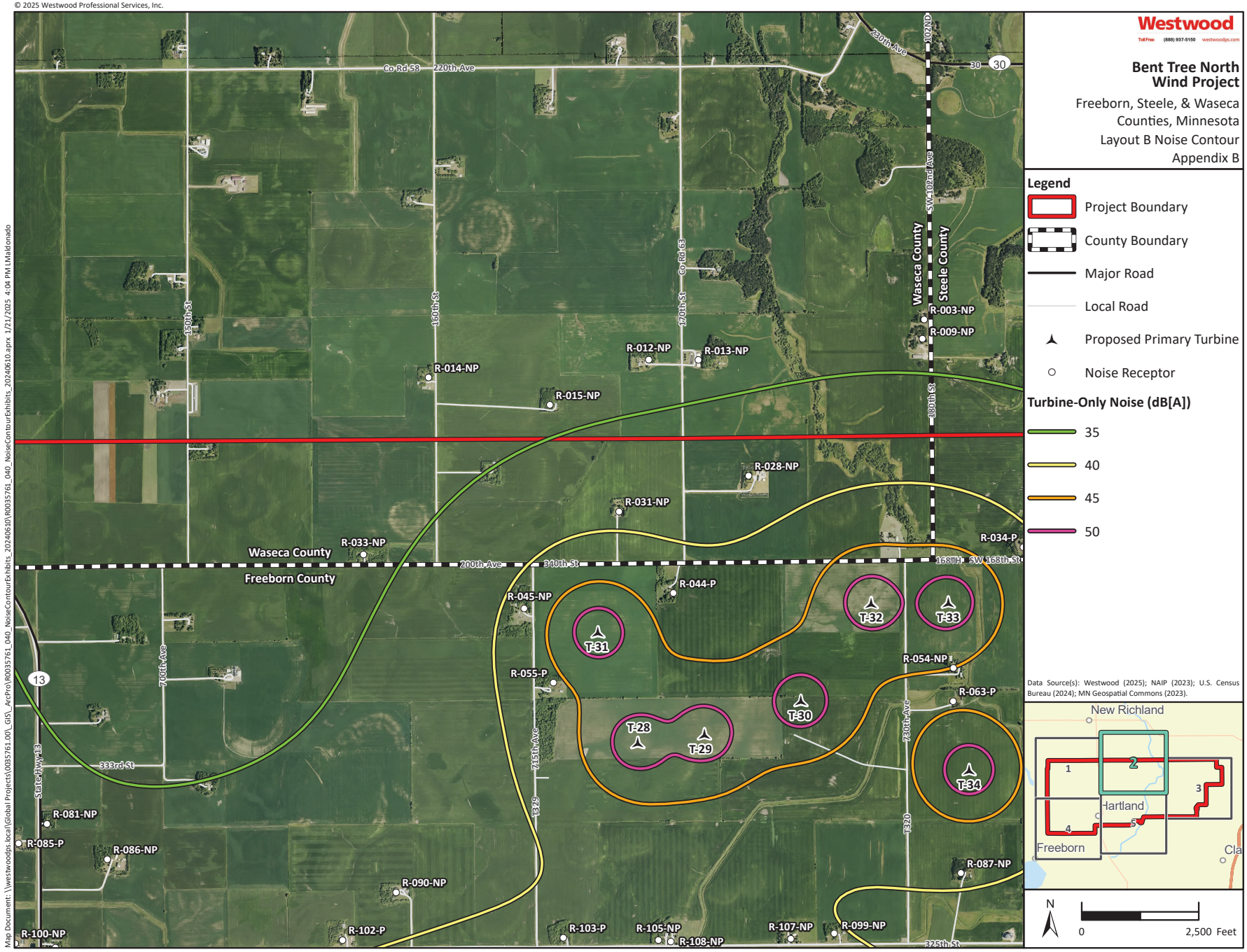


Appendix B
Layout B - Project Noise Contour Map





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Bent Tree North Wind Project

Freeborn, Steele, & Waseca Counties, Minnesota

Layout B Noise Contour

Appendix B

Legend

- Project Boundary
- County Boundary
- Major Road
- Local Road
- Proposed Primary Turbine
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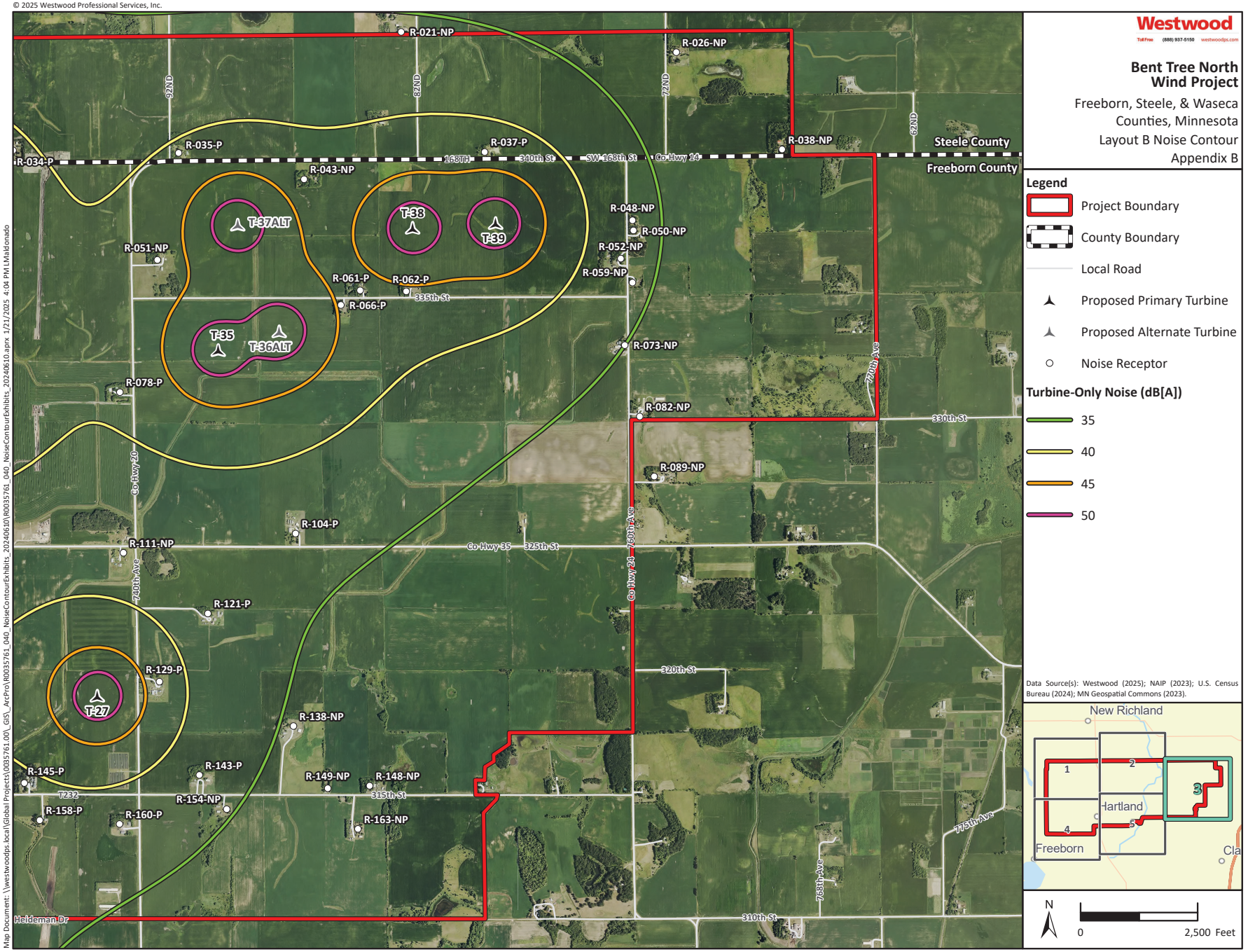

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Bent Tree North Wind Project
Freeborn, Steele, & Waseca Counties, Minnesota
Layout B Noise Contour
Appendix B

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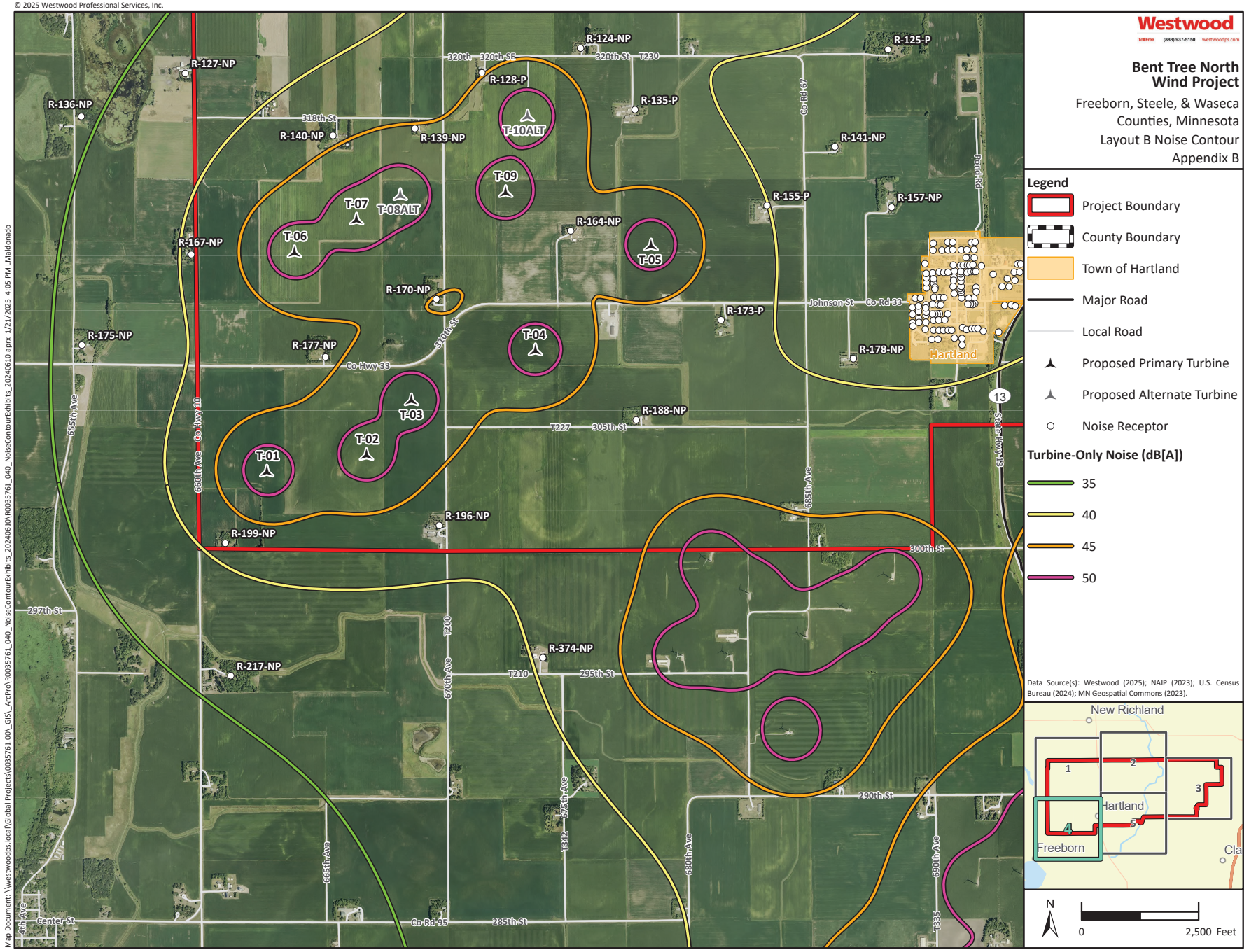

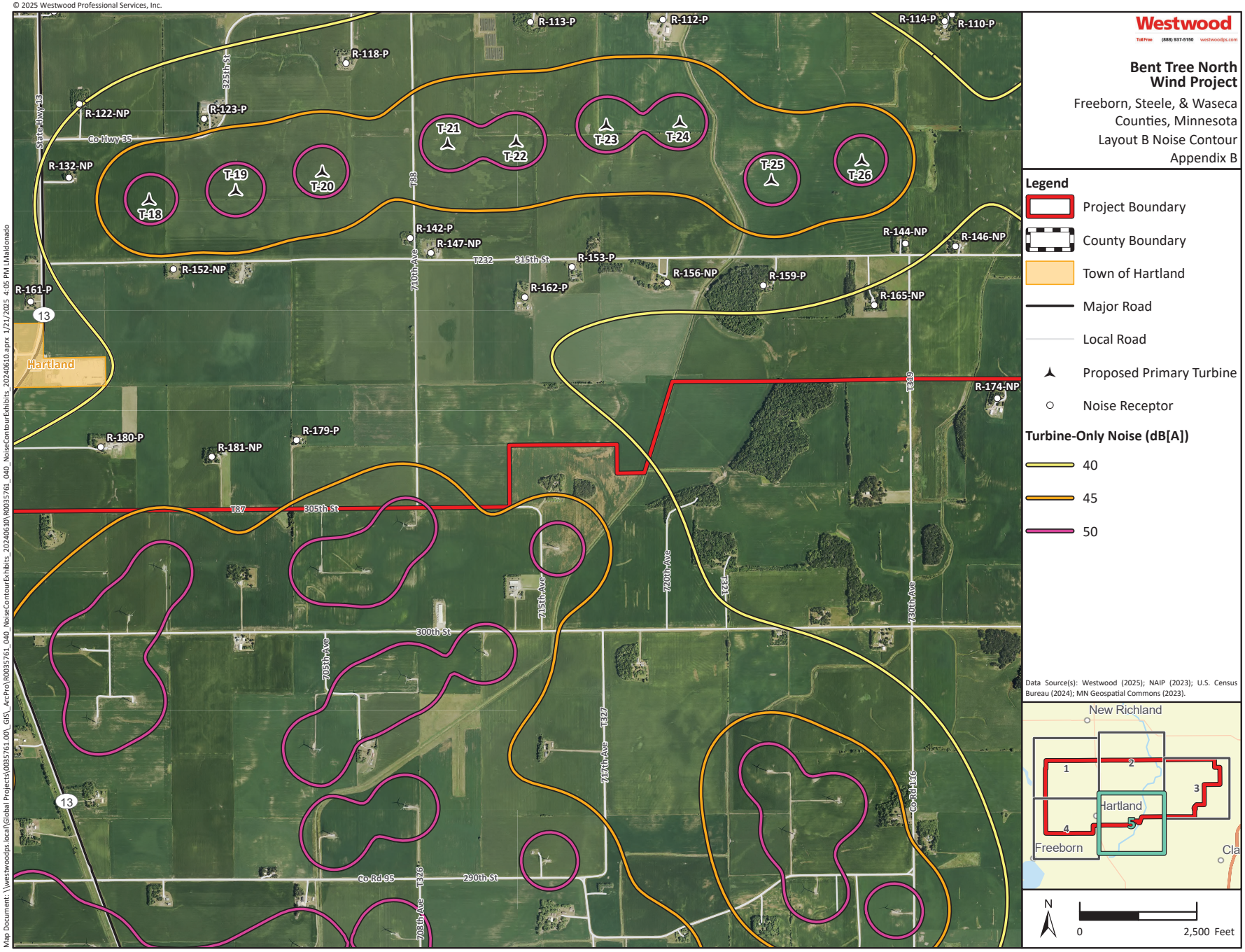

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Bent Tree North Wind Project

Freeborn, Steele, & Waseca Counties, Minnesota

Layout B Noise Contour

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Appendix C
Layout A - Modeling Results

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-003-NP	467,274	4,856,654	385.7	33.4
R-007-NP	470,686	4,856,546	384.2	32.3
R-008-NP	468,615	4,856,533	383.8	33.1
R-009-NP	467,261	4,856,529	392.3	33.9
R-010-NP	459,366	4,856,513	364.0	31.5
R-012-NP	465,479	4,856,414	383.2	33.6
R-013-NP	465,801	4,856,409	392.2	33.8
R-014-NP	464,044	4,856,316	378.7	32.0
R-015-NP	464,831	4,856,128	384.3	34.0
R-016-NP	470,382	4,856,046	390.0	35.0
R-018-NP	458,303	4,856,025	365.9	32.1
R-021-NP	470,436	4,855,904	389.8	35.8
R-022-NP	458,136	4,855,890	367.3	32.2
R-024-NP	459,562	4,855,803	369.2	35.1
R-026-NP	472,224	4,855,750	396.8	31.8
R-028-NP	466,119	4,855,651	392.0	37.8
R-030-NP	458,858	4,855,493	365.6	35.9
R-031-NP	465,273	4,855,428	389.0	38.8
R-032-NP	461,210	4,855,170	372.1	34.0
R-033-NP	463,607	4,855,169	384.4	34.1
R-034-P	467,901	4,855,164	388.1	41.1
R-035-P	468,978	4,855,134	387.2	41.2
R-037-P	470,970	4,855,116	389.8	43.1
R-038-NP	472,905	4,855,109	399.3	30.1
R-043-NP	469,792	4,854,953	389.2	43.1
R-044-P	465,621	4,854,894	390.9	42.6
R-045-NP	464,648	4,854,805	386.3	41.9
R-047-NP	461,221	4,854,699	373.1	35.0
R-048-NP	471,926	4,854,660	400.6	36.7
R-050-NP	471,932	4,854,594	401.0	36.6
R-051-NP	468,832	4,854,440	393.5	42.9
R-052-NP	471,847	4,854,412	396.0	37.2
R-054-NP	467,437	4,854,383	384.1	45.1
R-055-P	464,833	4,854,320	392.5	44.0

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-056-NP	458,131	4,854,313	370.2	37.9
R-057-NP	456,985	4,854,289	369.5	34.3
R-058-NP	456,672	4,854,281	366.8	33.3
R-059-NP	471,921	4,854,255	389.0	36.1
R-061-P	470,149	4,854,226	390.5	44.0
R-062-P	470,448	4,854,216	386.4	44.4
R-063-P	467,432	4,854,167	387.2	44.6
R-064-NP	458,757	4,854,132	369.2	41.3
R-066-P	470,022	4,854,132	391.9	44.7
R-067-P	460,705	4,854,056	371.6	38.2
R-068-NP	456,154	4,853,961	368.4	32.5
R-070-P	457,582	4,853,945	370.0	38.3
R-071-NP	457,476	4,853,936	369.2	37.9
R-072-NP	459,419	4,853,877	378.6	42.9
R-073-NP	471,866	4,853,848	387.1	35.0
R-078-P	468,577	4,853,582	387.8	41.1
R-081-NP	461,525	4,853,440	380.1	36.0
R-082-NP	471,958	4,853,383	396.8	32.9
R-083-NP	456,156	4,853,362	366.5	33.7
R-085-P	461,339	4,853,316	376.1	36.6
R-086-NP	461,915	4,853,205	386.5	36.1
R-087-NP	467,469	4,853,048	393.5	40.7
R-089-NP	472,047	4,852,992	388.7	31.6
R-090-NP	463,792	4,852,966	389.7	38.5
R-093-NP	457,077	4,852,799	368.7	38.9
R-094-NP	458,827	4,852,757	378.0	42.6
R-099-NP	466,640	4,852,665	396.1	40.1
R-100-NP	461,310	4,852,664	378.0	37.4
R-101-P	460,401	4,852,660	378.5	42.0
R-102-P	463,440	4,852,660	389.7	39.4
R-103-P	464,877	4,852,658	395.7	41.5
R-104-P	469,709	4,852,649	388.7	36.8
R-105-NP	465,496	4,852,635	396.5	41.9
R-106-NP	461,571	4,852,634	383.6	37.4
R-107-NP	466,357	4,852,633	395.8	40.6
R-108-NP	465,576	4,852,625	394.7	41.9
R-110-P	467,417	4,852,545	386.8	39.2
R-111-NP	468,587	4,852,537	388.8	38.4

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-112-P	465,534	4,852,533	395.6	42.6
R-113-P	464,671	4,852,529	391.4	42.1
R-114-P	467,369	4,852,501	387.9	39.3
R-118-P	463,468	4,852,275	389.2	41.8
R-121-P	469,132	4,852,136	390.4	37.6
R-122-NP	461,728	4,852,030	386.3	39.9
R-123-P	462,539	4,851,924	382.9	43.9
R-124-NP	458,413	4,851,871	380.5	42.6
R-125-P	460,414	4,851,838	375.9	38.5
R-127-NP	455,838	4,851,738	369.5	36.7
R-128-P	457,770	4,851,719	379.9	44.7
R-129-P	468,812	4,851,696	389.3	42.8
R-132-NP	461,655	4,851,552	387.1	41.9
R-135-P	458,763	4,851,467	377.4	42.1
R-136-NP	455,158	4,851,466	368.5	34.5
R-138-NP	469,680	4,851,397	391.1	34.6
R-139-NP	457,328	4,851,362	368.4	45.4
R-140-NP	456,794	4,851,323	369.2	44.1
R-141-NP	460,061	4,851,210	380.9	38.3
R-142-P	463,872	4,851,131	394.6	43.1
R-143-P	469,064	4,851,086	399.9	37.3
R-144-NP	467,096	4,851,057	394.5	41.3
R-145-P	467,924	4,851,048	391.0	39.3
R-146-NP	467,422	4,851,034	393.7	39.5
R-147-NP	464,005	4,851,034	395.5	42.5
R-148-NP	470,171	4,851,002	394.6	32.4
R-149-NP	469,898	4,850,989	389.9	33.1
R-152-NP	462,328	4,850,948	385.8	43.9
R-153-P	464,923	4,850,931	393.3	41.5
R-154-NP	469,239	4,850,862	393.0	35.3
R-155-P	459,614	4,850,833	381.4	40.1
R-156-NP	465,542	4,850,820	395.7	40.8
R-157-NP	460,425	4,850,811	380.8	38.0
R-158-P	468,022	4,850,804	390.5	38.0
R-159-P	466,167	4,850,796	396.8	41.2
R-160-P	468,541	4,850,773	391.2	37.5
R-161-P	461,395	4,850,748	384.9	39.1
R-162-P	464,614	4,850,738	395.8	40.8

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-163-NP	470,092	4,850,723	393.4	32.2
R-164-NP	458,335	4,850,683	378.2	45.5
R-165-NP	466,889	4,850,658	390.6	39.2
R-167-NP	455,863	4,850,559	372.5	40.8
R-170-NP	457,455	4,850,250	381.1	45.0
R-173-P	459,306	4,850,090	378.2	41.5
R-174-NP	467,682	4,850,042	393.3	35.8
R-175-NP	455,144	4,849,978	370.0	36.0
R-177-NP	456,729	4,849,881	379.0	44.4
R-178-NP	460,164	4,849,828	385.2	39.6
R-179-P	463,116	4,849,825	394.3	42.3
R-180-P	461,841	4,849,796	392.4	41.1
R-181-NP	462,563	4,849,723	396.0	42.1
R-182-NP	468,475	4,849,669	397.1	34.1
R-188-NP	458,746	4,849,447	384.2	41.9
R-196-NP	457,456	4,848,776	378.7	42.2
R-199-NP	456,062	4,848,677	379.2	41.5
R-217-NP	456,087	4,847,814	376.5	35.9
R-253-NP	461,112	4,849,989	382.1	39.4
R-254-NP	460,873	4,849,909	388.2	39.3
R-255-NP	460,873	4,849,951	388.3	39.2
R-256-NP	460,824	4,849,954	387.7	39.2
R-257-NP	460,717	4,849,948	387.4	39.2
R-258-NP	460,675	4,849,947	387.1	39.2
R-259-NP	460,689	4,850,008	386.5	39.0
R-260-NP	460,724	4,850,007	387.1	39.0
R-261-NP	460,753	4,850,006	387.3	39.1
R-262-NP	460,784	4,850,006	387.3	39.1
R-263-NP	460,807	4,850,006	387.4	39.1
R-264-NP	460,877	4,850,022	386.6	39.1
R-265-NP	460,903	4,850,009	386.2	39.1
R-266-NP	460,937	4,850,015	384.7	39.1
R-267-NP	460,957	4,850,014	384.2	39.2
R-268-NP	460,977	4,850,014	383.7	39.2
R-269-NP	461,012	4,849,997	383.8	39.3
R-270-NP	460,634	4,850,014	386.7	39.0
R-271-NP	460,639	4,850,059	384.5	38.9
R-272-NP	460,552	4,850,058	382.3	38.9

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-273-NP	460,554	4,850,036	383.2	39.0
R-274-NP	460,593	4,850,084	381.7	38.9
R-275-NP	460,594	4,850,059	383.3	38.9
R-276-NP	460,640	4,850,105	381.9	38.8
R-277-NP	460,642	4,850,126	381.4	38.8
R-278-NP	460,553	4,850,112	380.4	38.8
R-279-NP	460,552	4,850,157	379.6	38.7
R-280-NP	460,592	4,850,130	380.2	38.8
R-281-NP	460,592	4,850,166	379.8	38.7
R-282-NP	460,641	4,850,172	380.8	38.7
R-283-NP	460,639	4,850,152	381.0	38.7
R-284-NP	460,684	4,850,177	381.3	38.7
R-285-NP	460,721	4,850,172	382.2	38.7
R-286-NP	460,737	4,850,172	382.8	38.7
R-287-NP	460,782	4,850,112	386.4	38.9
R-288-NP	460,728	4,850,114	384.8	38.8
R-289-NP	460,713	4,850,112	384.1	38.8
R-290-NP	460,697	4,850,112	383.5	38.8
R-291-NP	460,683	4,850,112	382.9	38.8
R-292-NP	460,690	4,850,071	384.5	38.9
R-293-NP	460,723	4,850,073	385.6	38.9
R-294-NP	460,762	4,850,073	386.4	38.9
R-295-NP	460,572	4,850,217	378.0	38.6
R-296-NP	460,606	4,850,217	378.8	38.6
R-297-NP	460,694	4,850,222	380.6	38.6
R-298-NP	460,731	4,850,219	381.3	38.6
R-299-NP	460,758	4,850,218	382.0	38.7
R-300-NP	460,645	4,850,283	379.8	38.5
R-301-NP	460,645	4,850,317	380.5	38.5
R-302-NP	460,693	4,850,312	381.6	38.5
R-303-NP	460,701	4,850,286	381.5	38.5
R-304-NP	460,700	4,850,274	381.4	38.5
R-305-NP	460,646	4,850,349	381.0	38.4
R-306-NP	460,645	4,850,377	381.3	38.4
R-307-NP	460,686	4,850,379	381.1	38.4
R-308-NP	460,692	4,850,342	381.3	38.4
R-309-NP	460,729	4,850,385	380.2	38.4
R-310-NP	460,759	4,850,383	379.9	38.4

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-311-NP	460,787	4,850,383	379.7	38.4
R-312-NP	460,638	4,850,440	381.7	38.3
R-313-NP	460,829	4,850,390	379.6	38.4
R-314-NP	460,825	4,850,350	379.8	38.5
R-315-NP	460,823	4,850,330	380.4	38.5
R-316-NP	460,819	4,850,291	380.8	38.6
R-317-NP	460,826	4,850,244	382.6	38.6
R-318-NP	460,873	4,850,216	384.8	38.7
R-319-NP	460,872	4,850,251	383.5	38.7
R-320-NP	460,869	4,850,266	382.8	38.6
R-321-NP	460,865	4,850,278	382.1	38.6
R-322-NP	460,872	4,850,291	381.3	38.6
R-323-NP	460,871	4,850,323	380.9	38.6
R-324-NP	460,872	4,850,348	380.5	38.5
R-325-NP	460,870	4,850,372	380.3	38.5
R-326-NP	460,871	4,850,386	380.1	38.5
R-327-NP	460,822	4,850,430	379.2	38.4
R-328-NP	460,868	4,850,426	379.8	38.4
R-329-NP	460,911	4,850,379	380.7	38.5
R-330-NP	460,936	4,850,386	380.9	38.5
R-331-NP	460,957	4,850,386	381.2	38.5
R-332-NP	460,968	4,850,386	381.3	38.5
R-333-NP	460,886	4,850,428	379.9	38.4
R-334-NP	460,914	4,850,428	380.2	38.5
R-335-NP	460,929	4,850,427	380.6	38.5
R-336-NP	460,950	4,850,430	380.9	38.5
R-337-NP	461,005	4,850,422	381.6	38.5
R-338-NP	460,968	4,850,283	381.6	38.7
R-339-NP	460,969	4,850,254	381.9	38.7
R-340-NP	460,954	4,850,213	382.7	38.8
R-341-NP	460,919	4,850,213	384.3	38.8
R-342-NP	460,959	4,850,178	382.9	38.8
R-343-NP	460,945	4,850,171	383.3	38.8
R-344-NP	460,930	4,850,173	383.9	38.8
R-345-NP	460,914	4,850,174	384.6	38.8
R-346-NP	460,692	4,850,528	379.0	38.2
R-347-NP	460,694	4,850,573	378.4	38.2
R-348-NP	460,749	4,850,528	378.2	38.2

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-349-NP	460,788	4,850,579	378.5	38.2
R-350-NP	460,789	4,850,528	378.4	38.3
R-351-NP	460,820	4,850,578	378.6	38.2
R-352-NP	460,820	4,850,529	378.5	38.3
R-353-NP	460,875	4,850,528	379.3	38.3
R-354-NP	460,912	4,850,527	379.7	38.4
R-355-NP	460,942	4,850,574	379.2	38.3
R-356-NP	460,966	4,850,578	379.5	38.4
R-357-NP	460,959	4,850,528	379.9	38.4
R-358-NP	460,922	4,850,477	380.0	38.4
R-359-NP	460,906	4,850,477	379.9	38.4
R-360-NP	460,959	4,850,475	380.1	38.4
R-361-NP	461,080	4,850,367	382.5	38.7
R-362-NP	461,240	4,850,431	383.7	38.8
R-363-NP	461,262	4,850,431	382.8	38.8
R-364-NP	461,218	4,850,378	385.7	38.8
R-365-NP	461,254	4,850,379	383.9	38.9
R-366-NP	461,222	4,850,325	384.0	38.9
R-367-NP	461,172	4,850,336	384.9	38.8
R-368-NP	461,183	4,850,285	383.0	38.9
R-369-NP	461,138	4,850,287	382.2	38.8
R-370-NP	461,153	4,850,163	381.3	39.1
R-371-NP	461,196	4,850,166	381.6	39.1
R-372-NP	461,222	4,850,158	381.7	39.1
R-373-NP	460,510	4,855,205	377.1	36.9
R-374-NP	458,120	4,847,906	380.6	40.4

Appendix D
Layout B - Modeling Results

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-003-NP	467,274	4,856,654	385.7	33.3
R-007-NP	470,686	4,856,546	384.2	32.2
R-008-NP	468,615	4,856,533	383.8	33.1
R-009-NP	467,261	4,856,529	392.3	33.9
R-010-NP	459,366	4,856,513	364.0	31.5
R-012-NP	465,479	4,856,414	383.2	33.5
R-013-NP	465,801	4,856,409	392.2	33.8
R-014-NP	464,044	4,856,316	378.7	32.0
R-015-NP	464,831	4,856,128	384.3	34.0
R-016-NP	470,382	4,856,046	390.0	34.9
R-018-NP	458,303	4,856,025	365.9	32.1
R-021-NP	470,436	4,855,904	389.8	35.8
R-022-NP	458,136	4,855,890	367.3	32.2
R-024-NP	459,562	4,855,803	369.2	35.1
R-026-NP	472,224	4,855,750	396.8	31.7
R-028-NP	466,119	4,855,651	392.0	37.8
R-030-NP	458,858	4,855,493	365.6	35.9
R-031-NP	465,273	4,855,428	389.0	38.8
R-032-NP	461,210	4,855,170	372.1	33.9
R-033-NP	463,607	4,855,169	384.4	34.1
R-034-P	467,901	4,855,164	388.1	41.2
R-035-P	468,978	4,855,134	387.2	40.9
R-037-P	470,970	4,855,116	389.8	43.0
R-038-NP	472,905	4,855,109	399.3	30.1
R-043-NP	469,792	4,854,953	389.2	42.9
R-044-P	465,621	4,854,894	390.9	42.6
R-045-NP	464,648	4,854,805	386.3	41.8
R-047-NP	461,221	4,854,699	373.1	34.9
R-048-NP	471,926	4,854,660	400.6	36.6
R-050-NP	471,932	4,854,594	401.0	36.6
R-051-NP	468,832	4,854,440	393.5	42.9
R-052-NP	471,847	4,854,412	396.0	37.2
R-054-NP	467,437	4,854,383	384.1	45.0
R-055-P	464,833	4,854,320	392.5	44.0
R-056-NP	458,131	4,854,313	370.2	37.9

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-057-NP	456,985	4,854,289	369.5	34.3
R-058-NP	456,672	4,854,281	366.8	33.3
R-059-NP	471,921	4,854,255	389.0	36.1
R-061-P	470,149	4,854,226	390.5	44.0
R-062-P	470,448	4,854,216	386.4	44.3
R-063-P	467,432	4,854,167	387.2	44.5
R-064-NP	458,757	4,854,132	369.2	41.3
R-066-P	470,022	4,854,132	391.9	44.6
R-067-P	460,705	4,854,056	371.6	38.1
R-068-NP	456,154	4,853,961	368.4	32.5
R-070-P	457,582	4,853,945	370.0	38.3
R-071-NP	457,476	4,853,936	369.2	37.9
R-072-NP	459,419	4,853,877	378.6	42.9
R-073-NP	471,866	4,853,848	387.1	35.0
R-078-P	468,577	4,853,582	387.8	41.1
R-081-NP	461,525	4,853,440	380.1	36.0
R-082-NP	471,958	4,853,383	396.8	33.0
R-083-NP	456,156	4,853,362	366.5	33.7
R-085-P	461,339	4,853,316	376.1	36.6
R-086-NP	461,915	4,853,205	386.5	36.0
R-087-NP	467,469	4,853,048	393.5	40.7
R-089-NP	472,047	4,852,992	388.7	31.6
R-090-NP	463,792	4,852,966	389.7	38.5
R-093-NP	457,077	4,852,799	368.7	38.9
R-094-NP	458,827	4,852,757	378.0	42.6
R-099-NP	466,640	4,852,665	396.1	40.1
R-100-NP	461,310	4,852,664	378.0	37.4
R-101-P	460,401	4,852,660	378.5	42.0
R-102-P	463,440	4,852,660	389.7	39.4
R-103-P	464,877	4,852,658	395.7	41.5
R-104-P	469,709	4,852,649	388.7	36.8
R-105-NP	465,496	4,852,635	396.5	41.9
R-106-NP	461,571	4,852,634	383.6	37.3
R-107-NP	466,357	4,852,633	395.8	40.6
R-108-NP	465,576	4,852,625	394.7	41.9
R-110-P	467,417	4,852,545	386.8	39.2
R-111-NP	468,587	4,852,537	388.8	38.4
R-112-P	465,534	4,852,533	395.6	42.5

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-113-P	464,671	4,852,529	391.4	42.1
R-114-P	467,369	4,852,501	387.9	39.3
R-118-P	463,468	4,852,275	389.2	41.8
R-121-P	469,132	4,852,136	390.4	37.6
R-122-NP	461,728	4,852,030	386.3	39.9
R-123-P	462,539	4,851,924	382.9	43.9
R-124-NP	458,413	4,851,871	380.5	42.5
R-125-P	460,414	4,851,838	375.9	38.5
R-127-NP	455,838	4,851,738	369.5	36.6
R-128-P	457,770	4,851,719	379.9	44.7
R-129-P	468,812	4,851,696	389.3	42.8
R-132-NP	461,655	4,851,552	387.1	41.9
R-135-P	458,763	4,851,467	377.4	42.1
R-136-NP	455,158	4,851,466	368.5	34.5
R-138-NP	469,680	4,851,397	391.1	34.6
R-139-NP	457,328	4,851,362	368.4	45.4
R-140-NP	456,794	4,851,323	369.2	44.1
R-141-NP	460,061	4,851,210	380.9	38.3
R-142-P	463,872	4,851,131	394.6	43.1
R-143-P	469,064	4,851,086	399.9	37.2
R-144-NP	467,096	4,851,057	394.5	41.3
R-145-P	467,924	4,851,048	391.0	39.3
R-146-NP	467,422	4,851,034	393.7	39.5
R-147-NP	464,005	4,851,034	395.5	42.4
R-148-NP	470,171	4,851,002	394.6	32.3
R-149-NP	469,898	4,850,989	389.9	33.1
R-152-NP	462,328	4,850,948	385.8	43.8
R-153-P	464,923	4,850,931	393.3	41.5
R-154-NP	469,239	4,850,862	393.0	35.3
R-155-P	459,614	4,850,833	381.4	40.1
R-156-NP	465,542	4,850,820	395.7	40.8
R-157-NP	460,425	4,850,811	380.8	38.0
R-158-P	468,022	4,850,804	390.5	38.0
R-159-P	466,167	4,850,796	396.8	41.2
R-160-P	468,541	4,850,773	391.2	37.5
R-161-P	461,395	4,850,748	384.9	39.1
R-162-P	464,614	4,850,738	395.8	40.8
R-163-NP	470,092	4,850,723	393.4	32.2

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-164-NP	458,335	4,850,683	378.2	45.4
R-165-NP	466,889	4,850,658	390.6	39.2
R-167-NP	455,863	4,850,559	372.5	40.7
R-170-NP	457,455	4,850,250	381.1	45.0
R-173-P	459,306	4,850,090	378.2	41.5
R-174-NP	467,682	4,850,042	393.3	35.8
R-175-NP	455,144	4,849,978	370.0	36.0
R-177-NP	456,729	4,849,881	379.0	44.5
R-178-NP	460,164	4,849,828	385.2	39.5
R-179-P	463,116	4,849,825	394.3	42.2
R-180-P	461,841	4,849,796	392.4	41.1
R-181-NP	462,563	4,849,723	396.0	42.1
R-182-NP	468,475	4,849,669	397.1	34.1
R-188-NP	458,746	4,849,447	384.2	41.9
R-196-NP	457,456	4,848,776	378.7	42.2
R-199-NP	456,062	4,848,677	379.2	41.5
R-217-NP	456,087	4,847,814	376.5	35.9
R-253-NP	461,112	4,849,989	382.1	39.4
R-254-NP	460,873	4,849,909	388.2	39.3
R-255-NP	460,873	4,849,951	388.3	39.2
R-256-NP	460,824	4,849,954	387.7	39.2
R-257-NP	460,717	4,849,948	387.4	39.2
R-258-NP	460,675	4,849,947	387.1	39.2
R-259-NP	460,689	4,850,008	386.5	39.0
R-260-NP	460,724	4,850,007	387.1	39.0
R-261-NP	460,753	4,850,006	387.3	39.1
R-262-NP	460,784	4,850,006	387.3	39.1
R-263-NP	460,807	4,850,006	387.4	39.1
R-264-NP	460,877	4,850,022	386.6	39.1
R-265-NP	460,903	4,850,009	386.2	39.1
R-266-NP	460,937	4,850,015	384.7	39.1
R-267-NP	460,957	4,850,014	384.2	39.2
R-268-NP	460,977	4,850,014	383.7	39.2
R-269-NP	461,012	4,849,997	383.8	39.2
R-270-NP	460,634	4,850,014	386.7	39.0
R-271-NP	460,639	4,850,059	384.5	38.9
R-272-NP	460,552	4,850,058	382.3	38.9
R-273-NP	460,554	4,850,036	383.2	38.9

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-274-NP	460,593	4,850,084	381.7	38.9
R-275-NP	460,594	4,850,059	383.3	38.9
R-276-NP	460,640	4,850,105	381.9	38.8
R-277-NP	460,642	4,850,126	381.4	38.8
R-278-NP	460,553	4,850,112	380.4	38.8
R-279-NP	460,552	4,850,157	379.6	38.7
R-280-NP	460,592	4,850,130	380.2	38.8
R-281-NP	460,592	4,850,166	379.8	38.7
R-282-NP	460,641	4,850,172	380.8	38.7
R-283-NP	460,639	4,850,152	381.0	38.7
R-284-NP	460,684	4,850,177	381.3	38.7
R-285-NP	460,721	4,850,172	382.2	38.7
R-286-NP	460,737	4,850,172	382.8	38.7
R-287-NP	460,782	4,850,112	386.4	38.8
R-288-NP	460,728	4,850,114	384.8	38.8
R-289-NP	460,713	4,850,112	384.1	38.8
R-290-NP	460,697	4,850,112	383.5	38.8
R-291-NP	460,683	4,850,112	382.9	38.8
R-292-NP	460,690	4,850,071	384.5	38.9
R-293-NP	460,723	4,850,073	385.6	38.9
R-294-NP	460,762	4,850,073	386.4	38.9
R-295-NP	460,572	4,850,217	378.0	38.6
R-296-NP	460,606	4,850,217	378.8	38.6
R-297-NP	460,694	4,850,222	380.6	38.6
R-298-NP	460,731	4,850,219	381.3	38.6
R-299-NP	460,758	4,850,218	382.0	38.6
R-300-NP	460,645	4,850,283	379.8	38.5
R-301-NP	460,645	4,850,317	380.5	38.5
R-302-NP	460,693	4,850,312	381.6	38.5
R-303-NP	460,701	4,850,286	381.5	38.5
R-304-NP	460,700	4,850,274	381.4	38.5
R-305-NP	460,646	4,850,349	381.0	38.4
R-306-NP	460,645	4,850,377	381.3	38.4
R-307-NP	460,686	4,850,379	381.1	38.4
R-308-NP	460,692	4,850,342	381.3	38.4
R-309-NP	460,729	4,850,385	380.2	38.4
R-310-NP	460,759	4,850,383	379.9	38.4
R-311-NP	460,787	4,850,383	379.7	38.4

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-312-NP	460,638	4,850,440	381.7	38.3
R-313-NP	460,829	4,850,390	379.6	38.4
R-314-NP	460,825	4,850,350	379.8	38.5
R-315-NP	460,823	4,850,330	380.4	38.5
R-316-NP	460,819	4,850,291	380.8	38.6
R-317-NP	460,826	4,850,244	382.6	38.6
R-318-NP	460,873	4,850,216	384.8	38.7
R-319-NP	460,872	4,850,251	383.5	38.7
R-320-NP	460,869	4,850,266	382.8	38.6
R-321-NP	460,865	4,850,278	382.1	38.6
R-322-NP	460,872	4,850,291	381.3	38.6
R-323-NP	460,871	4,850,323	380.9	38.5
R-324-NP	460,872	4,850,348	380.5	38.5
R-325-NP	460,870	4,850,372	380.3	38.5
R-326-NP	460,871	4,850,386	380.1	38.5
R-327-NP	460,822	4,850,430	379.2	38.4
R-328-NP	460,868	4,850,426	379.8	38.4
R-329-NP	460,911	4,850,379	380.7	38.5
R-330-NP	460,936	4,850,386	380.9	38.5
R-331-NP	460,957	4,850,386	381.2	38.5
R-332-NP	460,968	4,850,386	381.3	38.5
R-333-NP	460,886	4,850,428	379.9	38.4
R-334-NP	460,914	4,850,428	380.2	38.4
R-335-NP	460,929	4,850,427	380.6	38.5
R-336-NP	460,950	4,850,430	380.9	38.5
R-337-NP	461,005	4,850,422	381.6	38.5
R-338-NP	460,968	4,850,283	381.6	38.7
R-339-NP	460,969	4,850,254	381.9	38.7
R-340-NP	460,954	4,850,213	382.7	38.8
R-341-NP	460,919	4,850,213	384.3	38.7
R-342-NP	460,959	4,850,178	382.9	38.8
R-343-NP	460,945	4,850,171	383.3	38.8
R-344-NP	460,930	4,850,173	383.9	38.8
R-345-NP	460,914	4,850,174	384.6	38.8
R-346-NP	460,692	4,850,528	379.0	38.2
R-347-NP	460,694	4,850,573	378.4	38.2
R-348-NP	460,749	4,850,528	378.2	38.2
R-349-NP	460,788	4,850,579	378.5	38.2

Receptor ID	Easting (m)	Northing (m)	Elevation AMSL (m)	Predicted noise level of hypothetical 38-turbine layout (dBA)
R-350-NP	460,789	4,850,528	378.4	38.3
R-351-NP	460,820	4,850,578	378.6	38.2
R-352-NP	460,820	4,850,529	378.5	38.3
R-353-NP	460,875	4,850,528	379.3	38.3
R-354-NP	460,912	4,850,527	379.7	38.3
R-355-NP	460,942	4,850,574	379.2	38.3
R-356-NP	460,966	4,850,578	379.5	38.3
R-357-NP	460,959	4,850,528	379.9	38.4
R-358-NP	460,922	4,850,477	380.0	38.4
R-359-NP	460,906	4,850,477	379.9	38.4
R-360-NP	460,959	4,850,475	380.1	38.4
R-361-NP	461,080	4,850,367	382.5	38.7
R-362-NP	461,240	4,850,431	383.7	38.8
R-363-NP	461,262	4,850,431	382.8	38.8
R-364-NP	461,218	4,850,378	385.7	38.8
R-365-NP	461,254	4,850,379	383.9	38.9
R-366-NP	461,222	4,850,325	384.0	38.9
R-367-NP	461,172	4,850,336	384.9	38.8
R-368-NP	461,183	4,850,285	383.0	38.9
R-369-NP	461,138	4,850,287	382.2	38.8
R-370-NP	461,153	4,850,163	381.3	39.0
R-371-NP	461,196	4,850,166	381.6	39.1
R-372-NP	461,222	4,850,158	381.7	39.1
R-373-NP	460,510	4,855,205	377.1	36.8
R-374-NP	458,120	4,847,906	380.6	40.4